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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 23.501 [3], 3GPP TS 23.502 [2], 3GPP TS 23.316 [28], 3GPP TS 23.288 [29], 3GPP TS 23.273 [36], 3GPP TS 23.548 [42], 3GPP TS 23.247 [53], 3GPP TS 23.503 [70], 3GPP TS 33.501 [6], 3GPP TS 33.535 [37], 3GPP TS 33.558 [56], 3GPP TS 26.531 [59], 3GPP TS 26.532 [60] and 3GPP TS 26.502 [65].

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) and Short Message Services (SMS); 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".
- [68] 3GPP TS 29.543: "5G System; Data Transfer Policy Control Services; Stage 3".
- [69] 3GPP TS 24.578: "Aircraft-to-Everything (A2X) services in 5G System (5GS); UE policies".
- [70] 3GPP TS 23.503: "Policy and Charging Control Framework for the 5G System; Stage 2".
- [71] 3GPP TS 26.517: "5G Multicast-Broadcast User Services; Protocols and Formats".
- [72] 3GPP TS 24.514: "Ranging based services and sidelink positioning in 5G system(5GS); Stage 3".
- [73] 3GPP TS 29.591: "5G System; Network Exposure Function Southbound Services; Stage 3".
- [74] 3GPP TS 26.522: "5G Real-time Media Transport Protocol Configurations".

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.

For the purposes of the present document, the following terms and definitions given in 3GPP TS 23.503 [70], subclause 3.1 apply:

VPLMN specific URSP rules

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
A2X	Aircraft-to-Everything
AAAnF	AKMA Anchor Function
ACS	Auto-Configuration Server
AI/ML	Artificial Intelligence/Machine Learning
AF	Application Function
AKMA	Authentication and Key Management for Applications
AM	Access and Mobility management
ASTI	Access Stratum Time distribution
BAT	Burst Arrival Time
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
EHE	Edge Hosting Environment
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
MCC	Mobile Country Code
MNC	Mobile Network Code
MO-LR	Mobile Originated Location Request
NAT	Network Address Translation
NAPT	Network Address Port Translation
NEF	Network Exposure Function
NSAC	Network Slice Admission Control
NSACF	Network Slice Admission Control Function
PCF	Policy Control Function
PEGC	PIN Element with Gateway Capability
PCRF	Policy and Charging Rule Function
PDTQ	Planned Data Transfer with QoS requirements
PF	Packet Flow Description
PFDF	Packet Flow Description Function
PIN	Personal IoT Network
REST	Representational State Transfer
SCEF	Service Capability Exposure Function
SFC	Service Function Chain
S-NSSAI	Single Network Slice Selection Assistance Information
SSM	Source Specific IP Multicast address
TAI	Traffic Area Identity
TMGI	Temporary Mobile Group Identity
TNAP	Trusted Network Access Point
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

UPF	User Plane Function
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, ECS address provisioning, Slice Parameters Provisioning and DNN and S-NSSAI specific Group Parameters provisioning.
- 5) Procedures for PFD Management.
- 6) Procedures for Traffic Influence.
- 7) Procedures for changing the chargeable party at session set up or during the session.
- 8) Procedures for AF 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.
- 31) Procedures for MBS Group Message Delivery management.
- 32) Procedures for DNAI mapping.
- 33) Procedures for negotiation of Planned Data Transfer with QoS requirements.
- 34) Procedures for Member UE Slection Assistance.
- 37) Procedures for UE Address retrieval.
- 38) Procedures for ECS Address configuration in roaming.

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 and Nnef_AF_Request_for_QoS service.
- 9) Nnef_MSISDN-less_MO_SMS service.
- 10) Nnef_NIDDConfiguration and Nnef_NIDD services.
- 11) Nnef_AnalyticsExposure service.
- 12) Nnef_ApplyPolicy service.
- 13) Nnef_ECRestriction service.
- 14) Nnef_IPTVConfiguration service.
- 15) Nnef_ServiceParameter service.
- 16) Nnef_UCMFP provisioning service.
- 17) Nnef_Location service.
- 18) Nnef_AKMA service.

- 19) Nnef_AMInfluence service.
- 20) Nnef_AMPolicyAuthorization service.
- 21) Nnef_TimeSynchronization and Nnef_ASTI services.
- 22) Nnef_EASDeployment service.
- 23) Nnef_MBSTMGI service.
- 24) Nnef_MBSSession service.
- 25) Nnef_DataReporting service.
- 26) Nnef_DataReportingProvisioning service.
- 27) Nnef_UEId service.
- 28) Nnef_MSEventExposure service.
- 29) Nnef_MBSUserService service.
- 30) Nnef_MBSUserDataIngestSession service.
- 31) Nnef_MBSGroupMsgDelivery service.
- 32) Nnef_DNAIMapping service.
- 33) Nnef_PDTQPolicyNegotiation service.
- 34) Nnef_MemberUESelectionAssistance service.
- 37) Nnef_UEAddress service.
- 38) Nnef_ECSAddress service.

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

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

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

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

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".

NOTE 6: The stage 2 Nnef_AF_request_for_QoS API is defined by reusing the Nnef_AFsessionWithQoS API with the "GMEC_5G" feature.

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.

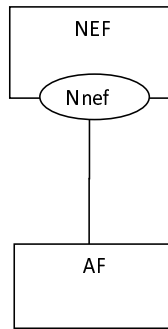


Figure 4.2-1: Reference Architecture for the Nnef Service; SBI representation

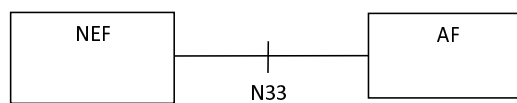


Figure 4.2-2: Reference Architecture for the Nnef Service; reference point representation

4.3 Functional elements

4.3.1 NEF

The Network Exposure Function (NEF) is a functional element that supports the related stage 2 functional requirements defined in the technical specifications listed in clause 1 and that are implemented via the procedures specified in clause 4.4. A specific NEF instance may support one or more of these functionalities, and consequently, an individual NEF may support one, several or all of the APIs specified for capability exposure.

In addition, the NEF shall also:

- securely expose network capabilities and events provided by 3GPP NFs to AF;
- provide means for the AF to securely provide information to 3GPP network and may authenticate, authorize and assist in throttling the AF;
- be able to translate the information received from the AF to the one sent to internal 3GPP NFs, and vice versa; and
- support to expose information (collected from other 3GPP NFs) to the AF.

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 and provisions for event monitoring defined 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 the 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 apply to the change of SUPI-PEI association monitoring event;
- when the "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 event monitoring using the 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 an 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, 8 if the UE is purged or 9 if the UE's Unavailability Period Duration is available and the "Loss_of_connectivity_notification_5G" feature as defined in clause 5.3.4 of 3GPP TS 29.122 [4] is supported;
- 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", "Number_of_UEs_in_an_area_notification_5G" and "NSAC" features in the NEF;
- if the "locationType" attribute sets to "LAST_KNOWN_LOCATION", the "maximumNumberOfReports" attribute shall set to 1 as a One-time Monitoring Request;
- description about the PDN connectivity status event apply 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" defined in clause 5.3.3.3 of 3GPP TS 29.122 [4] for updating the subscription as follows:
 - 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 an 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 an subscription or send an HTTP PUT message to the NEF to the resource "Individual Monitoring Event Subscription" defined in clause 5.3.3.3 of 3GPP TS 29.122 [4] for updating the subscription as follows:
 - 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. If the "eLCS_en" feature is also supported, the AF may include the "upLocRepIndAf" attribute to indicate whether or not location reporting over user plane is required, and may also include the

- "upLocRepAddrAf" attribute to convey the AF's addressing information for location reporting over user plane;
- 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];
 - 5) 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]; and
 - 6) 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;
- 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; and
- 7) 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 to create a subscription, as defined in clause 5.3.3.2.3.4 of 3GPP TS 29.122 [4], or send an HTTP PUT message to the NEF to the "Individual Monitoring Event Subscription" resource to update an existing subscription defined in clause 5.3.3.3.2 of 3GPP TS 29.122 [4] as follows:
 - A) within the MonitoringEventSubscription data structure:
 - a) either the concerned network slice identified by the "snsai" 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 either "NUM_OF_REGD_UES" or "NUM_OF_ESTD_PDU_SESSIONS";
 - 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];
 - 3) 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);

NOTE 1: There can be a single or multiple NSACF(s) deployed in a network as specified in clause 5.15.11 of 3GPP TS 23.501 [3]. Whether the NEF needs to interact with one or multiple NSACF(s) to establish and manage network slice status reporting depends on the deployed NSAC architecture option (cf. clause 4.15.3.2.10 of 3GPP TS 23.502 [2] and clause 5.15.11 of 3GPP TS 23.501 [3]).

NOTE 2: If multiple NSACFs need to be contacted by the NEF to establish and manage network slice status reporting 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).

- 4) after receiving a successful response from the NSACF(s), the NEF shall:
 - 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";
 - B) for the HTTP PUT request, respond to the AF with a "200 OK" status code as defined in clause 5.3.3.3.3.2 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 3: 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 4: 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.

- 5) 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 defined in clause 5.3.3A.2.3 of 3GPP TS 29.122 [4] as follows:
 - 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:
 - i) 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 if "eNSAC" feature is also supported, the current number of UEs with at least one PDU session/PDN connection, or the current number of established PDU Sessions, for the network slice identified by the "snsai" 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 if "eNSAC" feature is also supported, the current number of UEs with at least one PDU session/PDN connection, or the current number of established PDU Sessions for the network slice identified by the "snsai" attribute provided during the subscription creation/update;

NOTE 5: The handling of threshold-based notifications is described in clause 4.15.3.2.10 of 3GPP TS 23.502 [2].

NOTE 6: 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).

and

- 6) 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];
- if the "enNB1_5G" feature as defined in clause 5.3.4 of 3GPP TS 29.122 [4] is supported, the AF may require immediate reporting of the subscribed event(s) current available information with the "immediateRep" attribute set to "true", then if the NEF receives the current subscribed available event(s), shall include the "monitoringEventReport" attribute and/or "addnMonEventReports" attribute, if the "enNB" feature is supported, within the `MonitoringEventSubscription` data type in the subscription response;
- 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 for AF specific UE ID retrieval 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 for AF specific UE ID retrieval 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 7: 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.

- if the "GMEC" feature defined in clause 5.3.4 of 3GPP TS 29.122 [4] is supported, in order to support group status change reporting (e.g. the group member list is updated to add new group member(s) or remove existing group member(s)):
 - the AF shall send an HTTP POST request to the NEF targeting the "Monitoring Event Subscriptions" resource defined in clause 5.3.3.2.3.4 of 3GPP TS 29.122 [4] to request the creation of a subscription as follows:
 - within the MonitoringEventSubscription data structure:
 - the external group identifier shall be provided within the "externalGroupId" to identify the targeted group (e.g. 5G VN group); and
 - the value of the "monitoringType" attribute shall be set to "GROUP_MEMBER_LIST_CHANGE" to indicate that the AF requests to be notified of the Group Members List changes event reporting;
 - the AF may also update/modify an existing subscription to add group status change reporting event(s) to the list of monitored event(s) or update/modify its properties by sending an HTTP PUT/PATCH request to the NEF targeting the corresponding "Individual Monitoring Event Subscription" resource, as defined in clause 5.3.3.3.2/5.3.3.3.3 of 3GPP TS 29.122 [4], including the above mentioned attributes when relevant;
 - the NEF shall then further interact with the UDM to create or update the associated subscription(s) to notifications by invoking the relevant service operations of the Nudm_EventExposure API as specified in 3GPP TS 29.503 [17];
 - upon reception of a successful response from the UDM, the NEF shall respond to the AF as defined in clause 5.3.3.2.3.4, 5.3.3.3.2 or 5.3.3.3.3 of 3GPP TS 29.122 [4];
 - when the NEF receives Group Members List changes event report(s) from the UDM as defined in 3GPP TS 29.503 [17], the NEF shall notify the AF by sending an HTTP POST request message as defined in clause 5.3.3A.2.3 of 3GPP TS 29.122 [4] as follows:
 - within an array element of the "monitoringEventReports" attribute (encoded via the MonitoringEventReport data structure) of the MonitoringNotification data type:
 - the "monitoringType" attribute shall be set to "GROUP_MEMBER_LIST_CHANGE" (i.e. the same value received during the HTTP POST or PUT/PATCH request that created or updated/modified the subscription); and
 - the information on the change(s) to the group member list shall be provided within the "groupMembListChanges" attribute;

and

- in order to unsubscribe from group status events reporting:
 - if the AF subscribed to other monitoring event(s) in addition to group status change reporting event(s), the AF shall update/modify the corresponding subscription to remove the group status change reporting event(s) from the list of monitoring event(s);
 - if the AF subscribed only to group status change reporting event(s) or the AF desires to unsubscribe from all the monitoring event(s) that it has subscribed to via this monitoring event subscription, then:

- the AF shall send an HTTP DELETE request message to the NEF targeting the corresponding "Individual Monitoring Event Subscription" resource, as defined in clause 5.3.3.3.3.5 of 3GPP TS 29.122 [4], to request the deletion of the related existing subscription;
- for the group status change reporting event(s), the NEF shall then interact with the UDM to request the deletion of the associated subscription(s) by invoking the relevant service operation of the Nudm_EventExposure API as specified in 3GPP TS 29.503 [17]; and
- upon reception of a successful response from the UDM, the NEF shall delete the targeted subscription and respond to the AF as defined in clause 5.3.3.3.3.5 of 3GPP TS 29.122 [4];

and

- if the "AppDetection_5G" feature defined in clause 5.3.4 of 3GPP TS 29.122 [4] is supported, in order to support AF request for Application traffic detection (Start/Stop) monitoring event notification, the AF shall send an HTTP POST request to the NEF targeting the "Monitoring Event Subscriptions" resource (defined in clause 5.3.3.2.3.4 of 3GPP TS 29.122 [4]) to request the creation of 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 as follows:
 - 1) targeting any UE application traffic associated with the S-NSSAI indicated by the "snssai" attribute and the DNN indicated by the "dnn" attribute for the application(s) identified by the "appIds" attribute in the MonitoringEventSubscription data type setting the monitoring type as "APPLICATION_START" and "APPLICATION_STOP";
 - 2) 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 for Application detection 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;
 - 3) upon successful AF authorization, the NEF shall subscribe for the Application traffic detection (start/stop) event with the individual PCF(s) (locally configured at the NEF for the authorized DNN/S-NSSAI) using the Npcf_EventExposure_Subscribe service as described in clause 4.2.2.2 of 3GPP TS 29.523 [22]; and
 - 4) when the NEF receives an event notification from the PCF via Npcf_EventExposure service as described in clause 4.2.4 of 3GPP TS 29.523 [22] indicating that the subscribed event has been detected, then the NEF shall provide a notification by sending an HTTP POST message to the AF.

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];

NOTE: When the AF sends a PUT request to the NEF to update BDT negotiation data different from selecting a transfer policy and/or toggling BDT warning notifications, the NEF can delete the existing resource and create a new one with the required values at the PCF using the Npcf_BDTPolicyControl service. When the AF contacts NEF to select a transfer policy and/or to enable/disable BDT warning notifications, the NEF will initiate a PATCH request for BDT negotiation data on Npcf_BDTPolicyControl service.

- 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.
- if the "AspId_5G" feature is supported, the AF may include an ASP Identifier within the "aspId" attribute in the Bdt data type. If the "aspId" attribute is included, the NEF shall not map the AF Identifier to ASP Identifier.

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;
- if the "AppExpUeBehaviour" feature as defined in clause 5.10.4 of 3GPP TS 29.122 [4] is supported, the Application-Specific Expected UE Behaviour parameters within the "appExpUeBehvs" attribute may also be included in the HTTP POST/PUT request; 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 for AF specific UE ID retrieval 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 for AF specific UE ID retrieval 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 1: 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.

NOTE 2: When multiple AF parameter provisioning requests with different values of the same Expected UE Behavior parameters are received from different AFs, the network behavior is unspecified.

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.
- The NEF (PFDF) may interact with the NWDAF to retrieve the PFD Determination analytics to assist the determination of PFDs for known application identifiers by using Nnwdaf_EventsSubscription service as defined in 3GPP TS 29.520 [27]. The PFD information for which the source NF type is equal to "NWDAF" shall not be exposed to the AF unless based on local configuration and with related SLA between the operator and the ASP.
- 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 to provide the information of application function influence on traffic routing and/or N6-LAN service function chaining(s), the AF shall send an HTTP POST message to the NEF to the resource "Traffic Influence Subscription", with the request body including the TrafficInfluSub data structure as specified in clause 5.4.3.3.2.

If the feature "CommonEASDNAI" is supported, the AF may include the "tfcCorreInfo" attribute within the "TrafficInfluSub" data type. Within the "TrafficCorrelationInfo" data type, AF may include the "COMMON_DNAI" within the "corrType" attribute to indicate that the traffic of the set of UEs associated with the same traffic correlation Id accessing the application identified by an Application Identifier or traffic filtering information should target the EAS(es) corresponding to a common DNAI from the list of DNAI(s) or include the "COMMON_EAS" within the "corrType" attribute to indicate that the traffic of the set of UEs associated with the same traffic correlation Id accessing the application identified by an Application Identifier or traffic filtering information should target a common EAS. In the case of common EAS within the "TrafficCorrelationInfo" data type, the AF shall additionally include the common EAS address(es) within the "comEasIpv4Addr" attribute and/or "comEasIpv6Addr" attribute and/or the FQDN range corresponding to the application within the "fqdnRange" attribute. When the NEF receives traffic correlation notification from the SMF, if the NEF determines that there is currently no common EAS IP address and/or common DNAI available for the set of UEs identified by the Traffic Correlation ID or it determines that the common EAS or common DNAI needs to be re-selected, it selects a common DNAI and/or common EAS using the list of DNAI(s), EAS IP address and number of PDU sessions each SMF is serving for the set of UEs received in traffic correlation notification from the SMF. Then the NEF shall update the traffic influence data in UDR with the 5GC determined common EAS/DNAI for the set of UEs by invoking the Nudr_DataRepository service as described in 3GPP TS 29.504 [20] and 3GPP TS 29.519 [23] and then responds by acknowledging the notification to the SMF.

NOTE 1: Common EAS selection means the common DNAI is selected.

In order to update an existing traffic influence subscription, the AF shall send an HTTP PUT message to the resource "Individual Traffic Influence Subscription", with the request body including the TrafficInfluSub data structure as specified in clause 5.4.3.3.2 requesting to update the traffic influence parameters.

In order to modify an existing traffic influence subscription, the AF shall send an HTTP PATCH message to the resource "Individual Traffic Influence Subscription", with the request body including the TrafficInfluSubPatch data structure as specified in clause 5.4.3.3.3 requesting to modify 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 POST request, 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 2: 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, if the NEF supports HR-SBO scenarios, it may determine whether the PDU session is in HR-SBO mode as described in clause 4.4.7.5.

If the NEF deduces that the PDU session is not working in HR-SBO mode, the procedure in this clause applies. Otherwise, the procedure described in clause 4.4.7.5 shall be performed instead.

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, with the response body including a representation of the created "Individual Traffic Influence Subscription" resource within the TrafficInfluSub data structure. The AF shall use the URI received in the Location header in subsequent requests to the NEF to refer to this traffic influence subscription;
- for the HTTP PUT or PATCH request, update a resource "Individual Traffic Influence Subscription" which represents the traffic influence subscription, and shall responds to the AF with a "200 OK" status code with the "TrafficInfluSub" data structure as response body containing the representation of the modified "Individual Traffic Influence Subscription", or an HTTP "204 No Content" response; 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 responds 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, one or more groups of UEs or any UE.

If HR-SBO scenarios are supported by the NEF, it may determine whether the PDU session is in HR-SBO mode as described in clause 4.4.7.5.

If the NEF deduces that the PDU session is not working in HR-SBO mode, the procedure in this clause applies. Otherwise, the procedure described in clause 4.4.7.5 shall be performed instead.

For an individual UE identified by GPSI, or one or more groups 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.

When the feature FinerGranUEs is supported, the NEF may map the External Subscriber Category(ies) and any UE indicator, or External Subscriber Category(ies) and External Group Identifier(s) to Internal Group Identifier(s) or Internal Group Identifier(s) and Subscriber Category(ies).

NOTE: As a user can be associated with multiple Subscriber Category(ies), some values of Subscriber Category(ies) can correspond to an SLA between an application provider represented by an AF and the 5GC operator. The combination of application identifier and External Subscriber Category can also be used to refer to this SLA.

The NEF shall interact with the UDR to store the traffic influence parameters received from the AF, updated as required and mapped as applicable 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 with the response body including a representation of the created "Individual Traffic Influence Subscription" resource within the TrafficInfluSub data structure. The AF shall use the URI received in the Location header in subsequent requests to the NEF to refer to this traffic influence subscription;
- for the HTTP PUT or PATCH request, update a resource "Individual Traffic Influence Subscription" which represents the traffic influence subscription, and shall responds to the AF with a "200 OK" status code with the "TrafficInfluSub" data structure as response body containing the representation of the modified "Individual Traffic Influence Subscription", or an HTTP "204 No Content" response; and
- for the HTTP DELETE request, delete the corresponding active resource "Individual Traffic Influence Subscription" which represents the traffic influence subscription, and shall responds to the AF with a "204 No Content" status code.

4.4.7.4 Handling of UP path management event notification

If the NEF receives a UP path management event notification from the SMF indicating that the subscribed event has been detected, then the NEF shall provide a notification by sending an HTTP POST message that shall include the EventNotification data type at least with the subscribed event (e.g. UP Path has changed) to the AF identified by the notification destination received during creation 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].

4.4.7.5 Processing AF requests to influence traffic routing for HR-SBO session

If HR-SBO scenarios are supported by the NEF, upon receiving the AF request, it shall determine whether the PDU session is working in HR-SBO mode based on the availability of the information provided by the AF as follows:

If the AF supports the "HR-SBO" feature and includes the "plmnId" attribute within the TrafficInfluSub data type, the NEF shall determine that the PDU session is working in HR-SBO mode when the PLMN of the UE is not the PLMN that the NEF belongs to.

If the NEF was not able to deduce the PLMN of the UE based on the "plmnId", the NEF shall deduce if the PDU session is working in HR-SBO mode based on the target UE information as follows:

1. If the "gpsi" attribute is received and the HPLMN of the UE is part of it, the NEF determines the HPLMN of the UE (and thus whether HR-SBO applies) from it, based on the received GPSI.
2. If the "anyUeInd" attribute is received, the NEF determines based on configuration if the PDU Session is working in HR-SBO mode.
3. If the UE address is received as part of "ipv6Addr" or "ipv4Addr" attribute and it corresponds to a private IP address, the NEF determines the HPLMN of the UE and thus whether HR-SBO applies based on configuration.
4. If the UE address is received as part of "ipv6Addr" or "ipv4Addr" attribute and it corresponds to a public IP address:
 - if this public address belongs to a range NOT owned by the PLMN of the NEF, then the NEF shall obtain the HPLMN of the UE (and thus whether HR-SBO applies) based on local configuration for that range;
 - otherwise, if the UE IP Address in the AF request is an IP address NATed by the PLMN that the NEF belongs to), the NEF shall deduce the PDU session is working in HR-SBO by interacting with the UPF.

NOTE 1: In this release, the HPLMN allows HR-SBO for a PDU session only if the UE IP address of the PDU Session has not been allocated in a range that may overlap with other PDU sessions to the same DNN and S-NSSAI of that HPLMN.

NOTE 2: It is assumed that the NEF is configured with the NATed IP range of its own PLMN. It is assumed that the NEF is configured based on HR-SBO roaming agreements for the DNN/S-NSSAI with the association of Public IP address ranges with an HPLMN ID, a DNN/S-NSSAI.

NOTE 3 This procedure is not supported if the AF request targets includes "externalGroupId", "externalGroupIds" or "extSubscats" attributes within the TrafficInfluSub data type.

Editor's Note: The details on how to use the received target UE information, DNN/S-NSSAI, and port information, how to interact with the HPLMN and/or the UPF, how to deduce the valid IP address, DNN and S-NSSAI information, and how to use those in the procedures (e.g. interaction with the V-UDR) requires further stage 2 work.

The NEF shall derive the information to be stored in the UDR.

Editor's Note: It is FFS how the NEF derives the required UE identity information to be stored in the UDR.

After having performed the necessary mappings as described above, the NEF shall interact with the UDR to store the traffic influence parameters 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 responds to the AF with a 200 OK status code with the "TrafficInfluSub" data structure as response body containing the representation of the modified "Individual Traffic Influence Subscription", or an HTTP "204 No Content" response; and
- for the HTTP DELETE request, delete the corresponding active resource "Individual Traffic Influence Subscription" which represents the traffic influence subscription, and shall responds to the AF with a 204 No Content status code.

4.4.8 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 shall reuse the procedures and provisions defined 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 "snssai" attribute;
- if the EthChgParty_5G feature defined in clause 5.5.4 of 3GPP TS 29.122 [4] is supported and the request is for an Ethernet UE:
 - in the HTTP POST request:
 - the AF shall include the UE MAC address within the "macAddr" attribute instead of the UE IP address; and
 - instead of the IP Flow description:
 - if the AppId feature defined in clause 5.5.4 of 3GPP TS 29.122 [4] is not supported, the AF shall include the Ethernet Flow description within the "ethFlowInfo" attribute;
 - otherwise, the AF shall include either the External Application Identifier, within the "exterAppId" attribute, or the Ethernet Flow description, within the "ethFlowInfo" attribute;

and

- 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 the BSF by using the Nbsf_Management_Discovery service (as defined in 3GPP TS 29.521 [9]) to retrieve the PCF addressing information;
- the NEF shall interact with the PCF by using the Npcf_PolicyAuthorization service as defined in 3GPP TS 29.514 [7]; and
- if the ToSTC_5G feature defined in clause 5.5.4 of 3GPP TS 29.122 [4] is supported:
 - in the HTTP POST request, the AF may include the "tosTC" attribute within the "flowInfo" attribute; and
 - in the HTTP PATCH request, the AF may include the "tosTC" attribute within the "flowInfo" attribute.

4.4.9 Procedures for AF required QoS

4.4.9.1 General

The following procedures are used for AF required QoS in 5GS:

- Setting up an AF session with required QoS in 5GS for target UE identified by UE address (i.e. IP address or Mac address) or setting up a Multi-member AF session with required QoS in 5GS for target list of UEs identified by the list of UE addresses as described in clause 4.4.9.2.
- AF required QoS in 5GS for target UE not identified by UE address as described in clause 4.4.9.3.

4.4.9.2 Procedures for AF setting up an AF session with required QoS for target UE identified by UE address or for target list of UEs identified by list of UE addresses

The provisions and procedures for setting up an AF session with required QoS in 5GS targeting a UE identified by its UE address (IP address or Mac address) or setting up a Multi-member AF session with required QoS in 5GS for target list of UEs identified by the list of UE addresses 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 NRF to retrieve the BSF address of the serving UE IP address (es) as defined in 3GPP TS 29.510 [57];
- 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];
- when the "ListUE_5G" feature is supported, in case the NEF receives a list of UE addresses, the NEF shall interact with the NRF/BSF/PCF with above procedures for each UE address individually.
- 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 "ListUE_5G" feature as defined in clause 5.14.4 of 3GPP TS 29.122 [4] is supported, in order to support the list of UEs from AF:

- in the HTTP POST/PUT request, the AF shall include:
 - a the list of UE address within the "listUeAddrs" attribute instead of the UE IP/MAC address.
 - b. the list of UE addresses subject for Consolidated Data Rate monitoring within the "listUeConsDtrt" attribute.
- in the HTTP PATCH request, the AF may update:
 - a the list of UE address within the "listUeAddrs" attribute;
 - b. the list of UE addresses subject for Consolidated Data Rate monitoring within the "listUeConsDtrt" attribute.
- if the NEF recognizes, based on configuration, that the IP address(es) received within the "listUeAddrs" attribute are different from the IP address(es) assigned by 5GC (i.e. the UE(s) are behind a NAT in UPFs), the NEF shall invoke the UEId API as defined in clause 4.4.32 for each UE IP address with port number in order to identify the corresponding IP address (and IP domain, if necessary) that has been assigned by the 5GC. The NEF then uses the respective corresponding IP address (and IP domain, if necessary) in the following steps instead of the UE IP address provided by the AF;
- 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 for packet delay, 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:
 1. one or more requested QoS Monitoring Parameter(s) (i.e., UL, DL and/or RTT delay) within the "reqQosMonParams"; and
 2. one or more report frequency within the "repFreqs" attribute; and
 3. when the "repFreqs" attribute includes the value "PERIODIC", the periodic time for reporting and, if the feature "PacketDelayFailureReport" is supported, the maximum period with no QoS measurement results reported within the "repPeriod" attribute; and
 4. when the "repFreqs" attribute includes the value "EVENT_TRIGGERED":
 - a. delay threshold(s) as follows:
 - 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;
 - b. the minimum waiting time between subsequent reports within the "waitTime" attribute; and
 - c. if the feature "PacketDelayFailureReport", the maximum period with no QoS measurement results reported within the "repPeriod" attribute;
- if the "EnQoSMon" feature is supported and QoS monitoring control is for packet delay and/or congestion and/or data rate and if the "MultiMedia" feature is supported, the request is not for multiple flows (i.e., the "multiModDatFlows" attribute is not included), the AF shall include:
 - i. the "qosMonInfo" attribute to request QoS monitoring for packet delay as described for the "QoSMonitoring_5G" feature, the "qosMonConReq" attribute to request QoS monitoring for congestion and/or the "qosMonDatRate" attribute to request QoS monitoring for data rate;

NOTE 1: When the feature "MultiMedia" is supported and the request is for multiple flows (i.e., the "multiModDatFlows" attribute is included) the subscription for QoS monitoring can only be indicated within the corresponding "multiModDatFlows" entry.

- ii. if direct notification is required for the QoS measurement(s) provided in the "qosMonInfo", "qosMonConReq" and "qosMonDatRate" attribute(s), the "directNotifInd" attribute set to true;
- iii. within each of the provided QoSMonitoringInformation data structure(s):

1. one or more requested QoS Monitoring Parameter(s) for the concerned QoS monitoring parameter within the "reqQosMonParams" attribute;
2. one or more report frequency within the "repFreqs" attribute, if applicable;

NOTE 2: If the "reqQosMonParams" attribute indicates congestion measurement(s), the "repFreqs" attribute can only indicate "EVENT_TRIGGERED".

3. when the "repFreqs" attribute includes the value "PERIODIC", the periodic time for reporting and the maximum period with no QoS measurement results reported within the "repPeriod" attribute; and
4. when the "repFreqs" attribute includes the value "EVENT_TRIGGERED":
 - a. for QoS monitoring for data rate:
 - the data rate threshold for downlink within the "repThreshDatRateDI" attribute; and/or
 - the data rate threshold for uplink within the "repThreshDatRateUI" attribute;
 - b. for QoS monitoring for congestion information
 - the congestion threshold for downlink with the "conThreshDI" attribute; and/or
 - the congestion threshold for uplink with the "conThreshUI" attribute; and
 - c. the minimum waiting time between subsequent reports within the "waitTime" attribute; and
 - d. the maximum period with no QoS measurement results reported within the "repPeriod" attribute.
 - e. when the "ListUE_5G" feature is supported, for QoS monitoring for consolidated data rate for list of UEs:
 - the consolidated data rate threshold for downlink within the "consDataRateThrDI" attribute; and/or
 - the consolidated data rate threshold for uplink within the "consDataRateThrUI" attribute; and

NOTE 3: If the "consDataRateThrDI" and/or "consDataRateThrUI" attributes are provided, the QoS parameter(s) to be measured indicates the Guaranteed Bitrate shall be provided.

Editor's note: Whether the applicable reporting frequency for the Data Rate QoS monitoring can be event triggered and/or periodic is FFS.

if the "EnQoSMon" feature is supported and QoS monitoring control is for data rate, the AF may include the averaging window within the "avrgWndw" 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 clause 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 with the delay measurement within the "qosMonReports", the data rate measurements within the "qosMonDatRateReps" and/or the congestion measurements within "qosMonCongReps" attribute. Within the QosMonitoringReport data structure, the NEF shall include the received monitored QoS information.
 - for packet delay measurements, within "qosMonReports":
 - a. the uplink packet delays within the "ulDelays" attribute; and/or
 - b. the downlink packet delays within the "dlDelays" attribute; and/or
 - c. the round trip packet delays within the "rtDelays" attribute;

NOTE 4: The PCF, the SMF, the UPF or the TSCTSF report one UL, DL and/or round-trip packet delay measurement for each periodic and/or event-triggered report as described in 3GPP TS 29.514 [7], 3GPP TS 29.508 [26], 3GPP TS 29.564 [61] and 3GPP TS 29.565 [50], i.e, the NEF can include only one element within the "ulDelays", "dlDelays", and/or "rtDelays" array(s), each one with the received report from the PCF, SMF, UPF or the TSCTSF for the UL, DL and/or round trip delay(s).

- when the feature "EnQoSMon" is supported, for congestion information measurements, within the "qosMonConInfoReps":
 - a. the uplink congestion information measurement(s) within the "ulConInfo" attribute; and/or
 - b. the downlink congestion information measurement(s) within the "dlConInfo" attribute;
- when the feature "EnQoSMon" is supported, for data rate measurements, within "qosMonDatRateReports":
 - a. one data rate measurement for the UL within the "ulDataRate" attribute; and/or
 - b. one data rate measurement for the DL within the "dlDataRate" attribute; or
- if the feature "PacketDelayFailureReport" is supported or the "EnQoSMon" feature is supported, the packet delay measurement failure indicator within the "pdmf" attribute;
- when the "ListUE_5G" feature is supported, for QoS monitoring for consolidated data rate for list of UEs, within "aggrDataRateRpts":
 - the consolidated data rate measurement for DL within the "dlAggrDataRate" attribute; and/or
 - the consolidated data rate measurement for UL within the "ulAggrDataRate" attribute;

Editor's Note: It is FFS whether new data type structure is needed for QoS monitoring control for multi-modal services.

- if the "MultiMedia" feature is supported, 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 clause 4.2.5.14 of 3GPP TS 29.514 [7], 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 the affected single-modal identification number and the corresponding flows within the "multiModFlows" attribute.
- 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.

If the feature "AltQoSProfilesSupportReport" is supported, when the NEF receives the indication from the PCF or the TSCTSF about the support of alternative QoS profiles, the NEF shall notify the AF forwarding the received indication within the "altQosNotSuppInd" attribute.

NOTE 5: 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 the (g)PTP domain that the AF is located in within the "tscaiTimeDom" attribute;

NOTE 6: For the adjustment of burst sending time and adjustment of periodicity within the "periodicityRange" attribute in the UL direction within the "tscaiInputUI" attribute, it is expected that the AF interacts with the application in the UE or devices behind the UE based on application layer signaling.

- the capability for BAT adaptation within the "capBatAdaptation" attribute, if the "EnTSCAC" feature is also supported. The capability for BAT adaptation and the burst arrival time window ("burstArrivalTimeWnd" attribute within the "tscaiInputUI" attribute and/or "tscaiInputDI" attribute of the "tscQosReq" attribute) are mutually exclusive; 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;
 - the maximum burst size within the "maxTscBurstSize" attribute;
 - the priority within the "priority" attribute;
 - the requested 5GS delay within the "req5Gsdelay" attribute; and
 - the requested packet error rate within the "reqPer" attribute, if the "ExtQoS_5G" feature is also supported.

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 7: 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 "EnTSCAC" feature is supported and the NEF receives the BAT offset information from the TSCTSF about the BAT offset and the optionally adjusted periodicity, the NEF shall send an Event Notification to the AF with the "event" attribute set to BAT_OFFSET_INFO and including the "ranBatOffsetNotif" attribute and optionally the "adjPeriod" attribute within the "batOffsetInfo" attribute.

- 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 "gbrUL" attribute and the guaranteed bandwidth in downlink within the "gbrDL" attribute;
 - The requested packet delay budget within the "pdb" attribute;
 - The requested packet error rate within the "per" attribute if the "ExtQoS_5G" feature is supported;

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 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 "tscaiInputUL" and/or "tscaiInputDL" 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 8: 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 feature "AltQoSProfilesSupportReport" is supported, when the NEF receives the indication from the PCF or the TSCTSF about the support of alternative QoS profiles, the NEF shall notify the AF forwarding the received indication within the "altQosNotSuppInd" attribute.

- If the "enNB_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.
- if the ToSTC_5G feature as defined in clause 5.14.4 of 3GPP TS 29.122 [4] is supported:
 - in the HTTP POST request, the AF may include the "tosTC" attribute within the "flowInfo" attribute of the AsSessionWithQoSSubscription data type; and
 - in the HTTP PATCH request, the AF may include the "tosTC" attribute within the "flowInfo" attribute of the AsSessionWithQoSSubscriptionPatch data type;
- if the "PowerSaving" feature is supported, the AF may include:

- the Uplink and/or Downlink Periodicity information which indicates the time period between the start of the two data bursts in Uplink and/or Downlink direction within the "periodUI" and "periodDI" attributes respectively;
- if the "EnQoSMon" feature is supported, the AF may include:
 - in order to support the QoS Monitoring for packet delay variation, the AF shall include the required Packet Delay Variation monitoring information within "pdvMon" attribute. The subscribed event is "PACK_DELAY_VAR". The AF shall include within the "pdvMon" attribute:
 - a) the requested Packet Delay Variation parameter(s) to be measured (i.e. DL, UL and/or round trip packet delay variation) within the "reqQosMonParams" attribute;
 - b) one or more report frequency within the "repFreqs" attribute;
 - c) when the "repFreqs" attribute is set to the value "EVENT_TRIGGERED":
 - the Packet Delay Variation threshold for downlink with the "repThreshDI" attribute;
 - the Packet Delay Variation threshold for uplink with the "repThreshUI" attribute; and/or
 - the Packet Delay Variation threshold for round trip with the "repThreshRp" attribute;
 - d) when the "repFreqs" attribute is set to the value "PERIODIC", the periodic time for reporting and the maximum period with no packet delay variance measurement within the "repPeriod" attribute; and
 - e) when the "repFreqs" attribute is set to the value "EVENT_DETECTION", the minimum waiting time between subsequent reports within the "waitTime" attribute and the maximum period with no packet delay variation within the "repPeriod" attribute;

NOTE 9: The direct notification "directNotifInd" attribute is not applicable for "pdvMon" attribute because the PDV monitoring calculation and notification is performed by the PCF. In case "directNotifInd" attribute is provided for packet delay, data rate, and/or congestion information along with PDV monitoring, the PDV monitoring follows the specified PCF notification mechanism and other QoS monitorings request follows the direct notification mechanism, if feasible.

- when the NEF receives the notification about Packet Delay Variation event notification from the PCF as defined in clause 4.2.5.26 of 3GPP TS 29.514 [7], the NEF shall notify the AF with "PACK_DELAY_VAR" event and include the received monitored Packet Delay Variation information within the "pdvMonReports" attribute, it may include:
 - a) the uplink packet delay variation measurement(s) within the "ulPdV" attribute;
 - b) the downlink packet delay variation measurement(s) within the "dlPdV" attribute;
 - c) the round trip packet delay variation measurement(s) within the "rtPdV" attribute;
- in order to support the QoS Monitoring for the required round-trip delay over two QoS flows (i.e. the UL traffic and DL traffic of the service data flow are separated into two QoS flows respectively), the AF shall provide the event "RT_DELAY_TWO_QOS_FLOWS" and shall include within the "rttMon" attribute:
 - a) the round trip packet delay value within the "reqQosMonParams" attribute;
 - b) one or more report frequency within the "repFreqs" attribute;
 - c) the requested threshold of round-trip delay measurements over two QoS flows within the "repThreshRp" attribute;
 - d) when the "repFreqs" attribute is set to the value "PERIODIC", the periodic time for reporting and the maximum period with no round-trip delay over two QoS flows within the "repPeriod" attribute; and
 - e) when the "repFreqs" attribute is set to the value "EVENT_DETECTION", the minimum waiting time between subsequent reports within the "waitTime" attribute and the maximum period with no round-trip delay over two QoS flows within the "repPeriod" attribute;

- when the NEF receives the notification about round-trip delay over two QoS flows (i.e., the UL traffic and DL traffic of the service data flow are separated into two QoS flows respectively) event notification from the PCF as defined in clause 4.2.5.28 of 3GPP TS 29.514 [7], the NEF shall notify the AF with "RT_DELAY_TWO_QOS_FLOWS" event and include the received round-trip delay over two QoS flows information with:

- a) the round-trip delay over two QoS flows within the "rtDelays" attribute;

Editor's note: It is FFS how to correlate the uplink and downlink service data flows for the measurement of round-trip delay over two QoS flows.

- if the "MultiMedia" feature is supported, the AF may include:
 - the multi-modal Service ID within the "multiModalId" attribute; and/or
 - the multi-modal data flow(s) information of the multi-modal service in the "multiModDatFlows" attribute. The AF shall include for each single-modal data flow(s) of the multi-modal service:
 1. the single-modal data identification number within the "medCompN" attribute;
 2. the IP data flow(s) description for the single-modal data flow within the "flowInfos" attribute; and
 3. the parameters that describe the requested QoS for the single-modal data flow, as follows:
 - a. the single-modal data flow type within the "medType" attribute, if applicable;
 - b. either a reference to a pre-defined QoS information for the single-modal data flow within the "qosReference" attribute, or individual QoS parameters within the "tsnQos" attribute;
 - c. if individual QoS parameters are provided, an ordered list of alternative service requirements for the single-modal data flow within the "altSerReqsData" attribute, if applicable;
 - d. if a reference to pre-defined QoS information is provided, an ordered list of QoS references for the single-modal data flow within the "altSerReqs" attribute, if applicable;
 - e. QoS assistance information for the UL and/or DL for the single-modal data flow within the "tscaiInputUI" and/or "tscaiInputDI" attribute, if applicable;
 - f. an indication of whether UL-DL transmission adjustments to meet the RT Latency applies to the single-modal data flow within the "rTLatencyReq" attribute, if applicable;
 - g. if the "PDUSetHandling" feature is supported, PDU Set QoS related information for the single-modal data flow within the "pduSetQosDI" and/or "pduSetQosUI" attribute(s), if applicable, and the Protocol Description related information within the "protoDescDI" and/or "protoDescUI" attribute(s), if applicable;

NOTE 10: For multi-modal communication services related to multiple UEs, multiple UE-specific AF requests are used, and the AF provided information to NEF is the same as single UE case. Multiple UE-specific AF requests can include the same multimodal Service ID within the "multiModalId" attribute. For the single UE case, the AF can provide the multiple single-modal data flows of the multi-modal communication service via single or multiple AF requests.

- h. if the "EnQoSMon" feature is supported, the subscription information which is applicable to the QoS monitoring events within the "evSubsc" attribute;
- i. if the "L4S" feature is supported, the Low Latency, Low Loss and Scalable Throughput (L4S) Support indication within the "l4sInd" attribute. In this case, the AF shall also subscribe to notifications of ECN marking for L4S support information not available in 5GS within the "evSubsc" attribute as specified in 3GPP TS 29.514 [7]; and
- j. if the "PowerSaving" feature is supported, the time period between the start of the two data bursts in Uplink and/or Downlink direction within "periodUI" and "periodDI" attributes respectively;

NOTE 11: When both, "EnQoSMon" and "L4S" features are supported, for each data flow of the multi-modal service, the AF can include either the indication of L4S support within the "l4sInd" attribute or the request for congestion measurements within the "evSubsc" attribute as specified in 3GPP TS 29.514 [7], but the request cannot include both attributes simultaneously. The Individual AS Session with Required QoS Subscription resource cannot contain for a single-modal data flow(s) simultaneously both, the indication of L4S support and the subscription to congestion monitoring.

- if the NEF authorizes the AF request, the NEF shall provision the received multi-modal service information to the PCF by invoking the Npcf_PolicyAuthorization service as defined in 3GPP TS 29.514 [7]. If the multi-modal service information contains per flow subscription to events, the NEF, per flow, shall provide a notification URI and may provide a notification correlation identifier together with the received event(s) parameters by invoking the Npcf_PolicyAuthorization service as defined in 3GPP TS 29.514 [7]; and
- when the NEF receives the QoS monitoring event notification for the AF transaction as defined in clause 4.2.5.14 of 3GPP TS 29.514 [7] the NEF shall identify the affected AF flow identifiers based on the flow identifiers received from the PCF. When the NEF receives the QoS monitoring event notification for the AF transaction as defined in clause 4.2.2 of 3GPP TS 29.508 [26] or when the AF requested direct notification, as defined in clause 5.2.2.3 of 3GPP TS 29.564 [61], the NEF may identify the affected AF flow identifiers based on the notification correlation identifier and/or target notification URI of the received notification;

NOTE 12: When the NEF receives QoS monitoring reports from the SMF or UPF, the NEF could determine the affected flows of a QoS monitoring report based on the per flow combination of notification URI and notification correlation ID value(s) provided to the PCF during per flow subscription with the PCF.

- if the "RTLatency" feature is supported, the AF may include:
 - the indication that the service data flow needs to meet the Round-Trip (RT) latency requirement within the "rTLatencyInd" attribute;

NOTE 13: The single direction latency requirement between the UE and the PSA UPF can be either explicitly included within the "req5Gsdelay" attribute or can be derived from the "qosReference" attribute. The twice of the single direction latency is used as the Uplink-Downlink Round Trip latency of the indicated service.

If the NEF authorizes the AF request, the NEF shall transfer the received multi-modal service ID and, if applicable, the single-modal data flow(s) information of the multi-modal communication service to the PCF via the Npcf_PolicyAuthorization service.

- if the "L4S" feature is supported, the AF may include:
 - the Low Latency, Low Loss and Scalable Throughput (L4S) Support within the "l4sInd" attribute. In this case, the AF shall also subscribe to notifications of ECN marking for L4S support information not available in 5GS and available again by including the "L4S_NOT_AVAILABLE" and "L4S_AVAILABLE" events in the "events" attribute. When the NEF receives the ECN marking for L4S availability event notification from the PCF as specified in 3GPP TS 29.514 [7], the NEF shall notify the AF with the corresponding "L4S_NOT_AVAILABLE" or "L4S_AVAILABLE" event;

NOTE 14: When both, the "L4S" and "EnQoSMon" features are supported, the AF request can include either the indication of L4S support within the "l4sInd" attribute or the request for congestion measurements within the "qosMonConReq" attribute, but the request cannot include both attributes simultaneously. The Individual AS Session with Required QoS Subscription resource cannot contain simultaneously both, the indication of L4S support and the subscription to congestion monitoring.

- if "PDUSetHandling" feature as defined in clause 5.14.4 of 3GPP TS 29.122 [4] is supported, the AF may include:
 - the protocol description within the "protoDescDI" and/or "protoDescUI" attribute(s) for the UPF to identify the PDU Set Information and or identify the last PDU of a data burst in the DL traffic and/or for the UE to identify PDU Set information. The protocol description indicates transport protocol (e.g. RTP, SRTP), transport protocol header extensions (e.g. RTP Header Extension for PDU Set Marking in the DL as defined in 3GPP TS 26.522 [74]), payload type and format (e.g. H.264, H.265), and format parameters (e.g. H.264 profile level and packetization mode) used by the service data flow for the DL and/or the UL. In case of the

multi-modal data flow(s), each flow may have the respective "protoDescDI" and/or "protoDescUI" attribute(s);

Editor's Note: the list of IEs of a multimodal data flow to complete the QoS parameters developed for the media component in TS 29.514 and applicable to external AFs is FFS.

- the PDU Set QoS parameters, "pduSetQosDI" and/or "pduSetQosUI" attribute(s);
- if the NEF receives the AF request with PDU Set QoS parameters within the "pduSetQosDI" and/or "pduSetQosUI" attribute(s) and protocol description information within the "protoDescDI" and/or "protoDescUI" attribute(s), the NEF shall forward the attributes to PCF to support the PDU Set QoS configuration by invoking the Npcf_PolicyAuthorization_Create/Update service operation(s);
- if the NEF receives from the PCF the indication that direct notification is not possible for the requested QoS monitoring parameters as specified in 3GPP TS 29.514 [7], the NEF shall include in the response to the AF request the "servAuthInfo" attribute with the value "DIRECT_NOTIF_NOT_POSSIBLE";
- if the "PowerSaving" feature as defined in clause 5.14.4 of 3GPP TS 29.122 [4] is supported, the AF may include:
 - the protocol description within the "protoDescDI" attribute, to assist the UPF to identify the End of Burst. In case of the multi-modal data flow(s), each flow may have the respective "protoDescDI" attribute;
 - if the NEF receives the AF request with the "protoDescDI" attribute, the NEF shall forward the attribute to the PCF to support End of Burst detection;
- if the "QoSTiming_5G" feature as defined in clause 5.14.4 of 3GPP TS 29.122 [4] is supported, NEF shall forward the following attributes to support the QoS Timing information:
 - "qosDuration" attribute to indicate the QoS duration to transfer data traffic (e.g., AI/ML traffic).
 - "qosInactInt" attribute for data traffic (e.g., AI/ML traffic) QoS inactivity interval.

If the NEF authorizes the AF request, the NEF shall provision with the received QoS timing parameters to the PCF by invoking the Npcf_PolicyAuthorization service as defined in 3GPP TS 29.514 [7].

- If the "ExtErrors" feature is supported, the NEF may send the following error responses based on failed request responses received from the 5GC (TSCTSF, as specified in 3GPP TS 29.565 [50], or PCF, as specified in 3GPP TS 29.514 [7]):
 - a. If the NEF receives the indication that the 5GC failed in executing session binding, the NEF shall reject the HTTP POST request with an HTTP "500 Internal Server Error" response including the "cause" attribute set to "PDU_SESSION_NOT_AVAILABLE".
 - b. If the service information provided in the body of the HTTP POST/PUT/PATCH request is rejected by the 5GC (e.g. the subscribed guaranteed bandwidth for a particular user is exceeded or the authorized data rate in that slice for a UE is exceeded), the NEF shall indicate in an HTTP "403 Forbidden" response message the cause for the rejection including the "cause" attribute set to "REQUESTED_SERVICE_NOT_AUTHORIZED".
 - c. If the service information provided in the body of the HTTP POST/PUT/PATCH request is rejected due to a temporary condition in the network, the NEF may include in the "403 Forbidden" response the "cause" attribute set to "REQUESTED_SERVICE_TEMPORARILY_NOT_AUTHORIZED", as received. The NEF may also provide a received retry interval within the "Retry-After" HTTP header field. When the NF service consumer receives the retry interval within the "Retry-After" HTTP header field, the NF service consumer shall not send the same service information to the NEF again (for the same application session context) until the retry interval has elapsed. The "Retry-After" HTTP header is described in 3GPP TS 29.122 [4].

The NEF may additionally provide the acceptable bandwidth within the attribute "acceptableServInfo" included in the "ProblemDetailsAsSessionQos" data structure returned in the rejection response message.

- d. When the request to provision sponsored data connectivity information provided in the body of the HTTP POST/PUT/PATCH request is rejected, the NEF shall reject the request with the received status and error cause, as follows:

1. HTTP "403 Forbidden" response message with the "cause" attribute set to "UNAUTHORIZED_SPONSORED_DATA_CONNECTIVITY".
2. HTTP "403 Forbidden" response message with the "cause" attribute set to "REQUESTED_SERVICE_NOT_AUTHORIZED".

4.4.9.3 Procedures for AF requested QoS for a target UE or group of UE(s) not identified by UE address(es)

When the "GMEC_5G" feature is supported and the AF requested QoS for a UE or group of UE(s) not identified by UE address(es) as defined in clause 4.15.6.14 of 3GPP TS 23.502 [2], the provisions and procedures of clause 4.4.9.2 shall apply with the following differences:

- Either the "gpsi" attribute or the "extGroupId" attribute shall be used to identify the target UE or group of UE(s) within the "Individual AS Session with Required QoS Subscription" resource representation.
- After the successful authorization of the request at the NEF, the NEF may further support service specific authorization as defined in clause 4.15.6.10 of 3GPP TS 23.502 [2] and 3GPP TS 29.503 [63].
- At the reception of requests from the AF, the NEF shall either invoke the relevant TSCTSF service, as defined in 3GPP TS 29.565 [50], in order to fulfil the request, or when it determines to not invoke the TSCTSF, invoke the Nudr_DataRepository service as described in 3GPP TS 29.504 [20] and 3GPP TS 29.519 [23] to store the received AF requested QoS information for the target UE or group of UE(s) identified by the SUPI or Internal Group ID (derived respectively from the received GPSI or External Group ID) as Application Data in the UDR.
- No direct interactions between the NEF and the PCF shall take place.
- The NEF may receive notification(s) on the subscribed event(s) from the TSCTSF (when the NEF decided to invoke the TSCTSF at the reception of the corresponding AF required QoS requests) or from the PCF (when the NEF decided to not invoke the TSCTSF but rather invoked the Nudr_DataRepository service at the reception of the corresponding AF required QoS request). In the latter case, the PCF notifies the NEF on the subscribed event(s) using the Npcf_PolicyAuthorization_Notify service operation, as specified in 3GPP TS 29.514 [7].

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;
- the NEF shall interact with UDM by using Nudm_SubscriberDataManagement service (as defined in 3GPP TS 29.503 [17]) to retrieve the external identifier; and
- the NEF may receive an MSISDN-less MO-SMS via SM11 including a destination SME address (long/short code of the AF) upon the SMS-SC invoking Nnef_SMSservice.

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 for AF specific UE ID retrieval 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 for AF specific UE ID retrieval 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. If the NEF receives an error response from the UDM, the NEF shall not create the resource and shall respond to the AF with a proper error status code. If the NEF receives 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, when applicable. 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 until the NF service consumer requests to retrieve them by setting the "notifFlag" attribute to "RETRIEVAL" or until a muting exception occurs (e.g. full buffer).

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 until the NF service consumer requests to retrieve them by setting the "notifFlag" attribute to "RETRIEVAL" or until a muting exception occurs (e.g. full buffer); if the "notifFlag" attribute 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 the "notifFlag" attribute 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.

Editor's Note: It is FFS to determine whether any further provisions or limitations with regard to the usage of the "notifFlag" attribute are needed.

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. 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 receives 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, when applicable. 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;
- Management of 5G Virtual Network group data; and/or
- Management of 5G Virtual Network group parameters provisioning.

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.

When the "GMEC" feature is supported, the AF may also provision the 5G VN group related parameters (e.g., LPI parameters, ECS Address information, Network Parameter Configuration).

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.

When the "GMEC" feature is supported, the AF may also update/modify the 5G VN group related parameters (e.g., LPI parameters, ECS Address information, Network Parameter Configuration).

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.

4.4.15.5 5G LAN parameter provisioning event notification

If the "GMEC" feature is supported and a previously subscribed AF shall be notified on 5G LAN parameter provisioning events (e.g. when Network Parameters Configuration information was provisioned), the NEF shall initiate an HTTP POST request to the AF targeting the notification URI provided during the creation of the corresponding "Individual 5GLAN Parameters Provision Subscription" resource within the "notifUri" attribute.

Upon successful reception and processing of the HTTP POST request message, the AF acknowledge the reception of the notification by responding with an HTTP "204 No Content" status code.

On failure, the AF shall take proper error handling actions and respond to the AF with an appropriate error status code as specified in clause 5.7.4.

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 one of the following:
 - 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. In this case, the NEF may translate the received AF service identifier into a DNN and S-NSSAI combination; or
 - c) an application identifier within the "appId" attribute;

NOTE 1: 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. When the "AfGuideTNAPs" feature is supported, and the attribute "tnaps" is included, the "appId" attribute cannot be included.

- indication of the UEs to which the subscription applies via one of the following:
 - 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 "externalGroupId" attribute;

NOTE 2: When the feature "PIN" is supported, AF can use "externalGroupId" attribute to indicate the external group identifier if more than one PEGC is present within the PIN. If external group identifier is not used for the PIN, then AF will indicate "gpsi" attribute in the individual request for each of the PEGC within the PIN.

- f) an identification of any UE within the "anyUeInd" attribute; or
 - g) when the feature "VPLMNSpecificURSP" is supported, the AF is interacting with the VPLMN, and the request is to influence the determination of VPLMN-specific URSP rules for any inbound roamer from one or more PLMN(s), an identification of the PLMN IDs of the roaming UEs within the "roamUeNetDescs" 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" and/or "ProSe_Ph2" feature(s) is/are 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;
 - d) configuration parameters for 5G ProSe UE-to-UE relay, including configuration parameters for 5G ProSe UE-to-UE relay UE within the "paramForProSeU2URelUe" attribute and configuration parameters for 5G ProSe end UE within the "ParamForProSeEndUe" attribute, only if the "ProSe_Ph2" feature is supported;
- 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:
 1. a traffic descriptor within the "trafficDesc" attribute;
 - if the "PIN" feature is supported and the provided URSP request applies to a PIN scenario, the traffic descriptor shall correspond to a PIN Identifier within the "pinId" attribute applicable for the PEGC;
 2. a relative precedence within the "relatPrecedence" attribute;
 3. when the feature "VPLMNSpecificURSP" is supported and the AF guidance is to influence the determination of VPLMN-specific URSP rules, the VPLMN description within the "visitedNetDescs" attribute; and/or
 4. 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, a spatial validity condition within the "spatialValidity" attribute, and if the "PduSessTypeChange" feature is also supported and the PDU Session type needs to be changed, the requested PDU Session type within the "pduSessType" 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;

NOTE 3: If the "PIN" feature is supported and the provided URSP request applies to a PIN scenario, the DNN and S-NSSAI need to be included.
- 4) if the "A2X" feature is supported, A2X service parameters via:
 - a) configuration parameters for A2X communications over PC5 within the "a2xParamsPc5" attribute;
- 5) if the "AfGuideTNAPs" feature is supported, TNAP ID(s) service parameters via:
 - a) a list of the TNAP ID(s) collocated with the 5G-RG(s) of a specific user within the "tnaps" attribute;

NOTE 4: When the "AfGuideTNAPs" feature is supported and the AF provides the "tnaps" attribute, the service specific parameter provisioning procedure is used for the provisioning of UE location related information to be applied for SM Policy Control.

and

- 6) if the "Ranging_SL" feature is supported:

- a) ranging and sidelink positioning service parameters via configuration parameters for ranging and sidelink positioning within the "paramForRangingSIPos" attribute; and
- b) the mapping between the Application Layer ID and the GPSI within the "mappingInfo" attribute;

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. When the HTTP PUT method is used, the NF service consumer should not update attributes that do not exist in the ServiceParameterDataPatch data type, i.e. such attributes should remain unchanged compared to the initial values provided in the HTTP POST request message.

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".

In non-roaming scenarios or roaming scenarios when the AF interacts with the HPLMN, 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.

The 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 "policDelivNotifCorrelId" 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.

In the roaming scenarios when the AF interacts with the VPLMN, the interaction of the V-NEF with the UDM does not apply. The V-NEF stores in the V-UDR the service parameter information provided by the AF and receives from the V-PCF the notification of the outcome of the provisioning of the AF requested service parameters.

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), to configure the (g)PTP instance in 5GS and monitor time synchronization service status 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 and monitor time synchronization service status 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. To subscribe to time synchronization status reports, and if the feature "NetTimeSyncStatus" is supported, the `TimeSyncExposureConfig` data structure shall provide the clock quality acceptance criteria.

Upon receipt of the corresponding HTTP POST message and the request is authorized by the NEF, the NEF translates any potentially received Time Synchronization Coverage Area from an external representation (e.g. geographical area) to an internal representation (e.g. TAI list) if the "CoverageArea" feature is supported, and 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 from the TSCTSF in the `Ntsctsf_TimeSynchronization_ConfigUpdateNotify` service operation defined in 3GPP TS 29.565 [50] the notification with the current state of time synchronization service configuration and/or, in case the feature "NetTimeSyncStatus" is supported, with the acceptable or not acceptable status of the time synchronization service, if applicable, the NEF shall provide a notification to the 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 UE(s). The AF may also use this procedure to indicate a coverage area to provide the service, clock quality detail level to provide to the UE or group of UE(s) and to subscribe for time synchronization status reports.

When the "ASTIConfigReport" feature is supported, to receive notifications about changes in the 5G access stratum time distribution configuration, the NF service consumer shall also provide the notification URI within the "astiNotifUri" attribute and the notification correlation Id within the "astiNotifId" attribute; and when the "NetTimeSyncStatus" feature is supported, the clock quality detail level in the "clkQltDetLvl" attribute and the clock quality acceptance criteria in the "clkQltAcptCri" attribute to indicate the subscription to notification of the status of the access stratum time distribution service.

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, and may indicate, when the feature "NetTimeSyncStatus" is supported, the clock quality detail level and, if applicable, the clock quality acceptance criteria, and when the feature "CoverageArea" is supported the time synchronization service coverage area, 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 translates any potentially received Time Synchronization Coverage Area from an external representation (e.g. geographical area) to an internal representation (e.g. TAI list) if the "CoverageArea" feature is supported, and 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.

When the "ASTIConfigReport" feature is supported and the NEF receives the notification for the 5G access stratum time distribution status change from the TSCTSF by Ntsctsf_ASTI_UpdateNotify 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 AstiConfigNotification 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 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, any 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, the target UE information via the "tgtUe" attribute, and if the "HR-SBO" feature is supported, the PLMN ID in which the provided information applies via the "plmnId" 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 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 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 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 External Application Identifier(s), and for LBO roaming scenarios, a list of PLMN ID(s) for inbound roaming UEs if the "DCAMP_Roaming_LBO" feature is supported, 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;

- list of DNS server identifier and/or IP address(s) of the EAS in the local DN for each DNAI as "dnaiInfos" attribute; and
- the identifier of the AF that is responsible for the EAS associated with this EAS deployment information as "targetAfId" attribute, if the "EasRelocationEnh" feature is supported.

NOTE 1: The AF responsible for the EAS (indicated by the "targetAfId" attribute) can be different from the AF that creates the EAS Deployment information (indicated by the "afId" attribute in the URI of the resource).

NOTE 2: When the "targetAfId" attribute is provided, then all DNAI(s) correspond to the same EHE provider. The "targetAfId" attribute can be used in case of AF(s) involving different EHE providers, and the source EHE is unaware of other/target EHE specific deployment details.

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:

NOTE: The Nnef_MBSTMGI_Allocation service operation corresponds to the stage 2 Nnef_MBSTMGI_Allocate service operation defined in 3GPP TS 23.247 [53].

- 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 "websockNotifConfig" 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
- if the received MBS Service Area information cannot be covered by the MB-SMF Service Area of a single MB-SMF, the NEF shall reject the request and respond to the AF with an HTTP "403 Forbidden" status code with the response body including the ProblemDetailsTmgiAlloc data structure containing:
 - the ProblemDetails data structure containing the "cause" attribute set to the "MBS_SERVICE_AREA_TOO_LARGE" application error; and optionally
 - the ReducedMbsServArea data structure containing the reduced MBS Service Area information, i.e., the MBS Service Area that can be supported by the network;
- 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]; and
- if the received MBS Service Area is not supported (e.g., the received MBS Service Area cannot be covered by the service area(s) of any MB-SMF), the NEF shall skip the following steps below and respond to the AF with an HTTP "403 Forbidden" status code with the response body including the "MBS_SERVICE_AREA_NOT_SUPPORTED" application error.

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 :

NOTE: The Nnef_MBSTMGI_Deallocation service operation corresponds to the stage 2 Nnef_MBSTMGI_Deallocate service operation defined in 3GPP TS 23.247 [53].

- 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 Nbmbsmf_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); and
 - when the 5MBS2 feature is supported:
 - within the "associatedSessionId" attribute, the Associated Session ID; and
 - within the "nrRedCapInfo" attribute, the indication of whether the broadcast MBS session is for NR RedCap UEs only, non-RedCap UEs only or both.

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];
- 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;
- if the NEF discovers the target MB-SMF based on the MBS Service Area and the received MBS Service Area information cannot be covered by the MB-SMF Service Area of a single MB-SMF, the NEF shall reject the request and respond to the AF with an HTTP "403 Forbidden" status code with the response body including the ProblemDetailsTmgiAlloc data structure containing:
 - the ProblemDetails data structure containing the "cause" attribute set to the "MBS_SERVICE_AREA_TOO_LARGE" application error; and optionally
 - the ReducedMbsServArea data structure containing the reduced MBS Service Area information, i.e., the MBS Service Area that can be supported by the network;

and

- if the received MBS Service Area is not supported (e.g., the received MBS Service Area cannot be covered by the service area(s) of any MB-SMF), the NEF shall skip the following steps below and respond to the AF with an HTTP "403 Forbidden" status code with the response body including the "MBS_SERVICE_AREA_NOT_SUPPORTED" application error.

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; and
 - if the "ReducedMbsServArea" feature is supported and the MB-SMF reduced the MBS Service Area initially requested by the AF, the reduced MBS Service Area that can be supported by the network within the "reducedMbsServArea" attribute or the "reducedExtMbsServArea" attribute;

and

- 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, or when the "ReducedMbsServArea" feature is supported, with either:

- if no updated MBS Service Area was provided in the corresponding request or an updated MBS Service Area was provided in the corresponding request and was fully accepted by the MB-SMF, an HTTP "204 No Content" status code; or
- if an updated MBS Service Area was provided in the corresponding request but only partially accepted by the MB-SMF (i.e., the MB-SMF reduced the MBS Service Area), an HTTP "200 OK" status code with the response body including the reduced MBS Service Area information within the MbsSessionUpdateResp data structure.

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 STARTED 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 clause 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, in order to carry out one or more of the following procedures:

- Multicast MBS Session Authorization information provisioning as defined in clause 7.2.9 of 3GPP TS 23.247 [53].
- Multicast MBS Session Assistance Information provisioning as defined in clause 7.2.9a of 3GPP TS 23.247[53].

NOTE 1: The stage 2 Nnef_ParameterProvisioning API for MBS Parameters Provisioning is implemented in stage 3 via the Nnef_MBSSession API.

NOTE 2: An AF can perform Multicast MBS Session Authorization information provisioning and Multicast MBS Session Assistance Information provisioning simultaneously, i.e., via the same MBS Parameters Provisioning.

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 success and 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 "201 Created" 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.

On failure or if the NEF receives an error response 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.

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 success and 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.

On failure or if the NEF receives an error response 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.

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 success and 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 response 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.

4.4.29.4.3 Procedure for multicast MBS Session Assistance information provisioning

When the "5MBS2" feature is supported, this procedure is used by an AF to request the creation/update/deletion of an MBS Session Assistance information provisioning for multicast MBS sessions.

In order to request the creation of an MBS Parameters Provisioning for the purpose of MBS Session Assistance information provisioning for multicast MBS sessions, 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 "mbsSessAssistInfo" attribute, the MBS Session Assistance information to be provisioned; and
- within the "suppFeat" attribute, the features supported by the AF, which shall include the support of the "5MBS2" feature.

The NEF shall then check whether the AF is authorized to perform this operation or not, as defined in clause 7.2.9a 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 Assistance information.

Upon success and 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 "201 Created" status code including an HTTP Location header field containing the URI of the created resource, and the response body containing the representation of the created "Individual MBS Parameters Provisioning" resource within the MbsPpData data structure.

On failure or if the NEF receives an error response 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.

In order to request the update or deletion of an existing "Individual MBS Parameters Provisioning" resource for the purpose of MBS Session Assistance information provisioning for multicast MBS sessions, an AF shall trigger the Nnef_MBSSession API by reusing the same update/deletion procedures defined in clause 4.4.29.4.2.

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].

NOTE: The procedures defined in the clauses below are not applicable for the MBS group message delivery feature specified in clauses 6.15 and 7.5 of 3GPP TS 23.247 [53]. For MBS group message delivery, the NEF plays the role of an AF and is hence responsible for the establishment and management of the related MBS User Service based on the received MBS group message delivery request from the AF. The NEF interacts for this purpose directly with the MBSF using the Nmbssf_MBSUserService API defined in 3GPP TS 29.580 [66]. The detailed procedures applicable for MBS group message delivery are defined in clause 4.4.29.7.

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 Nmbssf_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 subscriptions/notifications, as defined in 3GPP TS 26.502 [65].

NOTE: The procedures defined in the clauses below are not applicable for the MBS group message delivery feature specified in clauses 6.15 and 7.5 of 3GPP TS 23.247 [53]. For MBS group message delivery, the NEF plays the role of an AF and is hence responsible for the establishment and management of the related MBS User Data Ingest Session based on the received MBS group message delivery request from the AF. The NEF interacts for this purpose directly with the MBSF using the `Nmbssf_MBSUserDataIngestSession` API defined in 3GPP TS 29.580 [66]. The detailed procedures applicable for MBS group message delivery are defined in clause 4.4.29.7.

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 `MBSUserDataIngSession` 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 `Nmbssf_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 `MBSUserDataIngSession` 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 `Nmbssf_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 `MBSUserDataIngSession` 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 Nmbsf_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 Nmbsf_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 MBSUserDataIngStatSubsc 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 Nmbsf_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 MBSUserDataIngStatSubsc 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 Stats 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 Nmbfsf_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 clause 5.27.7, and respond to the NEF with an appropriate error status code.

4.4.29.7 Procedures for MBS Group Message Delivery Management

4.4.29.7.1 General

The procedures described in the clauses below are used by an AF to request and manage MBS Group Message Delivery as defined in clauses 6.15 and 7.5 of 3GPP TS 23.247 [53].

4.4.29.7.2 Procedure for MBS Group Message Delivery Creation

This procedure is used by an AF to request the creation of an MBS Group Message Delivery at the NEF (see also clause 7.5.1 of 3GPP TS 23.247 [53]).

In order to request the creation of an MBS Group Message Delivery, an AF shall invoke the Nnef_MBSGroupMsgDelivery_Create service operation by sending an HTTP POST request message to the NEF, targeting the "MBS Group Message Deliveries" collection resource, with the request body including the MbsGroupMsgDel data structure.

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:

- the NEF may trigger MBS User Service and MBS User Data Ingest Session provisioning towards the MBSF using the Object Distribution Method, as specified 3GPP TS 29.580 [66] (see also 3GPP TS 26.502 [65]); and
- if the AF provides the MBS Service Area in the form of geographical area(s) or civic address(es), the NEF shall translate this information into a list of TAI(s) and/or a list of cell ID(s) before sending the MBS Service Area information as part of MBS User Data Ingest Session provisioning towards the MBSF.

Upon success and/or reception of a successful response from the MBSF, the NEF shall send a Nnef_MBSGroupMsgDelivery_Create response to the AF with an HTTP "201 Created" status code and the response body including the representation of the created "Individual MBS Group Message Delivery" resource within the MbsGroupMsgDel data structure.

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

4.4.29.7.3 Procedure for MBS Group Message Delivery Update

This procedure is used by an AF to request the modification of an existing "Individual MBS Group Message Delivery" resource at the NEF (see also clause 7.5.2 of 3GPP TS 23.247 [53]).

In order to modify a previously submitted MBS Group Message Delivery, an AF shall invoke the Nnef_MBSGroupMsgDelivery_Update service operation by sending an HTTP PATCH request message to the NEF, targeting the corresponding "Individual MBS Group Message Delivery" resource, with the request body including the MbsGroupMsgDelPatch data structure.

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:

- the NEF may further interact with the MBSF to request the modification of the associated MBS User Service and MBS User Data Ingest Session instances as specified in 3GPP TS 29.580 [66] (see also 3GPP TS 26.502 [65]); and
- if the AF provides an updated MBS Service Area and it is in the form of geographical area(s) or civic address(es), the NEF shall translate this information into a list of TAI(s) and/or a list of cell ID(s) before sending the updated MBS Service Area information as part of MBS User Data Ingest Session modification towards the MBSF.

Upon success and/or reception of a successful response from the MBSF confirming that the requested modifications were successfully performed, the NEF shall send a Nnef_MBSGroupMsgDelivery_Update response to the AF with either:

- an HTTP "200 OK" status code with the response body containing the updated representation of the "Individual MBS Group Message Delivery" resource within the MbsGroupMsgDel data structure; or
- an HTTP "204 No Content" status code.

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

4.4.29.7.4 Procedure for MBS Group Message Delivery Deletion

This procedure is used by an AF to request the deletion of an existing "Individual MBS Group Message Delivery" resource at the NEF (see also clause 7.5.3 of 3GPP TS 23.247 [53]).

In order to delete a previously submitted MBS Group Message Delivery, an AF shall invoke the Nnef_MBSGroupMsgDelivery_Delete service operation by sending an HTTP DELETE request message to the NEF, targeting the corresponding "Individual MBS Group Message Delivery" resource.

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 may further interact with the MBSF to request the deletion of the associated MBS User Service and MBS User Data Ingest Session instances as specified in 3GPP TS 29.580 [66] (see also 3GPP TS 26.502 [65]).

Upon success and/or reception of a successful response from the MBSF, the NEF shall send a Nnef_MBSGroupMsgDelivery_Delete response to the AF with an HTTP "204 No Content" status code.

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

4.4.29.7.5 Procedure for MBS Group Message Delivery Status Notification

This procedure is used by the NEF to notify a previously subscribed AF of the status of the previously submitted MBS Group Message Delivery (see also clause 7.5.1 of 3GPP TS 23.247 [53]).

In order to notify an AF of the status of a previously submitted MBS Group Message Delivery, the NEF shall invoke the Nnef_MBSGroupMsgDelivery_StatusNotify service operation by sending an HTTP POST request message to the AF targeting the notification URI (i.e., "{notifUri}") received during the creation/update of the corresponding MBS Group Message Delivery, as defined in clauses 4.4.29.7.2 and 4.4.29.7.3, with the request body including the MbsGroupMsgDelStatusNotif data structure.

Upon reception of this notification request and its successful processing, the AF shall send a Nnef_MBSGroupMsgDelivery_StatusNotify response message with an HTTP "204 No Content" status code.

On failure, the AF shall take proper error handling actions, as specified in clause 5.29.7, 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. If the feature "PortNumber" is supported, the port number associated with the UE IP address may be also included in 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 request for AF specific UE ID retrieval 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; or
- if the AF's request for AF specific UE ID retrieval 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.

Upon success, if the port number associated with the UE IP address is received and based on configuration, the NEF may recognize the address received is an IP address which is different from the actual private UE IP address assigned by 5GC, i.e. the UE is behind a NAT in UPF. If so, the NEF shall discover the UPF implementing NAT functionality for the UE (public) IP address via Nnrf_NFDDiscovery service as defined in 3GPP TS 29.510 [57] and then the NEF shall request UE's (private) IP address and IP domain (if the UE IPv4 address is provided) from the UPF by invoking the Nupf_GetUEPrivateIPAddrAndIdentifiers_Get service operation as defined in 3GPP TS 29.564 [61]. If the UPF has the SUPI of the UE, the UPF may directly return the SUPI to the NEF then the NEF shall skip the interaction with the BSF. Otherwise 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 UPF or 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 or UPF, 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 combination of IP address and Port Number can be used by 5GC to derive the UE private IP address assigned by 5GC if the UE is behind a NAT deployed with NAPT within UPF.

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 AfEventExposureNotif 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 clause 5.28.7, and respond to the NEF with an appropriate error status code.

4.4.34 Procedures for DNAI Mapping

4.4.34.1 General

The procedures are used by AF to create or delete subscription(s) of DNAI Mapping information to NEF and also by NEF to notify NF consumer about the update of the DNAI Mapping information as defined in clause 5.2.6.34 of 3GPP TS 23.502 [2]

4.4.34.2 Creation of a new subscription for DNAI Mapping

In order to create a new subscription for DNAI Mapping for a given AF, the AF shall initiate an HTTP POST request to the NEF for the "DNAI Mapping Subscriptions" resource. The HTTP POST request message body shall include the DnaiMapSub data structure that shall include:

- a notification URI within the "notifUri" attribute and a notification correlation identifier within the "notifCorrId" attribute;
- either the FQDN(s) of the EAS(s) in the Local part of the DN as the "fqdns" attribute or the EAS(s) IP Address(es) in the Local part of the DN within the "easIpAddr" attribute;

and may include:

- a DNN as "dnn" attribute;
- an S-NSSAI as "snssai" attribute;
- event reporting requirements as "eventReq" attribute.

Upon receipt of the corresponding HTTP POST message, if the AF is authorized by the NEF to obtain the DNAI mapping information, the NEF may 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 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.

On successful DNAI Mapping subscription creation, the NEF shall return an HTTP POST response with an HTTP "201 Created" status code to the AF, including a "Location" header containing the URI of the created "Individual DNAI Mapping Subscription" resource and the response body containing a representation of the created resource within the DnaiMapSub data structure. If one-time reporting is not requested and the subscription can be expired based on the operator's policy, an expiry time shall be included within the "monDur" attribute of the ReportingInformation in the DnaiMapSub data structure. If immediate reporting is requested, the currently available DNAI Mapping information shall be included within the "immReports" attribute of the DnaiMapSub data structure.

On failure, the NEF shall take proper error handling actions, as specified in clause 5.30.7, and respond to the AF with an appropriate error status code.

4.4.34.3 Deletion of an existing individual DNAI Mapping subscription

In order to delete an existing DNAI Mapping subscription, the AF shall send an HTTP DELETE request message and targeting the corresponding "Individual DNAI Mapping Subscription" resource.

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

On failure, the NEF shall take proper error handling actions, as specified in clause 5.30.7, and respond to the AF with an appropriate error status code.

4.4.34.4 Notification for updated DNAI Mapping information

This procedure is used by the NEF to send DNAI Mapping information update notifications to a previously subscribed AF.

When the NEF receives the notification of the updated DNAI Mapping information from the UDR as described in 3GPP TS 29.504 [20], the NEF shall provide a notification by sending an HTTP POST request message to the AF with the request body including the DnaiMapUpdateNotif data structure and targeting the notification URI provided by the AF during the corresponding DNAI mapping subscription.

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

On failure, the AF shall take proper error handling actions, as specified in clause 5.30.7, and respond to the NEF with an appropriate error status code.

4.4.35 Procedures for negotiation of planned data transfer with QoS requirements

These procedures are used by an AF to perform negotiation of a viable time window for the planned application data transfer via the support of the NEF.

In order to create a resource for the PDTQ policy, the AF shall send an HTTP POST message to the NEF for the "PDTQ Policy Subscriptions" resource to negotiate the PDTQ policy. The body of the HTTP POST message shall include the ASP Identifier, Number of UEs, the list of Desired Time Windows, QoS reference or individual QoS parameters and optionally network area information, application identifier and Alternative Service Requirements. The AF may also include a notification URI and a request to enable the PDTQ warning notification during the planned data transfer policy negotiation.

After receiving the HTTP POST message, if the AF is authorized, the NEF may map the information received from the AF (e.g. QoS reference and network area information) based on local policies and negotiate the PDTQ policy with the PCF as described in 3GPP TS 29.543 [68]. After receiving the response including the determined PDTQ policies from the PCF, the NEF shall create an "Individual PDTQ Policy Subscription" resource which represents the PDTQ subscription, addressed by an URI that contains the AF identifier and a NEF-created subscription identifier, and shall respond to the AF with a 201 Created message, including a Location header field containing the URI for the created resource and a message body, which shall also include a PDTQ Reference ID and a set of PDTQ policies. The AF shall use the URI received in the Location header in subsequent requests to the NEF to refer to this PDTQ subscription. If the NEF receives a response with an error code from the PCF, the NEF shall not create the resource and shall respond to the AF with a corresponding failure code as described in clause 5.31.5.

If more than one policy is included in the HTTP response, the AF shall send an HTTP PATCH message to inform the NEF for the "Individual PDTQ Subscription" resource of the PDTQ policy selected by the AF. The AF may also send an HTTP PATCH to request to disable/enable the PDTQ warning notification at any moment.

After receiving the HTTP PATCH message, the NEF shall send an HTTP response to the AF with a "200 OK" status code and shall include the Pdtq data type in the response body, or with a "204 No Content" status code, then the NEF shall interact with the PCF as defined in 3GPP TS 29.543 [68]. If the NEF identifies any error (e.g. selected policy is not within the set of PDTQ policies), the NEF shall not update the resource and shall respond to the AF with a corresponding failure code as described in clause 5.31.5.

When the NEF receives the PDTQ warning notification from the PCF as defined in clause 5.2.2.4.2 of 3GPP TS 29.543 [68] and the "warnNotifEnabled" attribute was set to true, the NEF shall send an HTTP POST message including the Notification data structure to the AF identified by the notification destination URI received during the planned data transfer policy negotiation. The AF shall respond with an HTTP response to confirm the received notification and even if only one candidate PDTQ policy was provided within the PDTQ warning notification, the AF shall send the HTTP PATCH message with the "selectedPolicy" attribute to the NEF. The "selectedPolicy"

attribute shall contain the identifier of the selected candidate PDTQ policy or, otherwise value "0" indicating no PDTQ policy is accepted by the AF. The AF may also request to disable/enable the PDTQ warning notification by including the "warnNotifEnabled" attribute in the HTTP PATCH message.

The AF may also send an HTTP DELETE message to the NEF for the "Individual PDTQ Policy Subscription" resource requesting to remove an individual resource identified by the URI received in the response to the request that has created resource a URI. After receiving such request, the NEF shall delete the resource and send an HTTP response to the AF with a corresponding status code.

NOTE: The NEF can also remove the resource when the last window end time in PDTQ policies expires.

4.4.36 Procedures for Member UE Selection Assistance

4.4.36.1 General

The procedures described in the clauses below are used by an AF to subscribe, update and delete a subscription to Member UE selection assistance information via the NEF, also for the NEF to notify the AF about the member UE selection assistance information which has been subscribed.

4.4.36.2 Procedure for Member UE Selection Assistance Subscription Creation

In order to subscribe to receive the Member UE selection assistance information, the AF shall send an HTTP POST request message to the NEF targeting the "Member UE Selection Assistance Subscriptions" collection resource, with the request message body including the MemUeSelectAssistSubsc data structure, as specified in clause 5.32.5.2.2.

The NEF shall then check whether the AF is authorized to perform this operation or not. If the AF is authorized and based on the Member UE filtering criteria(s) provided by the AF, the NEF shall then interact with the corresponding different 5GC NFs via the services offered by the 5GC NFs.

Upon reception of a successful response from the 5GC NF, the NEF shall respond to the AF with a "201 Created" status code including a "Location" header field that shall contain the URI of the created resource, i.e. "{apiRoot}/3gpp-musa/v1/{afId}/subscriptions/{subscriptionId}", and the response body containing a representation of the created "Individual Member UE Selection Assistance Subscription" resource within the MemUeSelectAssistSubsc data structure.

On failure or if the NEF receives an error response from the 5GC NF, the NEF shall take proper error handling actions, as specified in clause 5.32.7, 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.

4.4.36.3 Procedure for Member UE Selection Assistance Subscription Update

In order to update an existing Individual Member UE Selection Assistance Subscription, the AF shall send an HTTP PUT or PATCH request message to the NEF targeting the "Individual Member UE Selection Assistance Subscription" resource, with the request message body including respectively the MemUeSelectAssistSubsc or MemUeSelectAssistSubscPatch data structure as specified in clauses 5.32.5.2.2 and 5.32.5.2.15.

The NEF shall then check whether the AF is authorized to perform this operation or not. If the AF is authorized and based on the Member UE filtering criteria(s) provided by the AF, the NEF shall then interact with the corresponding different 5GC NFs via the services offered by the 5GC NFs.

Upon reception of a successful response from the 5GC NF, the NEF shall respond to the AF with a "200 OK" status code with the MemUeSelectAssistSubsc data structure or "204 No Content" status code.

On failure or if the NEF receives an error response from the 5GC NF, the NEF shall take proper error handling actions, as specified in clause 5.32.7, 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.

4.4.36.4 Procedure for Member UE Selection Assistance Subscription Unsubscription

In order to request the deletion of an existing Individual Member UE Selection Assistance Subscription, the AF shall send an HTTP DELETE request message targeting the URI of the concerned "Individual Member UE Selection Assistance Subscription" resource.

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 unsubscribe from the different 5GC NFs to stop collecting the UE list.

Upon reception of a successful response from the 5GC NF, the NEF shall respond to the AF with a HTTP "204 No Content" status code.

On failure or if the NEF receives an error code from the 5GC AF, the NEF shall take proper error handling actions, as specified in clause 5.32.7, 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.

4.4.36.5 Procedure for Member UE Selection Assistance Notification

In order to send a Member UE Selection Assistance notification, the NEF shall send the HTTP POST request message to the AF using and targeting the notification URI provided during the creation/update of the corresponding subscription, with the request body including the MemUeSeletAssistNotif data structure as specified in clause 5.32.5.2.3.

The NEF consolidates all the information collected from other 5GC NFs to derive one or more list(s) of candidate UEs based on the Member UE filtering criterias which were provided by the AF.

Upon success, the AF shall send a HTTP "204 No Content" status code.

On failure, the AF shall take proper error handling actions, as specified in clause 5.32.7, and respond to the NEF with an appropriate error status code.

4.4.37 Procedures for Group Parameters Provisioning

4.4.37.1 General

The procedures described in the clauses below are used by an AF to interact with the 5GC for Group Parameters Provisioning, in order to carry out the following procedures:

- DNN and S-NSSAI Group parameters provisioning procedures (see clause 4.15.6.3e of 3GPP TS 23.502 [2]).

4.4.37.2 Procedures for DNN and S-NSSAI Group Parameters Provisioning

This procedure is used by an AF to request the creation/update/deletion of a DNN and S-NSSAI Group parameters provisioning.

In order to request the creation of a DNN and S-NSSAI Group Parameters Provisioning:

- an AF shall trigger the Nnef_GroupParametersProvisioning API by sending an HTTP POST request to the NEF targeting the "Group Parameters Provisionings" collection resource, with the request body including the GrpPpData data structure that shall contain:
 - within the "afId" attribute, the identifier of the AF that is sending the request;
 - within the "dnnSnsaiGrpData" attribute, the DNN and S-NSSAI specific Group parameters data that are to be provisioned; and
 - within the "supFeat" 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;
- if the AF is authorized:

- if the LADN Service Area is provided by the AF within the "dnnSnsaiGrpData" attribute (via the "ladnServArea" attribute) and in the form of a list of geographic area(s) or a list of civic address(es), the NEF shall translate this information into a list of TAI(s); and
- the NEF shall then trigger the Nudm_ParameterProvision service API of the UDM to request the provisioning of the received DNN and S-NSSAI Group parameters provisioning data as specified in 3GPP TS 29.503 [17];

and

- upon reception of a successful response from the UDM as defined in 3GPP TS 29.503 [17] and successful processing of the request, 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 including a representation of the created "Individual Group Parameters Provisioning" resource within the GrpPpData data structure.

In order to request the update of an existing "Individual Group Parameters Provisioning" resource:

- an AF shall trigger the Nnef_GroupParametersProvisioning API by sending to the NEF either:
 - an HTTP PUT request targeting the concerned "Individual Group Parameters Provisioning" resource with the request body including the GrpPpData data structure; or
 - an HTTP PATCH request targeting the concerned "Individual Group Parameters Provisioning" resource with the request body including the GrpPpDataPatch 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 DNN and S-NSSAI Group parameters provisioning data; and
- upon reception of a successful response from the UDM as defined in 3GPP TS 29.503 [17] and successful processing of the request, the NEF shall respond to the AF with either:
 - an HTTP "200 OK" status code with the response body containing a representation of the updated "Individual Group Parameters Provisioning" resource within the GrpPpData data structure; or
 - an HTTP "204 No Content" status code.

In order to request the deletion of an existing "Individual Parameters Provisioning" resource:

- an AF shall trigger the Nnef_GroupParametersProvisioning API by sending an HTTP DELETE request targeting the concerned "Individual Group Parameters Provisioning" resource to the NEF; and
- upon success, 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 5.33.7, and respond to the AF with an appropriate error status code.

4.4.38 Procedures for Network Slice Parameters Provisioning

4.4.38.1 General

The procedures described in the clauses below are used by an AF to interact with the 5GC for Network Slice Parameters Provisioning, in order to carry out one or more of the following procedures:

- Network Slice Usage Control parameters provisioning procedures (see clause 4.15.6.3g of 3GPP TS 23.502 [2]).

In order to request the creation of a Network Slice Parameters Provisioning:

- an AF shall trigger the Nnef_SliceParamProvision API by sending an HTTP POST request to the NEF targeting the "Slice Parameters Provisionings" collection resource, with the request body including the SlicePpData data structure that shall include:
 - within the "afId" attribute, the identifier of the AF that is sending the request; 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;
- if the AF is authorized, the NEF shall trigger the Nudm_ParameterProvision service API of the UDM to request the provisioning of the received Network Slice Parameters Provisioning data as specified in 3GPP TS 29.503 [17]; and
- upon reception of a successful response from the UDM as defined in 3GPP TS 29.503 [17] and successful processing of the request, 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 including a representation of the created "Individual Slice Parameters Provisioning" resource within the SlicePpData data structure.

In order to request the update of an existing "Individual Slice Parameters Provisioning" resource:

- an AF shall trigger the Nnef_SliceParamProvision API by sending to the NEF either:
 - an HTTP PUT request targeting the concerned "Individual Slice Parameters Provisioning" resource with the request body including the updated representation of the resource within the SlicePpData data structure; or
 - an HTTP PATCH request targeting the concerned "Individual Slice Parameters Provisioning" resource with the request body including the requested modifications to the resource within the SlicePpDataPatch 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 Network Slice parameters provisioning data; and
- upon reception of a successful response from the UDM as defined in 3GPP TS 29.503 [17] and successful processing of the request, the NEF shall respond to the AF with either:
 - an HTTP "200 OK" status code with the response body containing a representation of the updated "Individual Slice Parameters Provisioning" resource within the SlicePpData data structure; or
 - an HTTP "204 No Content" status code.

In order to request the deletion of an existing "Individual Slice Parameters Provisioning" resource:

- an AF shall trigger the Nnef_SliceParamProvision API by sending an HTTP DELETE request targeting the concerned "Individual Slice Parameters Provisioning" resource to the NEF; and
- upon success, 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 5.34.7, and respond to the AF with an appropriate error status code.

4.4.38.2 Procedures for Network Slice Usage Control Parameters Provisioning

This procedure is used by an AF to request Network Slice Usage Control parameters provisioning by reusing the procedures defined in clause 4.4.38.1 with the following differences:

- during the creation of the Network Slice Parameters Provisioning or update of the Network Slice Parameters Provisioning using HTTP PUT, the SlicePpData data structure shall include:
 - within the "sliceUsgCtrlData" attribute, the Network Slice Usage Control parameters data that are to be provisioned;

and

- during the modification of the Network Slice Parameters Provisioning or update of the Network Slice Parameters Provisioning using HTTP PATCH, the SlicePpDataPatch data structure shall include:
 - within the "sliceUsgCtrlData" attribute, the requested modification to the Network Slice Usage Control parameters data.

4.4.39 Procedures for UE Address Retrieval

4.4.39.1 General

The procedures described in the clauses below are used by an AF to request the NEF to provide UE Address(es).

4.4.39.2 Procedures for UE Address Retrieval

This procedure is used by an AF to retrieve UE Address(es).

In order to retrieve the UE Address(es):

- an AF shall invoke the UEAddress API by sending an HTTP POST request to the NEF targeting the custom operation URI "{apiRoot}/3gpp-ue-address/v1/retrieve", with the request body including the UeAddressReq data structure that shall contain:
 - a) within the "afId" attribute, the identifier of the AF that is sending the request;
 - b) within the "gpsi" attribute, the GPSI of the UE; and
 - c) within the "suppFeat" attribute, the features supported by the AF, if applicable (i.e., feature negotiation needs to take place); and

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 the AF's request for UE Address retrieval 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; or
- if the AF's request for UE Address retrieval is authorized, the NEF shall:
 - a) determine the corresponding DNN(s) and/or S-NSSAI(s) information based on the local configuration for the requesting AF Identifier;
 - b) invoke the Nudm_UECM_Get service operation to find the SMF serving the PDU session(s) for the GPSI, DNN, S-NSSAI including type of requested information set to SMF Registration Info and the S-NSSAI and DNN, as defined in clause 5.3.2.5.7 of TS 29.503 [17];
 - c) invoke the Nsmf_EventExposure_Subscribe service operation to the identified SMF(s), including the identified PDU Session ID to find the SMF(s) allocated IPv4 address and/or IPv6 prefix, as defined in clause 4.2.2 and clause 4.2.3 of TS 29.508 [26];
- upon reception of a successful response from the SMF as defined in 3GPP TS 29.508 [26] and successful processing of the request, the NEF shall respond to the AF with an HTTP "200 OK" status code and the response body including the SMF allocated UE Address information within the UeAddressInfo data structure.

On failure or if the NEF receives an error code from the SMF, the NEF shall take proper error handling actions, as specified in clause 5.35.7, and respond to the AF with an appropriate error status code.

4.4.40 Procedures for ECS Address Configuration Information provisioning in roaming

4.4.40.1 General

The procedures are used by the AF to provide, create, update or delete ECS Address Configuration Information to the V-NEF, and for the V-NEF to authorize the AF provisioned ECS Address Configuration Information to be stored in the V-UDR.

The following procedures support:

- Create/Update/Delete the AF provisioned ECS Address Configuration Information.

4.4.40.2 Creation of new ECS Address Configuration Information

In order to create a new Individual ECS Address Configuration Information resource for a given AF, the AF shall initiate an HTTP POST request to the V-NEF for the "ECS Address Configuration Information" resource. The HTTP POST request message body shall include the EcsAddressInfo data structure that shall include:

- the ECS Server Address information within the "ecsServerAddr" attribute;

and may include:

- the target UE(s) within the "tgtUe" attribute;
- the spatial validity condition within the "spatialValidityCond" attribute.

Upon receipt of the corresponding HTTP POST message, the V-NEF authorizes the request and, if an External Group Identifier is provided in the request, the V-NEF may determine the HPLMN of the UE(s) (e.g. based on the Realm in the identifier) and invoke the Nnef_UEId_Get service as described in 3GPP TS 29.591 [73] to retrieve the Internal Group Identifier from the NEF of the HPLMN. Then, if the AF was authorized by the V-NEF to provide the ECS Address Configuration Information, the V-NEF may interact with the V-UDR to create the associated ECS Address Roaming Information by using the Nudr_DataRepository service as defined in 3GPP TS 29.519 [23]. If the request is accepted by the V-UDR and the V-UDR informs the V-NEF with a successful response or if no interaction with the UDR takes place and the V-NEF successfully handles the information locally, the V-NEF shall create a new "Individual ECS Address Configuration Information" resource and send an HTTP "201 Created" response with the EcsAddressInfo data structure including the contents of the created ECS Address Configuration Information resource in the response body and a Location header field containing the URI of the created individual ECS Address Configuration Information resource. If the V-NEF receives an error response from the V-UDR, the V-NEF shall not create the resource and shall respond to the AF with a proper error status code. If the V-NEF received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the V-NEF shall relay this error response to the AF with a corresponding application error, if applicable.

4.4.40.3 Modification of existing ECS Address Configuration Information

In order to modify an existing individual ECS Address Configuration Information resource, the AF shall initiate an HTTP PUT request to the "Individual ECS Address Configuration Information" resource. The request body shall include the EcsAddressInfo data structure, which shall include the same contents as described in clause 4.4.30.2.

Upon receipt of the corresponding HTTP PUT request message, the V-NEF authorizes the request and, if an External Group Identifier is provided in the request, the V-NEF may determine the HPLMN of the UE(s) (e.g. based on the Realm in the identifier) and invoke the Nnef_UEId_Get service as described in 3GPP TS 29.591 [73] to retrieve the Internal Group Identifier from the NEF of the HPLMN. Then, if the AF was authorized by the V-NEF to provide the ECS Address Configuration Information, the V-NEF may interact with the V-UDR to update the associated ECS Address Roaming Data by using the Nudr_DataRepository service as defined in 3GPP TS 29.519 [23]. If the request is accepted by the V-UDR and the V-UDR informs the V-NEF with a successful response or if no interaction with the UDR takes place and the V-NEF successfully handles the information locally, the V-NEF shall update the "Individual ECS Address Configuration Information" resource and send an HTTP "200 OK" response with the EcsAddressInfo data structure including the contents of the created ECS Address Configuration Information resource in the response body or an HTTP "204 No Content" response. If the V-NEF receives an error response from the V-UDR, the V-NEF shall not update the resource and shall respond to the AF with a proper error status code. If the V-NEF received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the V-NEF shall relay this error response to the AF with a corresponding application error, if applicable.

4.4.40.4 Deletion of existing Individual ECS Address Configuration Information

In order to delete an existing ECS Address Configuration Information resource, the AF shall send an HTTP DELETE request message to the V-NEF targeting the URI of this "Individual ECS Address Configuration Information" resource. The V-NEF may interact with the V-UDR by invoking the Nudr_DataRepository service as described in 3GPP TS 29.519 [23] to delete the ECS Address Roaming Data in the application data of the V-UDR.

After receiving a successful response from the V-UDR or after successful local handling, the V-NEF shall delete the "Individual ECS Address Configuration Information" resource and shall respond to the AF with an HTTP "204 No Content" response message.

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

4.4.40.5 Deletion of ECS Address Configuration Information based on given criteria

In order to delete existing ECS Address Configuration Information which match given attributes, the AF shall send an HTTP POST request with "{apiRoot}/3gpp-ecs-address/<apiVersion>/remove-ecsaddr" as URI. The POST request body shall contain an EcsAddrDeleteCriteria data structure. The EcsAddrDeleteCriteria data structure provided in the request body shall include at least one of the following:

- an AF identifier within the "afId" attribute;
- a DNN within the "dnn" attribute;
- an S-NSSAI within the "snssai" attribute; and
- ECS Address Configuration Information which, if matched, the matching entries shall be deleted, as "ecsAddrInfo".

Upon the reception of this HTTP POST request, if the NF service consumer is authorized by the V-NEF to delete the ECS Address Configuration Information, the V-NEF shall determine the ECS Address Configuration Information resources that match the provided criteria and may interact with the V-UDR to delete the associated ECS Address Roaming Data by using the Nudr_DataRepository service as defined in 3GPP TS 29.519 [23]. If the request is accepted by the V-UDR and the V-UDR informs the V-NEF with a successful response of if the V-NEF can successfully handle the deletion locally, the V-NEF shall send a HTTP "204 No Content" response. If the V-NEF receives an error code from the V-UDR, the V-NEF shall respond to the AF with a proper 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
MBSGroupMsgDelivery	5.29	MBSGroupMsgDelivery API	TS29522_MBSGroupMsgDelivery.yaml	3gpp-mbs-group-msg	A.27
DNAIMapping	5.30	DNAIMapping API	TS29522_DNAIMapping.yaml	3gpp-dnai-mapping	A.28
PDTQPolicyNegotiation	5.31	PDTQPolicyNegotiation API	TS29522_PDTQPolicyNegotiation.yaml	3gpp-pdtq-policy-negotiation	A.29
MemberUESelectionAssistance	5.32	MemberUESelectionAssistance API	TS29522_MemberUESelectionAssistance.yaml	3gpp-musa	A.30
GroupParametersProvisioning	5.33	Group Parameters Provisioning API	TS29.522_GroupParametersProvisioning.yaml	3gpp-grp-pp	A.31
SliceParamProvision	5.34	Network Slice Parameters Provisioning API	TS29.522_SliceParamProvisioning.yaml	3gpp-slice-pp	A.32

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 5G-only features defined in clause 5.4.4 of 3GPP TS 29.122 [4] may be supported only by the NEF: "LocBdt_5G", "Group_Id", "BdtNotification_5G", "Aspld_5G".
PfdManagement	- The following 5G-only features defined in clause 5.11.4 of 3GPP TS 29.122 [4] may be supported only by the NEF: "FailureLocation_5G".
MonitoringEvent	- The following 5G-only features defined in clause 5.3.4 of 3GPP TS 29.122 [4] may be supported only by the NEF: "Number_of_UEs_in_an_area_notification_5G", "Downlink_data_delivery_status_5G", "Availability_after_DDN_failure_notification_enhancement", "eLCS", "eLCS_en", "NSAC", "MULTIQOS", "EDGEAPP", "UEId_retrieval", "Loss_of_connectivity_notification_5G", "GMEC", "enNB1_5G", "AppDetection_5G", "eNSAC", "QoS_Timing_5G", "ListUE_5G" and "Ranging_SL". - 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 5G-only features defined in clause 5.10.4 of 3GPP TS 29.122 [4] may be supported only by the NEF: "ExpectedUMT_5G", "ExpectedUmtTime_5G", "ScheduledCommType_5G", "UEId_retrieval", "AppExpUeBehaviour".
ChargeableParty	- The following 5G-only features defined in clause 5.5.4 of 3GPP TS 29.122 [4] may be supported only by the NEF: "EthChgParty_5G", "MacAddressRange_5G", "ToSTC_5G". - The "LOSS_OF_BEARER", "RECOVERY_OF_BEARER" and "RELEASE_OF_BEARER" events do not apply for 5G.
AsSessionWithQoS	- The following 5G-only features defined in clause 5.14.4 of 3GPP TS 29.122 [4] may be supported only by the NEF: "EthAsSessionQoS_5G", "QoSMonitoring_5G", "PacketDelayFailureReport", "MacAddressRange_5G", "AlternativeQoS_5G", "TSC_5G", "DisableUENotification_5G", "ExposureToEAS", "AltQoSWithIndParams_5G", "EnEthAsSessionQoS_5G", "enNB_5G", "AltQoSProfilesSupportReport", "ExtQoS_5G", "EnTSCAC", "L4S", "MultiMedia", "PowerSaving", "EnQoSMon", "PDUSetHandling", "RTLatency", "ToSTC_5G", "QoS_Timing_5G" and "GMEC_5G". - The "LOSS_OF_BEARER", "RECOVERY_OF_BEARER" and "RELEASE_OF_BEARER" events do not apply for 5G.
MsisdnLessMoSms	
NpConfiguration	- The following 5G-only features defined in clause 5.13.4 of 3GPP TS 29.122 [4] may be supported only by the NEF: "NpExpiry_5G", "UEId_retrieval".
NIDD	
RacsParameterProvisioning	
ECRControl	- The following 5G-only features defined in clause 5.12.4 of 3GPP TS 29.122 [4] may be supported only by the NEF: "ECR_WB_5G".

5.4 TrafficInfluence API

5.4.0 Introduction

The Nnef_TrafficInfluence service shall use the TrafficInfluence API.

The API URI of TrafficInfluence API shall be:

{apiRoot}/3gpp-traffic-influence/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-traffic-influence".
- "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.

5.4.1 Resources

5.4.1.1 Overview

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.

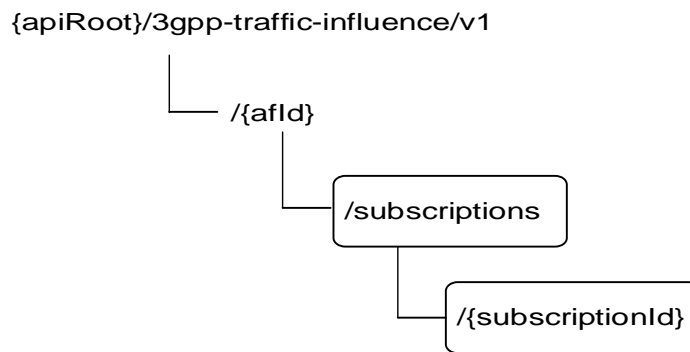


Figure 5.4.1.1-1: Resource URI structure of the TrafficInfluence API

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

5.4.1A Custom Operations without associated resources

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

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.

5.4.2.2.3.2 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.
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.
Metadata	3GPP TS 29.571 [8]	Contains opaque information for the service functions in the N6-LAN that is provided by AF and transparently sent to UPF.
PlmnId	3GPP TS 29.571 [8]	Identifies a PLMN Identifier.
Port	3GPP TS 29.122 [4]	Identifies a port number.
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
TrafficCorrelationInfo	3GPP TS 29.519 [23]	Contains the information for traffic correlation.
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 shall be relocated. - Set to "false" if it shall not be relocated. - 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.	
snsai	Snsai	O	0..1	Identifies an S-NSSAI.	

externalGroupId	ExternalGroupId	O	0..1	Identifies a group of users. (NOTE 2) (NOTE 6)	
externalGroupIds	array(ExternalGroupId)	O	2..N	List of external group identifiers associated with the subscriber. (NOTE 2) (NOTE 6) (NOTE 7)	FinerGranUEs
extSubscCats	array(string)	O	1..N	List of external categories associated with the subscriber. (NOTE 8)	FinerGranUEs
anyUeInd	boolean	O	0..1	Identifies whether the AF request applies to any UE (i.e. all UEs). <ul style="list-style-type: none"> - Set to "true": the AF request is applicable to any UE. - Set to "false": the AF request is not applicable to any UE. - Default value is "false" if omitted. (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	Indicates whether the AF requests the NEF to send a test notification. <ul style="list-style-type: none"> - 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" by the AF to not to request the NEF to send a test notification. - Default value is "false" if omitted. 	Notification_test_event

websocketNotifConfig	WebsocketNotifConfig	O	0..1	Configuration parameters to set up notification delivery over WebSocket protocol.	Notification_websocket
self	Link	C	0..1	Link to the created resource. This parameter shall be supplied by the NEF in HTTP responses that include an object of TrafficInfluSub type	
trafficFilters	array(FlowInfo)	O	1..N	Identifies IP packet filters. (NOTE 3)	
ethTrafficFilters	array(EthFlowDescription)	O	1..N	Identifies Ethernet packet filters. (NOTE 3)	
trafficRoutes	array(RouteToLocation)	O	1..N	Identifies the N6 traffic routing requirement. (NOTE 9)	
sfcdDI	string	O	0..1	Reference to a pre-configured steering of user traffic to service function chain in downlink. (NOTE 5)	SFC
sfcdUI	string	O	0..1	Reference to a pre-configured steering of user traffic to service function chain in uplink. (NOTE 5)	SFC
metadata	Metadata	O	0..1	Contains opaque information for the service functions in the N6-LAN that is provided by AF and transparently sent to UPF. May only be provided when "sfcdDI" and/or "sfcdUI" are provided.	SFC
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. Set to "true" if it should be correlated; otherwise set to "false". Default value is "false" if omitted. (NOTE 4) (NOTE 10)	
tfCorreInfo	TrafficCorrelationInfo	O	0..1	Contains the information for traffic correlation. The "notifUri" and "notifCorrId" attributes are not applicable for "tfCorreInfo" attribute. (NOTE 10)	CommonEAS DNAI
tempValidities	array(TemporalValidity)	O	1..N	Indicates the time interval(s) during which the AF request is to be applied.	
validGeoZones	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(Geographical Area)	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. - "true" indicates that the AF acknowledgement of UP path event is expected. - "false" indicates that the AF acknowledgement of UP path event notification is not expected. - Default value is "false" if omitted.	URLLC
addrPreserInd	boolean	O	0..1	Indicates whether UE IP address shall be preserved. - "true" indicates that the UE IP address shall be preserved. - "false" indicates that the UE IP address shall not be preserved. - Default value is "false" if omitted.	URLLC
simConnInd	boolean	O	0..1	Indication of whether simultaneous connectivity shall be temporarily maintained for the source and target PSA. - "true" indicates that the temporary simultaneous connectivity shall be kept. - "false" indicates that the temporary simultaneous connectivity shall not be kept. - Default value is "false" if omitted.	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_latency
easIpReplacInfos	array(EasIpReplacementInfo)	O	1..N	Contains EAS IP replacement information.	EASIPreplacement
easRedisInd	boolean	O	0..1	Indicates whether the EAS rediscovery is required for the application. - "true" indicates that the EAS rediscovery is required for the application.	EASDiscovery

				<ul style="list-style-type: none"> - "false" indicates that the EAS rediscovery is not required for the application. - Default value is "false" if omitted. <p>The indication shall be invalid after it was applied unless it is provided again.</p>	
eventReq	ReportingInformation	O	0..1	<p>Indicates the event reporting requirements.</p> <p>This attribute may be provided if the "EDGEAPP" feature is supported and the "subscribedEvents" attribute is present.</p>	EDGEAPP
eventReports	array(EventNotification)	C	1..N	<p>Represents user plane path management event report(s).</p> <p>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.</p> <p>This attribute may also be present in an HTTP PUT or PATCH response when the report(s) are available.</p>	EDGEAPP
candDnaiInd	boolean	O	0..1	<p>Indication of reporting candidate DNAI(s). If it is included and set to "true", the candidate DNAI(s) for the PDU session need to be reported. Otherwise, the default value is "false" if omitted.</p>	CommonEAS DNAI
plmnId	PlmnId	O	0..1	<p>Identifies the H-PLMN of the UE.</p>	HR-SBO
portNumber	Port	O	0..1	<p>Indicates the UDP or TCP port number associated with the UE IP address as provided in the "ipv4Addr" or "ipv6Addr" property.</p>	HR-SBO
supFeat	SupportedFeatures	C	0..1	<p>Indicates the list of Supported features used as described in clause 5.4.4.</p> <p>This attribute shall be provided in the POST request and in the response of successful resource creation.</p>	
NOTE 1:	Properties marked with a feature as defined in 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. "externalGroupId" or "externalGroupIds" (is included when FinerGranUEs feature is supported)) or any UE indication "anyUeInd" shall be included.				
NOTE 3:	One of "afAppId", "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.				
NOTE 5:	When the SFC feature is supported, for the purpose of influencing service function chaining, at least one attribute shall be present.				

NOTE 6:	The attributes "externalGroupld" and "externalGrouplds" are mutually exclusive attributes.
NOTE 7:	The AF request applies to the UE(s) that belong to all the External Group Identifiers indicated by the attribute "externalGrouplds", when included.
NOTE 8:	The AF request applies to the UE(s) that belong to all the External Subscriber Categories indicated by the attribute "extSubscCats", which is included only if either "externalGrouplds" attribute is included or "externalGroupld" is included or "anyUelnd" attribute is included.
NOTE 9:	When only one DNAI is included, and the Indication of traffic correlation within the "tfcCorrInd" attribute is available or the "corrType" attribute of the "tfcCorreInfo" includes the value "COMMON_DNAI", the DNAI is used as common DNAI for UEs identified by AF request.
NOTE 10:	The "tfcCorrInd" attribute and the "tfcCorreInfo" attribute are mutually exclusive.

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 should be relocated once a location of the application has been selected. - "true" indicates that an application shall be relocated once a location of the application has been selected. - "false" indicates that an application shall not be relocated once a location of the application has been selected. (NOTE 1)	
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 1)	
sfcdDI	string	O	0..1	Reference to a pre-configured steering of user traffic to service function chain in downlink.	SFC
sfcdUI	string	O	0..1	Reference to a pre-configured steering of user traffic to service function chain in uplink.	SFC
metadata	Metadata	O	0..1	Contains opaque information for the service functions in the N6-LAN that is provided by AF and transparently sent to UPF.	SFC
tfcCorrInd	boolean	O	0..1	Indication of traffic correlation. May only be included when "externalGroupld" attribute was included within the TrafficInfluSub data type previously. - "true" indicates that for the group of UEs, the targeted PDU sessions should be correlated by a common DNAI. - "false" indicates that for the group of UEs, the targeted PDU sessions should not be correlated by a common DNAI. (NOTE 2)	CommonEASDNAI

ffcCorreInfo	TrafficCorrelationInfo	O	0..1	Contains the information for traffic correlation. The "notifUri" and "notifCorrId" attributes are not applicable for "ffcCorreInfo" attribute. (NOTE 2)	CommonEASD NAI
tempValidities	array(Temporal Validity)	O	1..N	Indicates the time interval(s) during which the AF request is to be applied. (NOTE 1)	
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 1) 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 1) This attribute deprecates validGeoZonelds attribute.	
afAckInd	boolean	O	0..1	Identifies whether the AF acknowledgement of UP path event notification is expected. - "true" indicates that the AF acknowledgement of UP path event notification is expected. - "false" indicates that the AF acknowledgement of UP path event notification is not expected. (NOTE 3)	URLLC
addrPreserInd	boolean	O	0..1	Indicates whether UE IP address shall be preserved. - "true" indicates that the UE IP address shall be preserved. - "false" indicates that the UE IP address shall not be preserved. (NOTE 3)	URLLC
simConnInd	boolean	O	0..1	Indication of whether simultaneous connectivity shall be temporarily maintained for the source and target PSA. - "true" indicates that temporary simultaneous connectivity shall be kept. - "false" indicates that the temporary simultaneous connectivity shall not 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
easIpReplacInfos	array(EasIpReplacementInfo)	O	1..N	Contains EAS IP replacement information.	EASIPreplacement
easRedisInd	boolean	O	0..1	Indicates whether the EAS rediscovery is required for the application.	EASDiscovery

				<ul style="list-style-type: none"> - "true" indicates that the EAS rediscovery is required for the application. - "false" indicates that the EAS rediscovery is not required for the application. <p>The indication shall be invalid after it was applied unless it is provided again.</p>	
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
<p>NOTE 1: The value of the property shall be set to NULL for removal.</p> <p>NOTE 2: The "tfcCorrInd" attribute and the "tfcCorrelInfo" attribute are mutually exclusive.</p> <p>NOTE 3: The value of the property shall be set to NULL for removal, and in that case, the default value "false" applies.</p>					

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).	
candidateDnais	array(Dnai)	O	1..N	The candidate DNAI(s) for the PDU Session. May be included for event "UP_PATH_CHANGE".	CommonEASD NAI
candDnaisPriInd	boolean	O	0..1	If provided and set to "true", it indicates that the candidate DNAs provided in the "candidateDnais" attribute are in descending priority order, i.e. the lower the array index the higher the priority of the respective	CommonEASD NAI

				DNAI. If omitted, the default value is "false". It may only be provided if the "candidateDnais" attribute is provided and the "dnaiChgType" attribute is set to the value "EARLY".	
easRediscoverInd	boolean	O	0..1	Indication of EAS re-discovery. If present and set to "true", it indicates the EAS re-discovery is performed, e.g. due to change of common EAS. Default value is "false" if omitted. May be included for event "UP_PATH_CHANGE".	CommonEASDNAI
gpsi	Gpsi	O	0..1	Identifies a user.	
srcUelpv4Addr	Ipv4Addr	O	0..1	The IPv4 Address of the served UE for the source DNAI.	
srcUelpv6Prefix	Ipv6Prefix	O	0..1	The Ipv6 Address Prefix of the served UE for the source DNAI.	
tgtUelpv4Addr	Ipv4Addr	O	0..1	The IPv4 Address of the served UE for the target DNAI.	
tgtUelpv6Prefix	Ipv6Prefix	O	0..1	The Ipv6 Address Prefix of the served UE for the target DNAI.	
ueMac	MacAddr48	O	0..1	UE MAC address of the served UE.	
afAckUri	Link	O	0..1	The URI provided by the NEF for the AF acknowledgement. May only be included for event "UP_PATH_CHANGE".	URLLC
<p>NOTE 1: Properties marked with a feature as defined in 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.</p> <p>NOTE 2: If the DNAI is not changed while the N6 traffic routing information is changed, the "sourceDnai" attribute and "targetDnai" attribute shall not be provided.</p> <p>NOTE 3: The change from the UP path status where no DNAI applies to a status where a DNAI applies indicates the activation of the related AF request and therefore only the target DNAI and N6 traffic routing information is provided in the event notification; the change from the UP path status where a DNAI applies to a status where no DNAI applies indicates the de-activation of the related AF request and therefore only the source DNAI and N6 traffic routing information is provided in the event notification.</p>					

5.4.3.3.5 Type: AfResultInfo

Table 5.4.3.3.5-1: Definition of type AfResultInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
afStatus	AfResultStatus	M	1	Identifies the result of the application relocation.	
trafficRoute	RouteToLocation	O	0..1	Identifies the N6 traffic routing information associated to the target DNAI. May only be present if the "afStatus" sets to "SUCCESS".	
upBuffInd	boolean	O	0..1	Indicates whether buffering of uplink traffic to the target DNAI is needed. <ul style="list-style-type: none"> - "true" indicates that buffering of uplink traffic to the target DNAI is needed. - "false" indicates that buffering of uplink traffic to the target DNAI is not needed. - Default value is "false" if omitted. This attribute may only be present if the "afStatus" is set to "SUCCESS".	ULBuffering

easIpReplaceInfos	array(EasIpReplacementInfo)	O	1..N	Contains EAS IP replacement information.	EASIPreplacement
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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).
12	SFC	This feature indicates support for application function influence on service function chaining(s).
13	FinerGranUEs	This feature indicates support for handling of more granular set of UEs.
14	CommonEASDNAI	This feature controls the support of the common EAS/DNAI selection.
15	HR-SBO	This feature indicates the support of HR-SBO scenarios.
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

5.5.0 Introduction

The Nnef_NiddConfigurationTrigger service shall use the NiddConfigurationTrigger API.

The API URI of NiddConfigurationTrigger API shall be:

{apiRoot}/3gpp-nidd-configuration-trigger/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-nidd-configuration-trigger".
- "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.

5.5.1 Resources

There is no resource defined for this API in this release of the specification.

5.5.1A Custom Operations without associated resources

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

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)
afId	string	M	1	Identifies the trigger receiving entity.	
nefId	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

5.6.0 Introduction

The Nnef_AnalyticsExposure service shall use the AnalyticsExposure API.

The API URI of AnalyticsExposure API shall be:

{apiRoot}/3gpp-analyticsexposure/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-analyticsexposure".
- "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.

5.6.1.1 Overview

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.

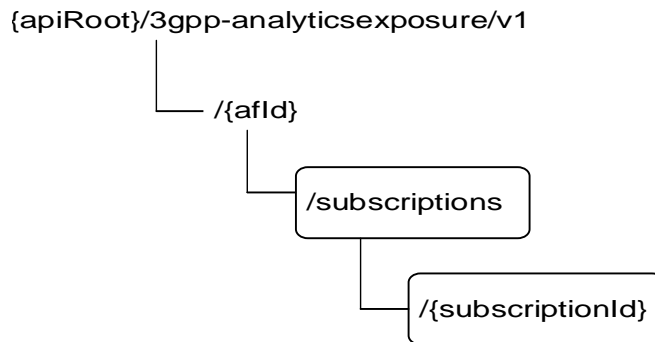


Figure 5.6.1.1-1: Resource URI structure of the AnalyticsExposure API

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	Retrieve all the subscriptions to analytics exposure for a given AF.
		POST	Create a new subscription to analytics exposure.
Individual Analytics Exposure Subscription	//{afId}/subscriptions /{subscriptionId}	GET	Retrieve an existing subscription to analytics exposure.
		PUT	Update an existing subscription to analytics exposure.
		DELETE	Delete an existing 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].
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 5.6.5.				

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	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 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/{afId}/subscriptions/{subscriptionId}

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

Table 5.6.1.3.2-1: Resource URI variables for this resource

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

5.6.1.3.3 Resource Methods

5.6.1.3.3.1 General

The following 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	403 Forbidden	(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/{afld}/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	403 Forbidden	(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	5.6.3.3.4	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
TargetUeld	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
WlanPerformInfo	5.6.3.3.21	Prpresents WLAN performance information	WlanPerformance_AIML

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	Applicability
AccuracyInfo	3GPP TS 29.520 [27]	The analytics accuracy information.	
AccuracyReq	3GPP TS 29.520 [27]	Represents the analytics accuracy requirement information.	
AdditionalMeasurement	3GPP TS 29.520 [27]	Represents additional measurement information.	
AddrFqdn	3GPP TS 29.517 [58]	Represents an IP address and/or an FQDN.	ServiceExperience DnPerformance
AnalyticsFeedbackInfo	3GPP TS 29.520 [27]	Represents analytics feedback information.	
AnalyticsSubset	3GPP TS 29.520 [27]	Represents an analytics Subset used to indicate the content of the analytics.	EneNA
ApplicationId	3GPP TS 29.571 [8]	Contains the application identifier.	Abnormal_Behavior Ue_Communication Dispersion DnPerformance ServiceExperience E2eDataVoITransTime NSLoad
BitRate	3GPP TS 29.571 [8]	Represents a bit rate.	
BwRequirement	3GPP TS 29.520 [27]	Represents bandwidth requirements.	ServiceExperience
CongestionType	3GPP TS 29.520 [27]	Represents a congestion analytics type.	
DateTime	3GPP TS 29.122 [4]	Represents a date and a time.	
DirectionInfo	3GPP TS 29.520 [27]	Represents the UE direction information	UeMobilityExt_AIML
DispersionInfo	3GPP TS 29.520 [27]	Dispersion information.	Dispersion
DispersionRequirement	3GPP TS 29.520 [27]	Dispersion requirement.	Dispersion
Dnai	3GPP TS 29.571 [8]	Identifies a user plane access to one or more DN(s).	DnPerformance ServiceExperience E2eDataVoITransTime

Dnn	3GPP TS 29.571 [8]	Represents a DNN.	Ue_Communication Abnormal_Behavior DnPerformance ServiceExperience E2eDataVolTransTime
DnPerfInfo	3GPP TS 29.520 [27]	DN Performance information.	DnPerformance
DnPerformanceReq	3GPP TS 29.520 [27]	DN Performance requirement.	DnPerformance
DurationSec	3GPP TS 29.122 [4]	Seconds of duration.	EneNA NetworkPerfExt_eNA Ue_MobilityExt_eNA CongestionExt_eNA QoS_SustainabilityExt_eNA DispersionExt_eNA DnPerformanceExt_eNA
EventReportingRequirement	3GPP TS 29.520 [27]	Represents the required type of reporting.	
ExternalGroupld	3GPP TS 29.122 [4]	External Group Identifier for a user group.	Abnormal_BehaviorUe_Mobility Ue_Communication Network_Performance Dispersion DnPerformance ServiceExperience
Exception	3GPP TS 29.520 [27]	Represents exception information.	
ExceptionId	3GPP TS 29.520 [27]	Represents the identifier of an exception.	Abnormal_Behavior
ExpectedAnalyticsType	3GPP TS 29.520 [27]	Represents the exception's trend.	Abnormal_Behavior
ExpectedUeBehaviourData	3GPP TS 29.503 [17]	Represents the expected UE behaviour data.	Abnormal_Behavior
Float	3GPP TS 29.571 [8]	Represents a number with the "float" format.	
GeoDistributionInfo	3GPP TS 29.520 [27]	Represents the geographical distribution of the UEs.	UeMobilityExt_AIML
GeographicalArea	5.17.3.3.4	Identifies the geographical information with shapes.	ServiceExperienceExt_eNA Ue_MobilityExt_eNA QoS_SustainabilityExt_eNA
Gpsi	3GPP TS 29.571 [8]	Identifies a GPSI.	Abnormal_Behavior Congestion Ue_Mobility Ue_Communication Network_Performance Dispersion DnPerformance ServiceExperience
LocationArea5G	3GPP TS 29.122 [4]	Represents a user location area when the UE is attached to 5G.	Abnormal_BehaviorExt_eNA DnPerformanceExt_eNA ServiceExperienceExt_eNA UeCommunicationExt_eNA E2eDataVolTransTime NSLoad
LocInfoGranularity	3GPP TS 29.520 [27]	Represents the preferred granularity of location information.	ServiceExperienceExt_eNA Ue_MobilityExt_eNA DispersionExt_eNA
MatchingDirection	3GPP TS 29.520 [27]	Matching direction	QoS_Sustainability Congestion, Network_Performance NSLoad
MovBehavInfo	3GPP TS 29.520 [27]	Represents the Movement Behaviour information.	MovementBehaviour
MovBehavReq	3GPP TS 29.520 [27]	Represents the Movement Behaviour analytics requirements.	MovementBehaviour
NetworkPerfRequirement	3GPP TS 29.520 [27]	Represents a network performance requirement.	Network_Performance
NsildInfo	3GPP TS 29.520 [27]	Represents the S-NSSAI and the optionally associated	ServiceExperience DnPerformance

		Network Slice Instance Identifier(s).	NSLoad
NsiLoadLevelInfo	3GPP TS 29.520 [27]	Represents the network slice load level information.	NSLoad
NwdafFailureCode	3GPP TS 29.520 [27]	Identifies the analytics failure reason.	
PduSessionInfo	3GPP TS 29.520 [27]	Identifies combination of PDU Session parameters information.	ServiceExperienceExt_eNA
ProblemDetails	3GPP TS 29.122 [4]	Represents error related information.	
ProblemDetailsAnalyticsInfoRequest	3GPP TS 29.520 [27]	Represents an extension to the ProblemDetails data structure with additional information on why the analytics request is rejected	
QosRequirement	3GPP TS 29.520 [27]	Represents QoS requirements.	QoS_Sustainability E2eDataVolTransTime
RatFreqInformation	3GPP TS 29.520 [27]	Represents the RAT type and/or Frequency information.	ServiceExperience
RelProxInfo	3GPP TS 29.520 [27]	Represents the Relative Proximity information.	RelProxInfo
RelProxReq	3GPP TS 29.520 [27]	Represents the Relative Proximity analytics requirements.	RelProxReq
ReportingInformation	3GPP TS 29.523 [22]	Describes the analytics reporting requirement information.	
ResourceUsageRequirement	3GPP TS 29.520 [27]		NetworkPerformanceExt_AIML
RetainabilityThreshold	3GPP TS 29.520 [27]	Represents a QoS flow retainability threshold.	QoS_Sustainability
SamplingRatio	3GPP TS 29.571 [8]	Indicates Sampling Ratio.	
ScheduledCommunicationTime	3GPP TS 29.122 [4]	Represents an offered scheduled communication time.	
ServiceExperienceInfo	3GPP TS 29.520 [27]	Represents the service experience information.	ServiceExperience
Snsai	3GPP TS 29.571 [8]	Represents an S-NSSAI.	UeCommunication QoS_Sustainability Abnormal_Behavior Congestion Dispersion ServiceExperience DnPerformance E2eDataVolTransTime NSLoad
SupportedFeatures	3GPP TS 29.571 [8]	Used to negotiate the applicability of the optional features.	
TermCause	3GPP TS 29.520 [27]	Cause for requesting the termination of a subscription.	TermRequest
ThresholdLevel	3GPP TS 29.520 [27]	Represents a threshold level.	Congestion
TimeWindow	3GPP TS 29.122 [4]	Represents a time window.	NetworkPerfExt_eNA
TopApplication	3GPP TS 29.520 [27]	Top application that contributes the most to the traffic.	CongestionExt
UeCommunication	3GPP TS 29.520 [27]	Represents UE communication information.	Ue_Communication
UeCommReq	3GPP TS 29.520 [27]	UE communication analytics requirement.	UeCommunicationExt_eNA
UeMobilityReq	3GPP TS 29.520 [27]	UE mobility analytics requirement.	Ue_MobilityExt_eNA
UInteger	3GPP TS 29.571 [8]	Unsigned integer.	
Uri	3GPP TS 29.122 [4]	Identifies a referenced resource.	

UserDataCongestReq	3GPP TS 29.520 [27]	The User Data Congestion requirement.	CongestionExt_eNA
UserDataConOrderCrit	3GPP TS 29.520 [27]	The ordering criterion for the list of User Data Congestion analytics.	CongestionExt_eNA
WlanPerformanceReq	3GPP TS 29.520 [27]	Represents the WLAN performance analytics requirement.	
WlanPerSsidPerformanceInfo	3GPP TS 29.520 [27]	WLAN performance information per SSID of WLAN access points deployed in the Area of Interest.	
WlanPerUeldPerformanceInfo	3GPP TS 29.520 [27]	WLAN performance information per UE ID of WLAN access points deployed in the Area of Interest.	

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.	
analyRepInfo	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 "analyRepInfo" attribute sets to true during the event subscription, and the reports are available.	
failEventReports	array(AnalyticsFailureEventInfo)	O	1..N	Supplied by the NWDAF. When available, shall contain the event(s) for which the subscription is not successful, including the failure reason(s).	

suppFeat	SupportedFeatures	C	0..1	Indicates the list of Supported features used as described in 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]. The default value is "false" if omitted.	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.	
termCause	TermCause	O	0..1	A cause for which the NEF will send no further notifications for this subscription. Its presence indicates that the NEF requests the termination of the subscription.	TermRequest

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	NwdafFailureCode	C	0..1	Identifies the failure reason for the event notification.	EneNA

				It shall only be included if the event notification is failed or the analytics information is not ready. (NOTE 1)	
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". (NOTE 5)	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". (NOTE 4)	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

locArea	LocationArea5G	O	0..1	Identification of locationarea to which the notification applies within the subscribed location area. (NOTE 3)	Abnormal_BehaviorExt_eNA DnPerformanceExt_eNA ServiceExperienceExt_eNA UeCommunicationExt_eNA E2eDataVolTransTime NSLoad
dataVITrnsTmfs	array(E2eDataVolTransTimeInfo)	C	1..N	E2E data volume transfer time information. Shall be present if the subscribed event is "E2E_DATA_VOL_TRANS_TIME".	E2eDataVolTransTime
accuInfo	AccuracyInfo	C	0..1	The analytics accuracy information. It shall be provided when accuracyReq was provided in the subscription request.	AnalyticsAccuracy
movBehavInfos	array(MovBehaviourInfo)	C	1..N	The Movement Behaviour information. Shall be present if the "analyEvent" attribute is set to "MOVEMENT_BEHAVIOUR".	MovementBehaviour
relProxInfos	array(RelProximityInfo)	C	1..N	The Relative Proximity information. Shall be present if the "analyEvent" attribute is set to "RELATIVE_PROXIMITY". The "supis" attribute inside the RelProximity data type is not applicable in this API and only the "gpsis" attribute can be used.	RelativeProximity
wlanInfos	array(WlanPerformanceInfo)	C	1..N	The WLAN performance related information. Shall be present if the "analyEvent" attribute is set to "WLAN_PERFORMANCE".	WlanPerformance_AIML
pauseInd	boolean	O	0..1	Pause analytics consumption indication applicable on analytics ID level. Set to "true" to indicate the consumer to stop the consumption of the analytics because the accuracy level needs to be increased. Default value is "false" if omitted.	AnalyticsAccuracy
resumeInd	boolean	O	0..1	Resume analytics consumption indication applicable on analytics ID level. Set to "true" to indicate the consumer to resume the consumption of the analytics because the accuracy has been improved. Default value is "false" if omitted.	AnalyticsAccuracy
nsiLoadLevelData	array(NsiLoadLevelInfo)	C	1..N	Identifies the load level information for each S-NSSAI. This attribute shall be present if the subscribed event is "NS_LOAD_LEVEL". (NOTE 6)	NSLoad

NOTE 1: The values of "BOTH_STAT_PRED_NOT_ALLOWED" of the NwdafFailureCode data type is not applicable for the "failNotifyCode" attribute. The value of "UNAVAILABLE_DATA" of the

NwdafFailureCode data type is applicable for the "failNotifyCode" attribute only when the "StatisticsFailure" feature is supported.

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.

NOTE 3: The NetworkAreaInfo data type within the "locArea" attribute is not applicable for the untrusted AF unless the corresponding SLA is agreed between the operator and application provider. The NEF may translate the network area information (received from the NWDAF, e.g. for "ABNORMAL_BEHAVIOR", "DN_PERFORMANCE", "SERVICE_EXPERIENCE", "UE_COMM" or "NS_LOAD_LEVEL" event) to an external representation of the area, which is provided within the "locArea" attribute.

NOTE 4: The "minTrafficRate", "aggTrafficRate", "varTrafficRate", "trafRateUelds", "avePacketDelay", "maxPacketDelay", "varPacketDelay", "packDelayUelds", "maxPacketLossRate", "varPacketLossRate" and "packetLossUelds" attribute(s) within the DnPerfInfo data type is applicable only if the "DnPerformanceExt_AIML" feature is supported.

NOTE 5: If the "UeMobilityExt_eNA" feature is supported and the "locGranularity" attribute value "LON_AND_LAT_LEVEL" is subscribed, the "geoLoc" attribute within the "UeMobility" type may be provided to report the geographical location (longitude and latitude level).

NOTE 6: When the "NSLoad" feature is supported, the "nsild" attribute of the NsiLoadLevelInfo data structure is not applicable for the "NS_LOAD_LEVEL" event within each array element of this attribute.

Editor’s note: The encoding of the nsiLoadLevelInfos attribute is FFS.

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.	
tgtUe	TargetUeld	O	0..1	Identifies target UE information	

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) (NOTE 14)	Abnormal_Behavior Congestion Ue_Communication Ue_Mobility QoS_Sustainability Network_Performance Dispersion DnPerformance ServiceExperience E2eDataVolTransTime MovementBehaviour RelativeProximity
fineGranAreas	array(GeographicalArea)	O	1..N	Indicates the fine granularity areas to which the subscription applies. (i.e. with a finer granularity than cell). (NOTE 1, NOTE 14)	ServiceExperienceExt_eNA Ue_MobilityExt_eNA QoS_SustainabilityExt_eNA
dnn	Dnn	O	0..1	Identifies the DNN. (NOTE 7)	Ue_Communication Abnormal_Behavior ServiceExperience DnPerformance RelativeProximity
dnns	array(Dnn)	O	1..N	Identifies the DNN(s) to which the subscription applies. (NOTE 7)	UeCommunicationExt_eNA Abnormal_BehaviorExt_eNA

					ServiceExperienceExt_eNA DnPerformanceExt_eNA E2eDataVolTransTime
dnais	array(Dnai)	O	1..N	Identification(s) of user plane access to DN(s) which the subscription applies.	DnPerformance ServiceExperience E2eDataVolTransTime
appls	array(ApplicationId)	O	1..N	Each element identifies an application. (NOTE 7) (NOTE 13)	Abnormal_Behavior Ue_CommunicationDispersion DnPerformance ServiceExperience E2eDataVolTransTime NSLoad
dataVITrnsTmRqs	array(E2eDataVolTransTimeReqs)	O	1..N	Represents the E2E data volume transfer time requirements	E2eDataVolTransTime
excepReqs	array(Exception)	O	1..N	Represents a list of Exception Ids with associated thresholds. (NOTE 2, NOTE 3)	Abnormal_Behavior
exptAnaType	ExpectedAnalyticsType	O	0..1	Represents expected UE analytics type. (NOTE 3)	Abnormal_Behavior
exptUeBehav	ExpectedUeBehaviourData	O	0..1	Represents expected UE behaviour.	Abnormal_Behavior
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 NSLoad
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 subscribed event is "NETWORK_PERFORMANCE".	Network_Performance
snssai	Snssai	O	0..1	Identifies the network slice information. (NOTE 7)	UeCommunication QoS_Sustainability Abnormal_Behavior Congestion Dispersion ServiceExperience DnPerformance
snssais	array(Snssai)	O	1..N	Identifies the network slice information. (NOTE 7)	Ue_CommunicationExt_eNA QoS_SustainabilityExt_eNA Abnormal_BehaviorExt_eNA CongestionExt_eNA DispersionExt_eNA ServiceExperienceExt_eNA DnPerformanceExt_eNA E2eDataVolTransTime RelativeProximity
nsildInfos	array(NsildInfo)	O	1..N	Each element identifies the S-NSSAI and the optionally associated network slice instance(s).	ServiceExperience DnPerformance NSLoad

				May be included when subscribed event is "SERVICE_EXPERIENCE", "DN_PERFORMANCE" or "NS_LOAD_LEVEL". (NOTE 15)	
qosReq	QosRequirement	C	0..1	Represents the QoS requirements. This attribute shall be included when subscribed event is "QOS_SUSTAINABILITY".	QoS_Sustainability E2eDataVolTransTime
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
bwReqs	array(BwRequirement)	O	1..N	Represents the bandwidth requirement for each application.	ServiceExperience
ratFreqs	array(RatFreqInfo)	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
appServerAdrs	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
wlanReqs	array(WlanPerformanceReq)	O	1..N	Represents WLAN performance analytics requirements.	WlanPerformance_A IML
listOfAnaSubsets	array(AnalyticsSubset)	O	1..N	The list of analytics subsets can be used to indicate the content of the analytics. (NOTE 12)	EneNA
extraReportReq	EventReportingRequirement	O	0..1	The extra event reporting requirement information. (NOTE 6)	
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 element 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 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

ueCommReqs	array(UeCommReq)	O	1..N	Represents the UE communication requirements. This attribute may be included when the subscribed event is "UE_COMM".	UeCommunicationExt_eNA
userDataConOrderCri	UserDataConOrderCrit	O	0..1	The ordering criterion for the list of User Data Congestion analytics. (NOTE 11)	CongestionExt_eNA
locGranularity	LocInfoGranularity	O	0..1	The preferred granularity of UE location information.	ServiceExperienceExt_eNA Ue_MobilityExt_eNA DispersionExt_eNA
locOrientation	LocationOrientation	O	0..1	Indicates the preferred orientation of location information.	Ue_MobilityExt_eNA MovementBehaviour
ueMobilityReqs	array(UeMobilityReq)	O	1..N	Represents the UE mobility requirements. This attribute may be included when the subscribed event is "UE_MOBILITY".	Ue_MobilityExt_eNA
movBehavReqs	array(MovBehavReq)	O	1..N	Represents the Movement Behaviour analytics requirements.	MovementBehaviour
relProxReqs	array(RelProxReq)	O	1..N	Represents the Relative Proximity analytics requirements.	RelativeProximity
pduSesInfos	array(PduSessionInfo)	O	1..N	Represents combination of PDU Session parameters information. (NOTE 13)	ServiceExperienceExt_eNA
useCaseCxt	string	O	0..1	Indicates the context of usage of the analytics. The value and format of this parameter are not standardized.	ENAExt
accuReq	AccuracyReq	O	0..1	Represents the analytics accuracy requirement information.	AnalyticsAccuracy
pauseFlg	boolean	O	0..1	Pause analytics consumption flag and is applicable on analytics ID level. Set to "true" to indicate the NWDAF to stop including analytics of this event type in its notifications (without cancelling the subscription), because the accuracy level needs to be increased. Default value is "false" if omitted. This attribute may be present in a update request message if the "pauseInd" attribute was provided in the notification.	AnalyticsAccuracy
resumeFlg	boolean	O	0..1	Resume analytics consumption flag and is applicable on analytics ID level. Set to "true" to indicate the NWDAF to resume sending the notifications of analytics because the accuracy has been improved. Default value is "false" if omitted. This attribute may be present in a update request message if the "resumeInd" attribute was provided in the notification.	AnalyticsAccuracy
temporalGranSize	DurationSec	O	0..1	Indicates the minimum duration of each time slot for which the analytics are provided.	NetworkPerfExt_eNA Ue_MobilityExt_eNA CongestionExt_eNA QoS_SustainabilityExt_eNA DispersionExt_eNA DnPerformanceExt_eNA

spatialGranSizeT a	UInteger	O	0..1	Indicates the maximum number of TAs used to define an area for which the analytics are provided. May be included when the "networkArea" attribute in the EventSubscription data type is provided.	NetworkPerfExt_eNA Ue_MobilityExt_eNA UeCommunicationExt_eNA QoS_SustainabilityExt_eNA DispersionExt_eNA DnPerformanceExt_eNA
spatialGranSize Cell	UInteger	O	0..1	Indicates the maximum number of cells used to define an area for which the analytics are provided. May be included when the "networkArea" attribute in the EventSubscription data type is provided.	NetworkPerfExt_eNA Ue_MobilityExt_eNA UeCommunicationExt_eNA QoS_SustainabilityExt_eNA DispersionExt_eNA DnPerformanceExt_eNA
feedback	AnalyticsFeedbackInfo	O	0..1	Analytics feedback information. It may only be provided in requests to update an existing analytics subscription for predictions.	AnalyticsAccuracy

- NOTE 1: The NetworkAreaInfo within the "locArea" attribute is not applicable for the untrusted AF. For "NETWORK_PERFORMANCE" or "CONGESTION" or "E2E_DATA_VOL_TRANS_TIME" 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" or "MOVEMENT_BEHAVIOUR" event, at least one of the "locArea" attribute and "fineGranAreas" attribute shall be provided.
- NOTE 2: Only "exceptId" and "exceptLevel" within the Exception data type apply to the "exceptReques" attribute.
- NOTE 3: Either "exceptReques" 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 "analyRepInfo" sets to "ON_EVENT_DETECTION" or omitted.
- NOTE 5: For "QOS_SUSTAINABILITY", this property shall be provided if the "notifMethod" in "analyRepInfo" is set to "ON_EVENT_DETECTION" or omitted.
- NOTE 6: The "sampRatio" attribute and the "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 "exceptReques" attribute is mobility related;
 - at least one of the "locArea", "appls", "dnn", "dnns", "snssai" and "snssais" attribute should be included, if the expected analytics type via the "exptAnaType" attribute or the list of Exception Ids via the "exceptReques" attribute is communication related;
 - the expected analytics type via the "exptAnaType" attribute or the list of Exception Ids via "exceptReques" attribute shall not be requested for both mobility and communication related analytics at the same time.
 - "dnns" and "snssais" is mutually exclusive for "dnn" and "snssai". "dnn" and "snssai" are available for the backward compatibility to the previous release of this specification.
- 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).
- NOTE 11: If the the value of "userDataConOrderCri" attribute is "APPLICABLE_TIME_WINDOW", the "ASCENDING" direction indicates that the list of User Data Congestion analytics are in chronological order and the "DESCENDING" direction indicates that the list of User Data Congestion analytics are in reverse chronological order.
- NOTE 12: The "AGG_TRAFFIC_RATE", "VAR_TRAFFIC_RATE", "VAR_PACKET_DELAY", "MAX_PACKET_LOSS_RATE" and "VAR_PACKET_LOSS_RATE" enumeration value(s) within the AnalyticsSubset data type is applicable only if the "DnPerformanceExt_AIML" feature is supported.
- NOTE 13: When the "pduSesInfos" attribute is provided, the associated "appls" attribute shall also be provided for the NWDAF to be able to compute the service experience per application.

NOTE 14: If both "locArea" and "fineGranAreas" attributes are provided, the Area of Interest is interpreted as the intersection area indicated by these two attributes.
 NOTE 15: When the "NSLoad" feature is supported, only the "snssai" attribute of the NsildInfo data structure is applicable for the "NS_LOAD_LEVEL" event within each array element of this attribute.

5.6.3.3.7 Type TargetUeld

Table 5.6.3.3.7-1: Definition of type TargetUeld

Attribute name	Data type	P	Cardinality	Description	Applicability
anyUelnd	boolean	C	0..1	Identifies whether the AF request applies to any UE. - Set to "true": the AF request is applicable to any UE. - Set to "false": the AF request is not applicable to any UE. - Default value is "false" if omitted.	Abnormal_Behavior Congestion Network_Performance QoS_Sustainability Dispersion DnPerformance ServiceExperience WlanPerformance_A IML
gpsi	Gpsi	C	0..1	Identifies a GPSI for an UE.	Abnormal_Behavior Congestion Ue_Mobility Ue_Communication Network_Performance Dispersion DnPerformance ServiceExperience WlanPerformance_A IML RelativeProximity
exterGroupld	ExternalGroupld	C	0..1	Represents an external group identifier and identifies a group of UEs.	Abnormal_Behavior Ue_Mobility Ue_Communication Network_Performance Dispersion DnPerformance ServiceExperience WlanPerformance_A IML RelativeProximity

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. (NOTE 3)	
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 4)	
directionInfos	array(DirectionInfo)	O	1..N	This attribute includes a list of UE direction information.	UeMobilityExt_AIML
<p>NOTE 1: Either ts or recurringTime shall be provided.</p> <p>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.</p> <p>NOTE 3: If the "temporalGranSize" attribute is provided in the request, the duration indicated by the "duration" attribute shall be greater than or equal to the value of the "temporalGranSize" attribute.</p> <p>NOTE 4: If the "spatialGranSizeTa" and/or "spatialGranSizeCell" attributes are provided in the request, the number of TAs or cells contained in "locInfo" attribute shall be smaller than or equal to the values of the "spatialGranSizeTa" and/or "spatialGranSizeCell" attributes.</p>					

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. (NOTE 3)	
geoLoc	GeographicalArea	O	0..1	This attribute contains the geographical location in a fine granularity (e.g. smaller than a cell). (NOTE 2) (NOTE 3)	Ue_MobilityExt_eNA ServiceExperienceExt_eNA DispersionExt_eNA
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 1) Shall be present if the analytics result is a prediction. Minimum = 0. Maximum = 100.	
geoDistrInfos	array(GeoDistributionInfo)	O	1..N	Indicates the geographical distribution of the UEs that may be selected by the AF for application service.	UeMobilityExt_AIML
<p>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.</p> <p>NOTE 2: When possible and applicable to the access type, the UE location is provided according to the preferred granularity subscribed or requested in the "locGranularity" attribute.</p> <p>NOTE 3: When the "geoLoc" attribute is present, the "loc" attribute shall be ignored.</p>					

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.	
supFeat	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, NOTE 10)	Ue_Mobility Ue_Communication Network_Performance QoS_Sustainability Abnormal_Behavior Congestion Dispersion DnPerformance ServiceExperience E2eDataVolTransTim MovementBehaviour RelativeProximity
eGranAreas	array(GeographicalArea)	O	1..N	Indicates the fine granularity areas to which the request applies. (i.e. with a finer granularity than cell). (NOTE 2, NOTE 10)	ServiceExperienceExt_eNA Ue_MobilityExt_eNA QoS_SustainabilityExt_eNA
nporalGranSize	DurationSec	O	0..1	Indicates the minimum duration of each time slot for which the analytics are provided.	NetworkPerfExt_eNA Ue_MobilityExt_eNA CongestionExt_eNA QoS_SustainabilityExt_eNA DispersionExt_eNA DnPerformanceExt_eNA
atialGranSizeTa	UInteger	O	0..1	Indicates the maximum number of TAs used to define an area for which the analytics are provided. May be included when the "networkArea" attribute in the EventSubscription data type is provided.	NetworkPerfExt_eNA Ue_MobilityExt_eNA UeCommunicationExt_eNA QoS_SustainabilityExt_eNA DispersionExt_eNA DnPerformanceExt_eNA
atialGranSizeCell	UInteger	O	0..1	Indicates the maximum number of cells used to define an area for which the analytics are provided. May be included when the "networkArea" attribute in the EventSubscription data type is provided.	NetworkPerfExt_eNA Ue_MobilityExt_eNA UeCommunicationExt_eNA QoS_SustainabilityExt_eNA

				DispersionExt_eNA DnPerformanceExt_eNA A	
dnn	Dnn	O	0..1	Identifies the DNN. (NOTE 3)	Ue_Communication Abnormal_Behavior DnPerformance ServiceExperience
dnnS	array(Dnn)	O	1..N	Identifies the DNN. (NOTE 3)	UeCommunicationExt_eNA Abnormal_BehaviorExt_eNA DnPerformanceExt_eNA ServiceExperienceExt_eNA E2eDataVolTransTimeRelativeProximity
dnais	array(Dnai)	O	1..N	Identification(s) of user plane access to DN(s) which the subscription applies.	DnPerformance ServiceExperience E2eDataVolTransTime
nwPerfTypes	array(NetworkPerfType)	C	1..N	Represents the network performance requirements. This attribute shall be included when requested event is "NETWORK_PERFORMANCE".	Network_Performance
dataVITrnsTmReqs	array(E2eDataVolTransTimeReq)	O	1..N	Represents the E2E data volume transfer time requirements	E2eDataVolTransTime
applds	array(ApplicationId)	O	1..N	Each element identifies an application. The absence of applds means all applications. (NOTE 3) (NOTE 9)	Ue_Communication Abnormal_Behavior DnPerformance ServiceExperience Dispersion E2eDataVolTransTime NSLoad
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
snssais	array(Snssai)	O	1..N	Identifies the network slice information. (NOTE 3)	UeCommunicationExt_eNA QoS_SustainabilityExt_eNA Abnormal_BehaviorExt_eNA CongestionExt_eNA DispersionExt_eNA ServiceExperienceExt_eNA DnPerformanceExt_eNA E2eDataVolTransTimeRelativeProximity
nsildInfos	array(NsildInfo)	O	1..N	Each element identifies the S-NSSAI and the optionally associated network slice instance(s). May be included when requested event is "SERVICE_EXPERIENCE" "DN_PERFORMANCE" or "NS_LOAD_LEVEL".	ServiceExperience DnPerformance NSLoad

				(NOTE 12)	
qosReq	QosRequirement	C	0..1	Represents the QoS requirements. This attribute shall be included when requested event is "QOS_SUSTAINABILITY".	QoS_Sustainability E2eDataVolTransTim
listOfAnaSubsets	array(AnalyticsSubset)	O	1..N	The list of analytics subsets can be used to indicate the content of the analytics. (NOTE 8)	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
wlanReqs	array(WlanPerformanceReq)	O	1..N	Represents other WLAN performance analytics requirements. If the attribute contains no content, may take default handling action.	WlanPerformance_All L
disperReqs	array(DispersionRequirement)	O	1..N	Represents the requirements of dispersion analytics.	Dispersion
maxNumOfTopAppUpl	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
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 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
ueCommReqs	array(UeCommReq)	O	1..N	Represents the UE communication requirements. This attribute may be included when the subscribed event is "UE_COMM".	UeCommunicationExt eNA
userDataConReq	UserDataCongestReq	O	0..1	The ordering criterion for the list of User Data Congestion analytics. (NOTE 7)	CongestionExt_eNA
locGranularity	LocInfoGranularity	O	0..1	The preferred granularity of UE location information.	ServiceExperienceExt eNA Ue_MobilityExt_eNA DispersionExt_eNA
Orientation	LocationOrientation	O	0..1	Indicates the preferred orientation of location information.	Ue_MobilityExt_eNA MovementBehaviour
ueMobilityReqs	array(UeMobilityReq)	O	1..N	Represents the UE mobility requirements. This attribute may be included when the subscribed event is "UE_MOBILITY".	Ue_MobilityExt_eNA

movBehavReqs	array(MovBehavReq)	O	1..N	Represents the Movement Behaviour analytics requirements.	MovementBehaviour
ProxReqs	array(RelProxReq)	O	1..N	Represents the Relative Proximity analytics requirements.	RelativeProximity
pduSesInfos	array(PduSessionInfo)	O	1..N	Represents combination of PDU Session parameters information. (NOTE 9)	ServiceExperienceExtEneNA
useCaseCxt	string	O	0..1	Indicates the context of usage of the analytics. The value and format of this parameter are not standardized.	ENAEExt
accuReq	AccuracyReq	O	0..1	Represents the analytics accuracy requirement information. (NOTE 11)	AnalyticsAccuracy

NOTE 1: Either "exceptIds" or "exptAnaType" shall be provided if the requested event is "ABNORMAL_BEHAVIOR".

NOTE 2: The NetworkAreaInfo within the "locArea" attribute is not applicable for the untrusted AF. For "NETWORK_PERFORMANCE" or "CONGESTION" event, the "locArea" attribute shall be provided if the event applied for all UEs (i.e. "anyUeInd" attribute set to true within the TargetUeId data). For "QOS_SUSTAINABILITY" or "MOVEMENT_BEHAVIOUR" event, at least one of "locArea" attribute and "fineGranAreas" attribute shall be provided.

NOTE 3: 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 "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.
- "dnn" and "snssai" is mutually exclusive for "dnn" and "snssai". "dnn" and "snssai" are available for the backward compatibility to the previous release of this specification.

NOTE 4: If both the "allFreq" attribute and the "allRat" attribute within the "ratFreqs" attribute are present, then the cardinality shall be as the "all" indication for all the RAT type and Frequency value the NWDAF has received for the application.

NOTE 5: This parameter shall be provided when a consumer requires analytics for an edge application over a UP path.

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).

NOTE 7: If the value of "orderCriterion" attribute contained in "userDataConReq" attribute is "APPLICABLE_TIME_WINDOW", the "ASCENDING" direction indicates that the list of User Data Congestion analytics are in chronological order and the "DESCENDING" direction indicates that the list of User Data Congestion analytics are in reverse chronological order.

NOTE 8: The "AGG_TRAFFIC_RATE", "VAR_TRAFFIC_RATE", "VAR_PACKET_DELAY", "MAX_PACKET_LOSS_RATE" and "VAR_PACKET_LOSS_RATE" enumeration value(s) within the AnalyticsSubset data type is applicable only if the "DnPerformanceExt_AIML" feature is supported.

NOTE 9: When the "pduSesInfos" attribute is provided, the associated "appls" attribute shall also be provided for the NWDAF to be able to compute the service experience per application.

NOTE 10: If both "locArea" and "fineGranAreas" attributes are provided, the Area of Interest is interpreted as the intersection area indicated by these two attributes.

NOTE 11: Only the "accuTimeWin" and "minNum" attributes within the AccuracyReq data type are applicable.

NOTE 12: When the "NSLoad" feature is supported, only the "snssai" attribute of the NsildInfo data structure is applicable for the "NS_LOAD_LEVEL" event within each array element of this attribute.

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

				(NOTE 4)	
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(NetworkPerformance)	C	1..N	Contains the network performance information. Shall be present if the "analyEvent" attribute is set to "NETWORK_PERFORMANCE".	Network_Performance
abnormalInfos	array(AbnormalExposure)	C	1..N	Contains the user's abnormal behavior information. Shall be present if the "analyEvent" attribute sets to "ABNORMAL_BEHAVIOR".	Abnormal_Behavior
congestInfos	array(CongestInfo)	C	1..N	Contains the UE's user data congestion information. Shall be present if the "analyEvent" attribute sets to "CONGESTION".	Congestion
dataVITrnsTmInfos	array(E2eDataVolTransTimeInfo)	C	1..N	Contains the E2E data volume transfer time information. Shall be present if the "analyEvent" attribute is set to "E2E_DATA_VOL_TRANS_TIME".	E2eDataVolTransTime
qosSustainInfos	array(QoS_Sustainability_Exposure)	C	1..N	Contains the QoS sustainability information. Shall be present if the "analyEvent" attribute is set to "QOS_SUSTAINABILITY". (NOTE 2)	QoS_Sustainability E2eDataVolTransTime
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". (NOTE 3)	DnPerformance
movBehavInfos	array(MovBehavInfo)	C	1..N	The Movement Behaviour information. Shall be present if the "analyEvent" attribute is set to "MOVEMENT_BEHAVIOUR".	MovementBehaviour
relProxInfos	array(RelProxInfo)	C	1..N	The Relative Proximity information. Shall be present if the "analyEvent" attribute is set to "RELATIVE_PROXIMITY".	RelativeProximity
svcExps	array(ServiceExperienceInfo)	C	1..N	Contains the service experience information. Shall be present if the "analyEvent" attribute is set to "SERVICE_EXPERIENCE".	ServiceExperience
wlanInfos	array(WlanPerformInfo)	C	1..N	The WLAN performance related information. Shall be present if the "analyEvent" attribute is set to "WLAN_PERFORMANCE".	WlanPerformance_AIML
accuInfo	AccuracyInfo	C	0..1	The analytics accuracy information. It shall be provided	AnalyticsAccuracy

				when accuracyReq was provided in the request.	
suppFeat	SupportedFeatures	M	1	Represents the features supported by both the AF and the NEF.	
<p>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.</p> <p>NOTE 2: The "qosFlowRetThd" and "ranUeThrouThd" attributes in QosSustainabilityExposure data type are not applicable.</p> <p>NOTE 3: The "minTrafficRate", "aggTrafficRate", "varTrafficRate", "trafRateUelds", "avePacketDelay", "maxPacketDelay", "varPacketDelay", "packDelayUelds", "maxPacketLossRate", "varPacketLossRate" and "packetLossUelds" attribute(s) within the DnPerfInfo data type is applicable only if the "DnPerformanceExt_AIML" feature is supported.</p> <p>NOTE 4: If the "UeMobilityExt_eNA" feature is supported and the "locGranularity" attribute value "LON_AND_LAT_LEVEL" is requested, the "geoLoc" attribute within the "UeMobility" type may be provided to report the geographical location (longitude and latitude level).</p>					

5.6.3.3.15 Type AbnormalExposure

Table 5.6.3.3.15-1: Definition of type AbnormalExposure

Attribute name	Data type	P	Cardinality	Description	Applicability
gpsis	array(Gpsi)	C	1..N	Each element identifies a UE which is affected with the Exception. Shall be present if the subscription request applies to more than one UE.	
excep	Exception	M	1	Contains the exception information.	
appld	ApplicationId	O	0..1	Identifies an application. May only be present if the "appls" attribute was provided within AnalyticsEventFilter during the subscription for event notification procedure.	
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.	
<p>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.</p>					

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. (NOTE 2)	
nsi	ThresholdLevel	M	1	Represents network congestion level.	
confidence	UInteger	C	0..1	Indicates the confidence of the prediction. (NOTE 1) 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 1: 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 2: If the "temporalGranSize" attribute is provided in the request, the duration indicated by the "tmWdw" attribute shall be greater than or equal to the value of the "temporalGranSize" attribute.					

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, NOTE 5)	
fineAreaInfos	array(GeographicalArea)	O	1..N	This attribute contains the geographical locations in a fine granularity (e.g. smaller than a cell). May be provided when the "fineGranAreas" attribute is provided in the request.	QoS_SustainabilityExt_eNA
startTs	DateTime	M	1	Represents the start time of the applicable observing period. (NOTE 4)	
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.	
<p>NOTE 1: Either qosFlowRetThd or ranUeThruThd shall be provided.</p> <p>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.</p> <p>NOTE 3: The NetworkAreaInfo data within the LocationArea5G data is not applicable.</p> <p>NOTE 4: If the "temporalGranSize" attribute is provided in the request, the duration indicated by the "startTs" and "endTs" attributes shall be greater than or equal to the value of the "temporalGranSize" attribute.</p> <p>NOTE 5: If the "spatialGranSizeTa" and/or "spatialGranSizeCell" attributes are provided in the request, the number of TAs or cells contained in "locArea" attribute shall be smaller than or equal to the values of the "spatialGranSizeTa" and/or "spatialGranSizeCell" attributes.</p>					

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, NOTE 6)	
nwPerfType	NetworkPerfType	M	1	The type of the network performance	
anaPeriod	TimeWindow	O	0..1	Indicates the analytics target period subset within the requested analytics target period. (NOTE 5)	NetworkPerfExt_eNA
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)	
rscUsgReq	ResourceUsageRequirement	O	0..1	Indicates more information when providing resource usage information for the network performance type indicated by the "nwPerfType" attribute. (NOTE 4)	NetworkPerformanceExt_AIML
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.	
<p>NOTE 1: Either relativeRatio or absoluteNum shall be provided.</p> <p>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.</p> <p>NOTE 3: The NetworkAreaInfo data within the LocationArea5G data is not applicable.</p> <p>NOTE 4: The "rscUsgReq" value is only applicable when the "nwPerfType" attribute is set to "GNB_RSC_USAGE_OVERALL_TRAFFIC", "GNB_RSC_USAGE_GBR_TRAFFIC" or "GNB_RSC_USAGE_DELAY_CRIT_GBR_TRAFFIC".</p> <p>NOTE 5: If the "temporalGranSize" attribute is provided in the request, the duration indicated by the "anaPeriod" attribute is greater than or equal to the value of the "temporalGranSize" attribute.</p> <p>NOTE 6: If the "spatialGranSizeTa" and/or "spatialGranSizeCell" attributes are provided in the request, the number of TAs or cells contained in "locArea" attribute shall be smaller than or equal to the values of the "spatialGranSizeTa" and/or "spatialGranSizeCell" attributes.</p>					

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	

5.6.3.3.21 Type WlanPerformInfo

Table 5.6.3.3.21-1: Definition of type WlanPerformInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
locArea	LocationArea5G	C	0..1	Identification of locationarea to which the notification applies within the subscribed location area.	
wlanPerSsidInfos	array(WlanPerSsidPerformanceInfo)	M	1..N	WLAN performance information for SSID(s) of WLAN access points deployed in the Area of Interest.	
wlanPerUeIdInfos	array(WlanPerUeIdPerformanceInfo)	O	1..N	WLAN performance information for UE Id(s) of WLAN access points deployed in the Area of Interest.	

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
E2E_DATA_VOLUME_TRANSFER_TIME	The AF requests to be notified about analytics information of E2E data volume transfer time.	E2eDataVolTransTime
MOVEMENT_BEHAVIOUR	The AF requests to be notified about analytics information of Movement Behaviour.	MovementBehaviour
WLAN_PERFORMANCE	Indicates that the event subscribed is WLAN performance.	WlanPerformance_AIML
NS_LOAD_LEVEL	Indicates that the event subscribed is Network Slice load level information.	NSLoad
RELATIVE_PROXIMITY	The AF requests to be notified about analytics information of Relative Proximity.	RelativeProximity

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.
16	TermRequest	This feature indicates support for Analytics Exposure Subscription termination requests sent by the NEF to the NF service consumer.
17	QoS_SustainabilityExt_eNA	This feature indicates support for the extensions related to eNA 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.
18	ServiceExperienceExt_eNA	This feature indicates support for the extensions to the event related to service experience supporting eNA, including support for DNN, S-NSSAI, Location Area, PDU Session parameters information for service experience analytics. Supporting this feature also requires the support of feature ServiceExperience.
19	Abnormal_BehaviorExt_eNA	This feature indicates support for the extensions to the event related to abnormal behavior related to eNA, including support of exposing DNN and S-NSSAI information. Supporting this feature also requires the support of feature Abnormal_Behavior.
20	CongestionExt_eNA	This feature indicates support for the extensions to the event related to user data congestion related to eNA, including support of GPSI and/or list of Top applications. Supporting this feature also requires the support of feature Congestion.
21	DispersionExt_eNA	This feature indicates support for the extensions associated with analytics event related to Dispersion analytics. Supporting this feature also requires the support of feature Congestion.
22	DnPerformanceExt_eNA	This feature indicates the support of the analytics event related to DN performance. Supporting this feature also requires the support of feature DnPerformance.
23	UeCommunicationExt_eNA	This feature indicates the support of the analytics event related to UE communication related to eNA. Supporting this feature also requires the support of feature Ue_Communication.
24	Ue_MobilityExt_eNA	This feature indicates the support of the analytics event related to UE Mobility supporting eNA, including ordering criterion and preferred granularity of location. Supporting this feature also requires the support of feature Ue_Mobility.
25	DnPerformanceExt_AIML	This feature indicates support for extensions to the event related to DN Performance supporting AIML, including support of extended DN Performance Analytics for group of UEs. Supporting this feature also requires the support of feature DnPerformance.
26	UeMobilityExt_AIML	This feature indicates support for further extensions to the event related to UE mobility supporting AIML, including support of UE's geographical distribution and direction analytics. Supporting this feature also requires the support of feature UeMobility.

27	NetworkPerformanceExt_AIML	This feature indicates support of the network performance enhancements for AI/ML-based Services. Within this feature the following enhancements are covered: - support of providing gNB resource usage for GBR traffic and Delay-critical GBR traffic. Supporting this feature also requires the support of Network_Performance feature.
28	E2eDataVolTransTime	This feature indicates support for E2E data volume transfer time analytics
29	ENAEExt	This feature indicates support for the general enhancements of analytics exposure requirements, including support for use case context sent by the NF service consumer to the NEF.
30	NetworkPerfExt_eNA	This feature indicates support for the enhancements of network performance. Within this feature the following enhancements are covered: - support of providing target period subset in the analytics. Supporting this feature also requires the support of Network_Performance feature.
31	MovementBehaviour	This feature indicates support for the Movement Behaviour information.
32	WlanPerformance_AIML	This feature indicates support for the WLAN Performance information supporting AIML.
33	NSLoad	This feature indicates the support of Network Slice load level information reporting subscription/notification functionality as part of the support of network slice capability exposure application layer framework. The following functionalities are supported: - support to subscribe and get notified of Network Slice load level analytics information.
34	AnalyticsAccuracy	This feature indicates support for the Analytics Accuracy information.
35	RelativeProximity	This feature indicates support for the Relative Proximity analytics.
33	StatisticsFailure	This feature indicates support for partial failure report for statistics during event notification. This feature requires the support of the "EneNA" feature.

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.
USER_CONSENT_NOT_GRANTED	403 Forbidden	Indicates that the request shall be rejected because an impacted user has not provided the required user consent.

DATA_NOT_FOUND	404 Not Found	The requested UE subscription data is not found/does not exist.
USER_NOT_FOUND	404 Not Found	The user does not exist.
GROUP_IDENTIFIER_NOT_FOUND	404 Not Found	The requested Group Identifier does not exist.
SUBSCRIPTION_NOT_FOUND	404 Not Found	The subscription does not exist.
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

5.7.0 Introduction

The Nnef_ParameterProvision service shall use the 5GLANParameterProvision API for 5G LAN parameters provisioning.

The API URI of 5GLANParameterProvision API shall be:

{apiRoot}/3gpp-5glan-pp/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-5glan-pp".
- "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.

5.7.1 Resources

5.7.1.1 Overview

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.

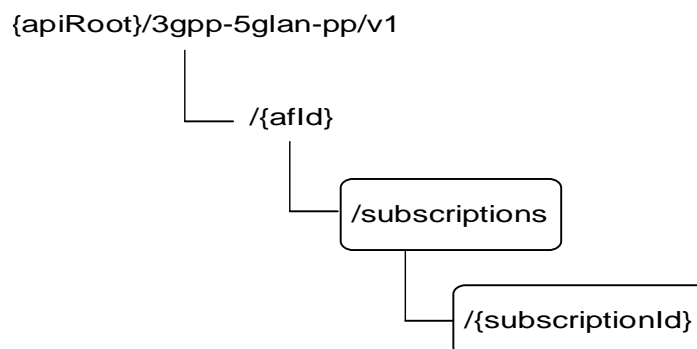


Figure 5.7.1.1-1: Resource URI structure of the 5GLANParameterProvision API

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	Update an existing subscription identified by {subscriptionId}.
		PATCH	Modify 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-5glan-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
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N/A			
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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/{afId}/subscriptions/{subscriptionId}

5.7.1.3 Resource: Individual 5GLAN Parameters Provision Subscription

5.7.1.3.1 Introduction

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

5.7.1.3.2 Resource Definition

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

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

Table 5.7.1.3.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	Clause 5.2.4 of 3GPP TS 29.122 [4].
afId	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
5GLanParametersProvisionPatch	M	1	Modify an existing subscription to provision parameters.

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

Data type	P	Cardinality	Response codes	Description
5GLanParametersProvision	M	1	200 OK	The subscription was updated successfully.
n/a			204 No Content	The subscription was updated successfully.
N/A			307 Temporary Redirect	Temporary redirection, during subscription modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in 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
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Location	string	M	1	An alternative URI of the resource located in an alternative NEF.
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5.7.1A Custom Operations without associated resources

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

5.7.1B Notifications

5.7.1B.1 General

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

Table 5.7.1B.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
5G LAN Parameter Provisioning Event Notification	{notifUri}	POST	This operation enables the NEF to notify a previously subscribed AF on 5G LAN Parameter Provisioning related Events.

5.7.1B.2 5G LAN Parameter Provisioning Event Notification

5.7.1B.2.1 Description

The 5G LAN Parameter Provisioning Event Notification is used by the NEF to report 5G LAN Parameter Provisioning related Events to a previously subscribed AF.

5.7.1B.2.2 Target URI

The Callback URI "{notifUri}" shall be used with the callback URI variables defined in table 5.7.1B.2.2-1.

Table 5.7.1B.2.2-1: Callback URI variables

Name	Definition
notifUri	Callback reference provided by the AF during the creation/update/modification of the related 5G LAN Parameters Provisioning.

5.7.1B.2.3 Operation Definition

5.7.1B.2.3.1 Notification via HTTP POST

This method shall support the request data structures specified in table 5.7.1B.2.3.1-1 and the response data structures and response codes specified in table 5.7.1B.2.3.1-2.

Table 5.7.1B.2.3.1-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
5GLanParamProv Notif	M	1	Provides information about the observed 5G LAN Parameter Provisioning related Events.

Table 5.7.1B.2.3.1-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response	Description
-----------	---	-------------	----------	-------------

			codes	
n/a			204 No Content	The 5G LAN Parameter Provisioning 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 5.7.1B.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 5.7.1B.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.

5.7.1B.2.3.2 Notification via Websocket

If supported by both AF and NEF and successfully negotiated, the 5G LAN Parameter Provisioning Event Notification may alternatively be delivered through the Websocket mechanism as defined in clause 5.2.5.4 of 3GPP TS 29.122 [4].

5.7.2 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.	
5GLanParamProvNotif	5.7.3.15	Represents a 5G LAN Parameter Provisioning Event Notification.	GMEC
AaaUsage	5.7.2.4.3	Represents the usage of the DN-AAA server.	

AcsParams	5.7.3.12	Represents ACS configuration parameters.	GMEC
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.	
CpParams	5.7.3.9	Represents Communication Pattern parameters.	GMEC
DnnSnssaiParams	5.7.3.14	Represents DNN and S-NSSAI specific group parameters.	GMEC
ECSAddrParams	5.7.3.13	Represents ECS address configuration parameters.	GMEC
LpiParams	5.7.3.11	Represents Location Privacy Indication parameters.	GMEC
NpConfigNotif	5.7.3.16	Represents a Network Parameters Configuration related notification.	GMEC
NpConfigParams	5.7.3.10	Represents Network Parameters Configuration information.	GMEC
CpParams	5.7.3.9	Represents Communication Pattern parameters.	GMEC
MaxGrpDataRateInfo	5.7.2.3.17	Represents the Maximum Group Data Rate related information.	GMEC

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
AfReqDefaultQoS	Clause 5.33.5.2.5	Represents the AF requested default QoS.
AppliedParameterConfiguration	3GPP TS 29.122 [4]	Represents the parameter configuration applied in the network.
ApplicationId	3GPP TS 29.571 [8]	Represents the identifier of an application.
AcsInfo	3GPP TS 29.571 [8]	Contains the ACS information.
BitRate	3GPP TS 29.571 [8]	Represents a bit rate.
CpParameterSet	3GPP TS 29.122 [4]	Represents an offered Communication Pattern parameter set.
CpReport	3GPP TS 29.122 [4]	Represents a CP report.
ConfigResult	3GPP TS 29.122 [4]	Represents one configuration processing result for a group's members.
DateTime	3GPP TS 29.122 [4]	Represents a data and a time.
Dnn	3GPP TS 29.571 [8]	Identifies a DNN.
DurationSec	3GPP TS 29.122 [4]	Indicates a time duration.
EcsServerAddr	3GPP TS 29.571 [8]	Represents the Edge Configuration Server (ECS) address configuration information.
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.
LadnServArea	Clause 5.33.5.2.6	Represents an LADN Service Area.
Link	3GPP TS 29.122 [4]	Represents a referenced resource.
Lpi	3GPP TS 29.503 [17]	Represents the Location Privacy Indication information.
MtcProviderInformation	3GPP TS 29.571 [8]	Indicates MTC provider information for 5G VN Group Configuration authorization.
OsId	3GPP TS 29.519 [23]	Operating System.
PduSessionType	3GPP TS 29.571 [8]	PDU session type.
Snssai	3GPP TS 29.571 [8]	Identifies the S-NSSAI.
SpatialValidityCond	3GPP TS 29.571 [8]	Represents the Spatial Validity Condition.
SupportedFeatures	3GPP TS 29.571 [8]	Used to negotiate the applicability of the optional features.
WebsocketNotifConfig	3GPP TS 29.122 [4]	Contains the configuration parameters to set up notification delivery over Websocket protocol.

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..N	Identifies the usage needs for secondary authentication/authorization and/or UE IP address allocation from the DN-AAA server. (NOTE 3)	
mtcProviderld	MtcProviderInformatio n	O	0..1	Indicates MTC provider information for 5G VN Group Configuration authorization. (NOTE 1)	

snssai	Snssai	M	1	S-NSSAI for the 5G VN group.	
sessionType	PduSessionType	M	1	PDU Session Type allowed for 5G VN group.	
sessionTypes	array(PduSessionType)	O	1..N	If further PDU Session Types (in addition to the PDU Session Type indicated in the "sessionType" attribute) are allowed for the 5G VN group, they are provided in this attribute. (NOTE 2)	multipleSessionTypes
appDesps	map(AppDescriptor)	M	1..N	Describes the operation systems and the corresponding applications for each operation systems. The key of map is osld.	
vnGroupCommInd	boolean	O	0..1	Indicates whether the 5G VN group is associated with 5G VN group communication. When set to "true", it indicates that the 5G VN group is associated with 5G VN group communication. When set to "false", it indicates that the 5G VN group is not associated with 5G VN group communication. The default value when omitted is "false".	GMEC
maxGrpDataRateInfo	MaxGrpDataRateInfo	O	0..1	Represents the Maximum Group Data Rate related information.	GMEC
cpParams	CpParams	O	0..1	Contains Communication Pattern Parameters for the 5G VN group.	GMEC
npConfigParams	NpConfigParams	O	0..1	Contains Network Parameters Configuration information for the 5G VN group.	GMEC
lpiParams	LpiParams	O	0..1	Contains Location Privacy Indication parameters for the 5G VN group.	GMEC
acsParams	Acs	O	0..1	Contains ACS configuration parameters for the 5G VN group.	GMEC
ecsAddrParams	ECSAddrParams	O	0..1	Contains ECS address parameters for the 5G VN group.	GMEC
dnnSnssaiParams	DnnSnssaiParams	O	0..1	Contains DNN and S-NSSAI specific parameters for the 5G VN group.	GMEC
notifUri	Link	O	0..1	Contains a URI indicating the notification destination where notification requests shall be delivered. This attribute may be provided only if 5G LAN Parameters Provisioning notifications (e.g., Network Parameter Configuration notifications) need to be delivered.	GMEC
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	GMEC, Notification_test_event

				3GPP TS 29.122 [4]. Set to false or omitted otherwise. This attribute may be provided only if 5G LAN Parameters Provisioning notifications (e.g., Network Parameter Configuration notifications) need to be delivered.	
websocketNotifConfig	WebsocketNotifConfig	O	0..1	Contains configuration parameters to set up notification delivery over Websocket protocol as defined in clause 5.2.5.4 of 3GPP TS 29.122 [4]. This attribute may be provided only if 5G LAN Parameters Provisioning notifications (e.g., Network Parameter Configuration notifications) need to be delivered.	GMEC, Notification_websocket

NOTE 1: The NEF should check received MTC Provider information and then the NEF may:

- 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.

NOTE 2: Only one PDU Session type is applied for a PDU Session of a VN group at a time.

NOTE 3: This attribute shall contain at most 2 array elements. It is however kept defined as it is (i.e. with a cardinality of "1..N") for backward compatibility considerations.

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.	
applds	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 osld.	
cpParams	CpParams	O	0..1	Contains the updated Communication Pattern Parameters for the 5G VN group.	GMEC
npConfigParams	NpConfigParams	O	0..1	Contains the updated Network Parameters Configuration information for the 5G VN group.	GMEC
lpiParams	LpiParams	O	0..1	Contains the updated Location Privacy Indication parameters for the 5G VN group.	GMEC
acsParams	AcsParams	O	0..1	Contains the updated ACS configuration parameters for the 5G VN group.	GMEC
ecsAddrParams	ECSAddrParams	O	0..1	Contains the updated ECS address parameters for the 5G VN group.	GMEC
dnnSnssaiParams	DnnSnssaiParams	O	0..1	Contains the updated DNN and S-NSSAI specific parameters for the 5G VN group.	GMEC
notifUri	Link	O	0..1	Contains the updated URI indicating the notification destination where notification requests shall be delivered.	GMEC

5.7.2.3.7 Type: AppDescriptorRm

Table 5.7.2.3.7-1: Definition of type AppDescriptorRm

Attribute name	Data type	P	Cardinality	Description	Applicability
applds	map(ApplicationIdRm)	O	1..N	Identifies application(s) on the UE's operating system. Any string value can be used as a key of the map.	

5.7.2.3.8 Void

5.7.2.3.9 Type: CpParams

Table 5.7.2.3.9-1: Definition of type CpParams

Attribute name	Data type	P	Cardinality	Description	Applicability
cpParameterSets	map(CpParameterSet)	M	1..N	Represents one or more set(s) of CP parameters information for the 5G VN group. Any string value may be used as a key of the map.	
cpReports	map(CpReport)	C	1..N	Contains the identifier(s) of the set(s) of CP parameters for which the provided CP parameters are not added or modified successfully with the corresponding failure reason. Each element provides the related information for one or more CP set identifier(s).	

				<p>The key of the map is a string representing the failure identifier.</p> <p>This attribute may only be present in responses from the NEF to the AF.</p> <p>(NOTE 4).</p>	
NOTE: At least one of these attributes shall be present.					

5.7.2.3.10 Type: NpConfigParams

Table 5.7.2.3.10-1: Definition of type NpConfigParams

Attribute name	Data type	P	Cardinality	Description	Applicability
maximumLatency	DurationSec	O	0..1	Contains the maximum delay acceptable for downlink data transfers.	
maximumResponseTime	DurationSec	O	0..1	Contains the time duration that the UE stays reachable to allow the AF to reliably deliver the required downlink data.	
suggestedNumberOfDIPackets	integer	O	0..1	Contains the number of packets that the serving gateway shall buffer in case the UE is not reachable.	
groupReportingGuardTime	DurationSec	O	0..1	Identifies the group reporting aggregation time duration that the NEF shall use when aggregating the reports detected for the UE(s) in the 5G VN group and report them together to the AF.	
validityTime	DateTime	O	0..1	Identifies when the network parameter expires and shall be deleted locally if it expires. (NOTE)	
NOTE: If this attribute is omitted, no expiry time applies for the provisioned network parameter configuration.					

5.7.2.3.11 Type: LpiParams

Table 5.7.2.3.11-1: Definition of type LpiParams

Attribute name	Data type	P	Cardinality	Description	Applicability
lpi	Lpi	M	1	Contains the Location Privacy Indication parameters for the 5G VN group.	

5.7.2.3.12 Type: AcsParams

Table 5.7.2.3.12-1: Definition of type AcsParams

Attribute name	Data type	P	Cardinality	Description	Applicability
acsInfo	AcsInfo	M	1	Contains the ACS parameters for the 5G VN group.	

5.7.2.3.13 Type: ECSAddrParams

Table 5.7.2.3.13-1: Definition of type ECSAddrParams

Attribute name	Data type	P	Cardinality	Description	Applicability
ecsServerAddr	EcsServerAddr	M	1	Represents the ECS address(es).	
spatialValidityCond	SpatialValidityCond	O	0..1	Contains the spatial validity conditions.	

5.7.2.3.14 Type: DnnSnssaiParams

Table 5.7.2.3.14-1: Definition of type DnnSnssaiParams

Attribute name	Data type	P	Cardinality	Description	Applicability
defQos	AfReqDefaultQoS	C	0..1	Represents the AF-requested default QoS parameters applicable to each UE within the 5G VN group.	
ladnServArea	LadnServArea	C	0..1	Represents the AF-requested LADN Service Area applicable to each UE within the 5G VN group.	

NOTE: At least one of these attributes shall be present.

5.7.2.3.15 Type: 5GLanParamProvNotif

Table 5.7.2.3.15-1: Definition of type 5GLanParamProvNotif

Attribute name	Data type	P	Cardinality	Description	Applicability
npConfigNotif	NpConfigNotif	C	0..1	Represents a configuration result notification related to the provisioned Network Parameters Configuration information. This attribute shall be present only if Network Parameters Configuration information was provisioned within the associated 5G LAN Parameters Provisioning and a configuration result notification needs to be sent.	

5.7.2.3.16 Type: NpConfigNotif

Table 5.7.2.3.16-1: Definition of type NpConfigNotif

Attribute name	Data type	P	Cardinality	Description	Applicability
configResults	array(ConfigResult)	O	0..N	Each element identifies a notification of grouping configuration result.	
appliedParam	AppliedParameterConfiguration	O	0..1	Indicates the applied parameter configuration in the network. The "maximumDetectionTime" attribute within the AppliedParameterConfiguration data type is not applicable for Network Parameter configuration.	

5.7.2.3.17 Type: MaxGrpDataRateInfo

Table 5.7.2.3.17-1: Definition of type MaxGrpDataRateInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
maxGrpDataRateUI	BitRate	C	0..1	Contains the maximum allowed aggregate UL data rate across all GBR and Non-GBR QoS Flows within the 5G VN group.	
maxGrpDataRateDI	BitRate	C	0..1	Contains the maximum allowed aggregate DL data rate across all GBR and Non-GBR QoS Flows within the 5G VN group.	

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

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.
2	GMEC	This feature indicates the support of Generic Group Management, Exposure and Communication Enhancements. The following functionalities are supported: <ul style="list-style-type: none"> - Support the provisioning of the Maximum Group Data Rate related information for 5G VN groups. - Support the simultaneous provisioning of 5G VN group information and 5G VN group parameters. - Support the provisioning of the indication on whether the 5G VN group is associated with 5G VN group communications or not.
3	Notification_test_event	The testing of notification connection is supported as described in 3GPP TS 29.122 [4].
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.

5.7.4 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

5.8.0 Introduction

The Nnef_ApplyingBdtPolicy service shall use the ApplyingBdtPolicy API.

The API URI of ApplyingBdtPolicy API shall be:

{apiRoot}/3gpp-applying-bdt-policy/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-applying-bdt-policy".
- "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.

5.8.1 Resources

5.8.1.1 Overview

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.

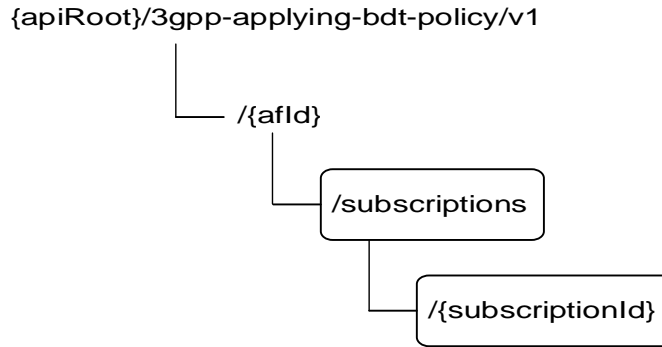


Figure 5.8.1.1-1: Resource URI structure of the ApplyingBdtPolicy API

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

5.8.1.2 Resource: Applied BDT Policy Subscriptions

5.8.1.2.1 Introduction

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

5.8.1.2.2 Resource Definition

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

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

Table 5.8.1.2.2-1: Resource URI variables for this resource

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

5.8.1.2.3 Resource Methods

5.8.1.2.3.1 General

The following 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 subscripion.

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

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

5.8.1A Custom Operations without associated resources

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

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

5.8.3.3 Structured data types

5.8.3.3.1 Introduction

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

5.8.3.3.2 Type: AppliedBdtPolicy

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

Table 5.8.3.3.2-1: Definition of type AppliedBdtPolicy

Attribute name	Data type	P	Cardinality	Description	Applicability
bdtRefld	BdtReferenceld	M	1	Identifies a selected policy of background data transfer.	
gpsi	Gpsi	C	0..1	Identifies a user. (NOTE)	
externalGroupld	ExternalGroupld	C	0..1	Identifies a user group. (NOTE)	
supFeat	SupportedFeatures	M	1	Indicates the list of Supported features used as described in clause 5.8.4.	
self	Link	C	0..1	Identifies the Individual Applied BDT Policy Subscription resource. Shall be present in the HTTP GET response when reading all the subscriptions for an AF.	
NOTE: Only one of the properties "gpsi" or "externalGroupld" shall be included.					

5.8.3.3.3 Type: AppliedBdtPolicyPatch

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

Table 5.8.3.3.2-1: Definition of type AppliedBdtPolicyPatch

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

5.8.3.4 Simple data types and enumerations

5.8.3.4.1 Introduction

This 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

5.9.0 Introduction

The Nnef_IPTVConfiguration service shall use the IPTVConfiguration API.

The API URI of IPTVConfiguration API shall be:

{apiRoot}/3gpp-iptvconfiguration/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-iptvconfiguration".
- "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.

5.9.1 Resources

5.9.1.1 Overview

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.

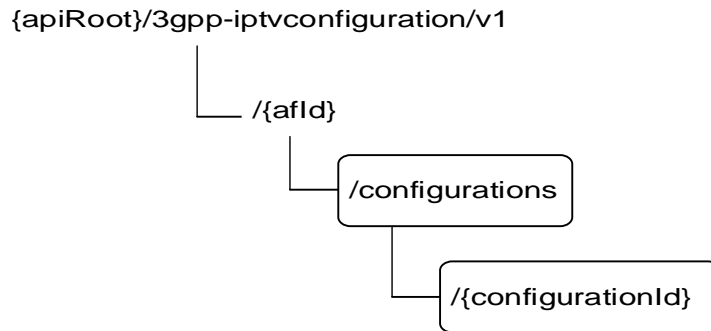


Figure 5.9.1.1-1: Resource URI structure of the IPTVConfiguration API

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	Update an existing configuration identified by {configurationId}.
		PATCH	Modify 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
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Location	string	M	1	An alternative URI of the resource located in an alternative NEF.
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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
lptvConfigData	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
lptvConfigData	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
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N/A				
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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
lptvConfigDataPatch	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 Custom Operations without associated resources

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

5.9.1B Notifications

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

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.	
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5.9.2.2 Reused data types

The data types reused by the IPTVConfiguration API from other specifications are listed in table 5.9.2.2-1.

Table 5.9.2.2-1: Re-used Data Types

Data type	Reference	Comments
Dnn	3GPP TS 29.571 [8]	Identifies a DNN.
ExternalGroupld	3GPP TS 29.122 [4]	External Group Identifier for a user group.
Gpsi	3GPP TS 29.571 [8]	Identifies a GPSI.
Ipv4Addr	3GPP TS 29.571 [8]	Identifies an IPv4 address.
Ipv6Addr	3GPP TS 29.571 [8]	Identifies an IPv6 address.
Link	3GPP TS 29.122 [4]	Represents a referenced resource.
MtcProviderInformation	3GPP TS 29.571 [8]	Indicates MTC provider information.
Snssai	3GPP TS 29.571 [8]	Identifies the S-NSSAI.
SupportedFeatures	3GPP TS 29.571 [8]	Used to negotiate the applicability of the optional features defined in table 5.9.3-1.

5.9.2.3 Structured data types

5.9.2.3.1 Introduction

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

5.9.2.3.2 Type: IptvConfigData

Table 5.9.2.3.2-1: Definition of type IptvConfigData

Attribute name	Data type	P	Cardinality	Description	Applicability
self	Link	C	0..1	Identifies the individual IPTV configuration resource URI. Shall be present in the HTTP GET response when reading all the configurations for an AF.	
gpsi	Gpsi	C	0..1	Identifies GPSI. (NOTE)	
exterGroupld	ExternalGroupld	C	0..1	Represents a group of users. (NOTE)	
afAppld	string	M	1	Identifies an application.	
dnn	Dnn	O	0..1	Identifies a DNN, a full DNN with both the Network Identifier and Operator Identifier, or a DNN with the Network Identifier only.	
snssai	Snssai	O	0..1	Identifies an S-NSSAI.	
multiAccCtrls	map(MulticastAccessControl)	M	1..N	Identifies a list of multicast address access control information. 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

5.10.0 Introduction

The Nnef_ParameterProvision service shall use the LpiParameterProvision API for LPI parameters provisioning.

The API URI of LpiParameterProvision API shall be:

{apiRoot}/3gpp-lpi-pp/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-lpi-pp".
- "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.

5.10.1 Resources

5.10.1.1 Overview

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.

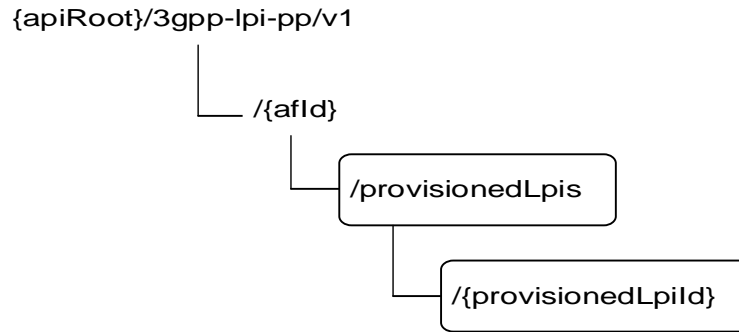


Figure 5.10.1.1-1: Resource URI structure of the LpiParameterProvision API

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	/{afId}/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	/{afId}/provisionedLpis/{provisionedLpId} (NOTE)	GET	Read an existing Individual LPI Parameters Provisioning resource identified by {provisionedLpId}.
		PUT	Update an existing Individual LPI Parameters Provisioning resource identified by {provisionedLpId}.
		PATCH	Modify an existing Individual LPI Parameters Provisioning resource identified by {provisionedLpId}.
		DELETE	Delete an existing Individual LPI Parameters Provisioning resource identified by {provisionedLpId}.
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/{afId}/provisionedLpis/{provisionedLpiId}

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/{afId}/provisionedLpis/{provisionedLpiId}

This resource shall support the resource URI variables defined in table 5.10.1.3.2-1.

Table 5.10.1.3.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	Clause 5.2.4 of 3GPP TS 29.122 [4].

afld	string	Identifier of the AF.
provisionedLpiId	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 provisionedLpiId. The AF shall initiate the HTTP GET request message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.10.1.3.3.2-1.

Table 5.10.1.3.3.2-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description
N/A				

This method shall support the request data structures specified in table 5.10.1.3.3.2-2 and the response data structures and response codes specified in table 5.10.1.3.3.2-3.

Table 5.10.1.3.3.2-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.10.1.3.3.2-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
LpiParametersProvision	M	1	200 OK	The information for the source in the request URI are returned.
N/A			307 Temporary Redirect	Temporary redirection, during resource retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in 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.

5.10.1A Custom Operations without associated resources

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

5.10.1B Notifications

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

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.	
LpiParametersProvisionPatch	5.10.2.3.3	Represents the requested modifications to an LPI Parameters Provisioning.	PatchUpdate

5.10.2.2 Reused data types

The data types reused by the LpiParameterProvision API from other specifications are listed in table 5.10.2.2-1.

Table 5.10.2.2-1: Re-used Data Types

Data type	Reference	Comments
ExternalGroupId	3GPP TS 29.122 [4]	External Group Identifier for a user group.
Gpsi	3GPP TS 29.571 [8]	Identifies a GPSI.
Link	3GPP TS 29.122 [4]	Identifies a referenced resource.
Lpi	3GPP TS 29.503 [17]	Identifies the Location Privacy Indication information.
MtcProviderInformation	3GPP TS 29.571 [8]	Indicates MTC provider information for LCS privacy parameter configuration authorization.
SupportedFeatures	3GPP TS 29.571 [8]	Used to negotiate the applicability of the optional features defined in table 5.10.3-1.

5.10.2.3 Structured data types

5.10.2.3.1 Introduction

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

5.10.2.3.2 Type: LpiParametersProvision

Table 5.10.2.3.2-1: Definition of type LpiParametersProvision

Attribute name	Data type	P	Cardinality	Description	Applicability
self	Link	C	0..1	Identifies the individual parameters provisioning resource. This attribute shall be supplied by the NEF in HTTP responses that include an object of LpiParametersProvision type.	
exterGroupId	ExternalGroupId	O	0..1	Identifies a group of UEs. (NOTE 1)	
gpsi	Gpsi	O	0..1	Identifies an UE with GPSI. (NOTE 1))	
lpi	Lpi	M	1	Location Privacy Indication parameters	
mtcProviderId	MtcProviderInformation	O	0..1	Indicates MTC provider information for LCS privacy parameter configuration authorization. (NOTE 2))	
supFeat	SupportedFeatures	M	1	Indicates the negotiated supported features.	
NOTE 1: Only one of the "gpsi" or "exterGroupId" attribute shall be provided.					
NOTE 2: The NEF should check received MTC Provider 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	0..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

5.11.0 Introduction

The Nnef_ServiceParameter service shall use the ServiceParameter API.

The API URI of ServiceParameter API shall be:

{apiRoot}/3gpp-service-parameter/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-service-parameter".
- "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.

5.11.1 Resources

5.11.1.1 Overview

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.

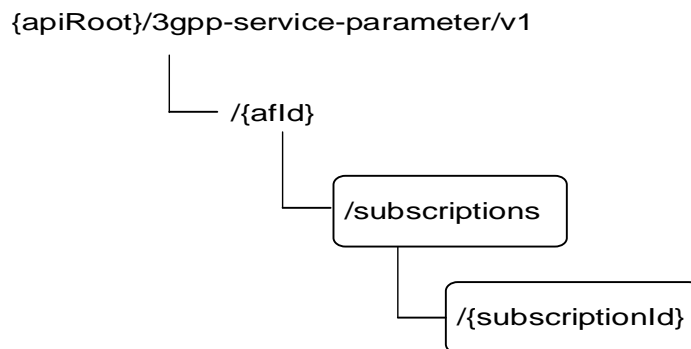


Figure 5.11.1.1-1: Resource URI structure of the ServiceParameter API

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 service parameter subscription identified by {subscriptionId}.
		PUT	Update an existing service parameter subscription identified by {subscriptionId}.
		PATCH	Modify an existing service parameter subscription identified by {subscriptionId}.
		DELETE	Delete an existing service parameter subscription identified by {subscriptionId}.

5.11.1.2 Resource: Service Parameter Subscriptions

5.11.1.2.1 Introduction

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

5.11.1.2.2 Resource Definition

Resource URI: **{apiRoot}/3gpp-service-parameter/v1/{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
ServiceParameterData	M	1	Parameters to create a service parameter subscription resource.

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

Data type	P	Cardinality	Response codes	Description
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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 theNEF shall respond to the message.

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

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

Name	Data type	P	Cardinality	Description
N/A				

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

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

Data type	P	Cardinality	Description
N/A			

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

Data type	P	Cardinality	Response codes	Description
ServiceParameter Data	M	1	200 OK	The information for the subscription in the request URI are returned.
N/A			307 Temporary Redirect	Temporary redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in 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 5.11.1.3.3.4-4: 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.

5.11.1.3.3.4 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].

5.11.1B Custom Operations without associated resources

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

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
A2xParamsPc5	5.11.2.4.2	Represents the service parameters for A2X communication over PC5.	A2X

A2xParamsPc5Rm	5.11.2.4.2	This data type is defined in the same way as the A2xParamsPc5 data type, but with the OpenAPI nullable property set to true.	A2X
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	Represents the result of the service parameters authorization.	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
MappingInfo	5.11.2.3.10	Contains the mapping information between the Application Layer ID and the GPSI.	Ranging_SL
MappingInfoRm	5.11.2.3.11	This data type is defined in the same way as the MappInfo data type, but with the OpenAPI "nullable: true" property.	Ranging_SL
NetworkDescription	5.11.2.3.9	Represents the description of a PLMN, by the definition of the PLMN ID, the MCC (and optionally applicable MNC(s)) or the indication of any PLMN.	VPLMNSpecificURSP
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
ParamForProSeEndUe	5.11.2.4.2	Represents the service parameters for 5G ProSe end UE.	ProSe_Ph2
ParamForProSeEndUeRm	5.11.2.4.2	This data type is defined in the same way as the ParamForProSeEndUe data type, but with the OpenAPI nullable property set to true.	ProSe_Ph2
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
ParamForProSeU2URelUe	5.11.2.4.2	Represents the service parameters for 5G ProSe UE-to-UE relay UE.	ProSe_Ph2
ParamForProSeU2URelUeRm	5.11.2.4.2	This data type is defined in the same way as the ParamForProSeU2URelUe data type, but with the OpenAPI nullable property set to true.	ProSe_Ph2
ParamForRangingSIPos	5.11.2.4.2	Represents the service parameters for ranging and sidelink positioning.	Ranging_SL
ParamForRangingSIPosRm	5.11.2.4.2	This data type is defined in the same way as the ParamForRangingSIPos data type, but with the OpenAPI nullable property set to true.	Ranging_SL

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	Applicability
AppDescriptor	5.7.2.3.4	Application descriptor describes the operation systems and the corresponding applications for each operation systems.	
ApplicationlayerId	3GPP TS 29.571 [8]	Identifies an Application Layer ID.	Ranging_SL
Dnn	3GPP TS 29.571 [8]	Identifies a DNN.	
EthFlowDescription	3GPP TS 29.514 [7]	Defines a packet filter for an Ethernet flow.	
ExternalGroupId	3GPP TS 29.122 [4]	External Group Identifier for a user group.	
GeographicalArea	5.17.3.3.4	Identifies the geographical area information.	AfGuideURSP
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]	Represents a referenced resource.	
MacAddr48	3GPP TS 29.571 [8]	Identifies an MAC address.	
Mcc	3GPP TS 29.571 [8]	Mobile Country Code.	
Mnc	3GPP TS 29.571 [8]	Mobile Network Code.	
PduSessionType	3GPP TS 29.571 [8]	Represents the PDU session type.	PduSessTypeChange
PlmnId	3GPP TS 29.571 [8]	Identifies a PLMN Identifier.	
PlmnIdNid	3GPP TS 29.571 [8]	Identifies a PLMN Identifier and optionally the Network Identity	PlmnIdNid
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.	
TnapId	3GPP TS 29.571 [8]	Trusted Network Access Point identifier.	
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)	
applId	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)	
externalGroupId	ExternalGroupId	O	0..1	Represents a group of users. (NOTE 1)	
anyUeInd	boolean	O	0..1	Identifies whether the service parameters apply to any non-roaming UE. <ul style="list-style-type: none"> - "true": the service parameters are applicable to any non-roaming UE. - "false": the service parameters are not applicable to any non-roaming UE. - Default value is "false" if omitted. (NOTE 1) (NOTE 3)	
roamUeNetDescs	array(NetworkDescription)	O	1..N	Each element identifies one (e.g., combination of MCC and MNC) or more (e.g. a MCC only) PLMN ID(s). It indicates the PLMN(s) of inbound roamers to which the provided AF guidance on VPLMN-specific URSP rules apply. (NOTE 1)	VPLMNSpecificURSP
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]. The default value is "false" if omitted.	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
paramForProSeU2URelUe	ParamForProSeU2URelUe	O	0..1	Contains the service parameters for 5G ProSe UE-to-UE relay UE.	ProSe_Ph2
paramForProSeEndUe	ParamForProSeEndUe	O	0..1	Contains the service parameters for 5G ProSe end UE.	ProSe_Ph2
paramForRangingSIPos	ParamForRangingSIPos	O	0..1	Contains the service parameters for ranging and sidelink positioning.	Ranging_SL
mappingInfo	MappingInfo	O	0..1	Contains the mapping information between the Application Layer ID and the GPSI.	Ranging_SL
urspGuidance	array(UrspRuleRequest)	O	1..N	Contains the service parameter used to guide the URSP and/or, when the VPLMNSpecificURSP feature is supported, to guide the VPLMN-specific URSP.	AfGuideURSP
a2xParamsPc5	A2xParamsPc5	O	0..1	Contains the A2X service parameters used over PC5.	A2X
tnaps	array(TnapId)	O	1..N	Contains the TNAP ID(s) collocated with the 5G-RG(s) of a specific user.	AfGuideTNAPs
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.	
<p>NOTE 1: One of individual UE identifier (i.e. "gpsi", "uelpv4", "uelpv6" or "ueMac" attribute), External Group Identifier (i.e. "externalGroupId" attribute) or any UE indication (i.e. "anyUeInd" attribute), and when the feature "VPLMNSpecificURSP" is supported, or any inbound roaming UE from the indicated PLMN(s) (i.e., "roamUeNetDescs" attribute) shall be included. For V2X, ProSe (when the "ProSe" and/or "ProSe_Ph2" feature is supported), A2X (when the "A2X" feature is supported) and URSP service parameter provisioning (see clause 4.4.20), only "anyUeInd", "gpsi" and "externalGroupId" attributes are applicable. When the "VPLMNSpecificURSP" feature is supported, the "roamUeNetDescs" attribute only applies to URSP service parameter provisioning and shall be included when the "urspGuidance" attribute contains VPLMN(s) description. When the "AfGuideTNAPs" feature is supported, when TNAP ID(s) is provisioned within the "tnaps" attribute, only "gpsi" shall be provided.</p> <p>NOTE 2: Either the "afServiceId" attribute, "appld" attribute or the combination of "snssai" and "dnn" attributes shall be provided. When the feature "AfGuideURSP" is supported, only the "afServiceId" attribute shall be provided for providing guidance for URSP determination. When the feature "AfGuideTNAPs" is supported, when TNAP ID(s) is provisioned within the "tnaps" attribute, only the "afServiceId" attribute shall be provided.</p> <p>NOTE 3: When "anyUeInd" attribute is present, "appld" attribute, "afServiceId" attribute or the combination of "snssai" attribute and "dnn" attribute shall be provided. When the feature "AfGuideURSP" is supported, only the "afServiceId" attribute shall be provided for providing guidance for URSP determination.</p> <p>NOTE 4: The attribute may be present when the individual UE identifier (i.e. "gpsi", "uelpv4", "uelpv6" or "ueMac" attribute) is present.</p>					

5.11.2.3.3 Type: ServiceParameterDataPatch

Table 5.11.2.3.3-1: Definition of type ServiceParameterDataPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
paramOverPc5	ParameterOverPc5Rm	O	0..1	Contains the V2X service parameters used over PC5	
paramOverUu	ParameterOverUuRm	O	0..1	Contains the V2X service parameters used over Uu	
paramForProSeDd	ParamForProSeDdRm	O	0..1	Contains the service parameters for 5G ProSe direct discovery.	ProSe
paramForProSeDc	ParamForProSeDcRm	O	0..1	Contains the service parameters for 5G ProSe direct communications.	ProSe

paramForProSeU2NRelUE	ParamForProSeU2NRelUeRm	O	0..1	Contains the service parameters for 5G ProSe UE-to-network relay UE.	ProSe
paramForProSeRemUe	ParamForProSeRemUeRm	O	0..1	Contains the service parameters for 5G ProSe remote UE.	ProSe
paramForProSeU2URelUE	ParamForProSeU2URelUeRm	O	0..1	Contains the service parameters for 5G ProSe UE-to-UE relay UE.	ProSe_Ph2
paramForProSeEndUe	ParamForProSeEndUeRm	O	0..1	Contains the service parameters for 5G ProSe end UE.	ProSe_Ph2
paramForRangingSIPos	ParamForRangingSIPosRm	O	0..1	Contains the service parameters for ranging and sidelink positioning.	Ranging_SL
mappingInfo	MappingInfoRm	O	0..1	Contains the mapping information between the Application Layer ID and the GPSI.	Ranging_SL
urspGuidance	array(UrspRuleRequest)	O	1..N	Contains the service parameter used to guide the URSP and/or, when the VPLMNSpecificURSP feature is supported, to guide the VPLMN-specific URSP.	AfGuideURSP
a2xParamsPc5	A2xParamsPc5Rm	O	0..1	Contains the A2X service parameters used over PC5.	A2X
tnaps	array(TnapId)	O	1..N	Contains the TNAP ID(s) collocated with the 5G-RG(s) of a specific user.	AfGuideTNAPS
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.	
visitedNetDescs	array(NetworkDescription)	O	1..N	It indicates the VPLMN(s) to which the provided AF guidance on VPLMN-specific URSP rules apply. (NOTE 3)	VPLMNSpecificURSP
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)	
<p>NOTE 1: If the "trafficDesc" attribute is not present, the NEF may derive the traffic descriptor components from the AF Service Identifier.</p> <p>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.</p> <p>NOTE 3: Each element of the "visitedNetDescs" attribute may describe one PLMN (the "plmnId" attribute is included) or more than one PLMNs (the "mcc" attribute and, optionally, the "mncs" attribute are included). To indicate any VPLMN, the "visitedNetDescs" attribute shall contain only one entry with the "anyPlmnInd" attribute set to true.</p>					

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	C	0..1	DNN to be matched with the DNN of the PDU Session. (NOTE)	
snssai	Snssai	C	0..1	S-NSSAI to be matched with the S-NSSAI of the PDU Session. (NOTE)	
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 TAIs).	
spatialValidityTais	array(Tai)	O	1..N	Indicates the TAIs in which the route selection parameters apply. This attribute is applicable only within the 5GC and it shall not be included in the request messages of untrusted AFs for URSP guidance.	
pduSessType	PduSessionType	O	0..1	Represents the requested PDU Session type.	PduSessType Change
<p>NOTE: This attribute shall be present when the "PIN" feature is supported and the "trafficDesc" attribute included in UrspRuleRequest data structure includes the "pinId" attribute.</p>					

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".	
plmnId	PlmnIdNid	O	0..1	Identify the PLMN ID of the inbound roamer when the AF subscribes with V-NEF about the outcome of the provisioning of VPLMN-specific URSP rules. It may be present if the "reportEvent" attribute value is "SUCCESS_UE_POL_DEL_SP" or "UNSUCCESS_UE_POL_DEL_SP"	VPLMNSpecificURSP

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.	
pinId	string	C	0..1	This is matched against a PIN ID for a specific PIN configured in the PEGC. Its encoding shall comply with the UE policy part type URSP as defined in clause 5.3 of 3GPP TS 24.526 [48]. (NOTE 5)	PIN
<p>NOTE 1: At least one attribute of the above Traffic descriptor components shall be present.</p> <p>NOTE 2: The information is used to identify the Application(s) that is(are) running on the UE's OS. The included "osId" attribute does not include an OS version number. The included "appls" attribute does not include a version number for the application.</p> <p>NOTE 3: "flowDescs" attribute and "ethFlowDescs" attribute are mutually exclusive.</p> <p>NOTE 4: The match of this traffic descriptor component does not require successful DNS resolution of the FQDN provided by the UE Application.</p> <p>NOTE 5: The "pinId" attribute and other attributes are mutually exclusive.</p>					

5.11.2.3.9 Type: NetworkDescription

Table 5.11.2.3.9-1: Definition of type NetworkDescription

Attribute name	Data type	P	Cardinality	Description	Applicability
plmnId	PlmnId	C	0..1	PLMN Identifier. It represents a combination of MCC and MNC. (NOTE)	
mcc	Mcc	C	0..1	Mobile Country Code (MCC). (NOTE)	
mncs	array(Mnc)	O	1..N	Represents the applicable MNC(s) for the indicated MCC. It may be present when the "mcc" attribute is present.	
anyPlmnInd	boolean	C	0..1	Indicates any PLMN. When present, it shall be set to true. true: any PLMN (i.e., any MCC and any MNC). (NOTE)	
NOTE: One of the "plmnId", the "mcc" or the "anyPlmnInd" attributes shall be included.					

5.11.2.3.10 Type: MappingInfo

Table 5.11.2.3.10-1: Definition of type MappingInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
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appLayerId	ApplicationlayerId	M	1	Contains the Application Layer ID.	
gpsi	Gpsi	M	1	Contains the GPSI.	

5.11.2.3.11 Type: MappingInfoRm

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

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
A2xParamsPc5	string	Configuration parameters for A2X communication over PC5. Its encoding shall comply with the UE policies for A2X communication over PC5 as defined in 3GPP TS 24.578 [69].	A2X
A2xParamsPc5Rm	string	This data type is defined in the same way as the "A2xParamsPc5" data type, but with the OpenAPI "nullable: true" property.	A2X
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

ParamForProSeU2NReUeRm	string	This data type is defined in the same way as the "ParamForProSeU2NReUe" 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
ParamForProSeU2URelUe	string	Configuration parameters for 5G ProSe UE-to-UE relay UE. Its encoding shall comply with the UE policies for 5G ProSe UE-to-UE relay UE defined in clause 5.8 of 3GPP TS 24.555 [49].	ProSe_Ph2
ParamForProSeU2URelUeRm	string	This data type is defined in the same way as the "ParamForProSeU2URelUe" data type, but with the OpenAPI "nullable: true" property.	ProSe_Ph2
ParamForProSeEndUe	string	Configuration parameters for 5G ProSe end UE. Its encoding shall comply with the UE policies for 5G ProSe end UE defined in clause 5.9 of 3GPP TS 24.555 [49].	ProSe_Ph2
ParamForProSeEndUeRm	string	This data type is defined in the same way as the "ParamForProSeEndUe" data type, but with the OpenAPI "nullable: true" property.	ProSe_Ph2
ParamForRangingSIPos	string	Configuration parameters for ranging and sidelink positioning. Its encoding shall comply with the UE policies for ranging and sidelink positioning defined in clause 5 of 3GPP TS 24.514 [72]	Ranging_SL
ParamForRangingSIPosRm	string	This data type is defined in the same way as the "ParamForRangingSlpos" data type, but with the OpenAPI "nullable: true" property.	Ranging_SL

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
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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.
7	A2X	This feature indicates the support of A2X communication.
8	ProSe_Ph2	This feature indicates the support of UE policy and N2 information provisioning for 5G ProSe UE-to-UE Relay function. This feature requires that the ProSe feature is also supported.
9	PIN	This feature indicates the support of Personal IoT Network requirements.
10	VPLMNSpecificURSP	This feature indicates the support of AF guidance on VPLMN-specific URSP rules. This feature requires that "AfGuideURSP" and "AfNotifications" features are also supported.
11	AfGuideTNAPs	This feature indicates the support of AF providing guidance to the HPLMN of the UE of the list of TNAP(s) collocated with the 5G-RG(s) of a specific user.
12	Ranging_SL	This feature indicates the support of the ranging and sidelink positioning functionality. The following functionalities are supported: <ul style="list-style-type: none"> - Support the provisioning/update/deletion of ranging and sidelink positioning service parameters. - Support the provisioning/update/deletion of the mapping between the Application Layer ID and the GPSI.

13	PduSessTypeChange	<p>This feature indicates the support of the provisioning/update of the requested PDU Session type functionality as part of the Generic Group Management, Exposure and Communication Enhancements.</p> <p>The following functionalities are supported:</p> <ul style="list-style-type: none"> - Support the provisioning/update of the requested PDU Session type as part of the information provided by the AF for guiding URSP determination. <p>This feature requires the support of the "AfGuideURSP" feature.</p>
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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

5.12.0 Introduction

The Nnef_ParameterProvision service shall use the ACSPParameterProvision API for ACS parameters provisioning.

The API URI of ACSPParameterProvision API shall be:

{apiRoot}/3gpp-acs-pp/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-acs-pp".
- "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.

5.12.1 Resources

5.12.1.1 Overview

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.

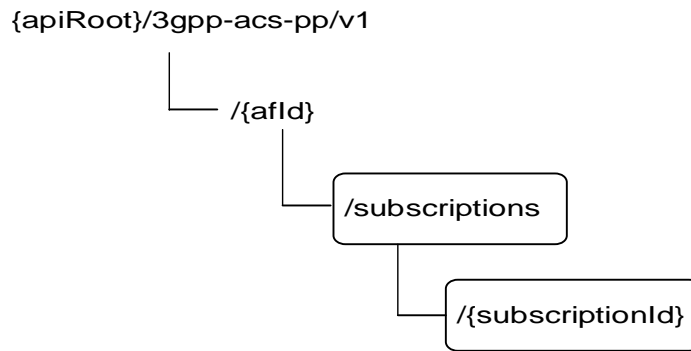


Figure 5.12.1.1-1: Resource URI structure of the ACSParameterProvision API

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

Table 5.12.1.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method	Description
ACS Configuration Subscriptions	/{afId}/subscriptions	GET	Read all subscriptions for a given AF.
		POST	Create a new ACS configuration subscription.
Individual ACS Configuration Subscription	/{afId}/subscriptions/{subscriptionId}	GET	Read an existing ACS configuration subscription identified by {subscriptionId}.
		PUT	Update an existing ACS configuration subscription identified by {subscriptionId}.
		PATCH	Modify an existing ACS configuration subscription identified by {subscriptionId}.
		DELETE	Delete an existing ACS configuration 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-ac-s-pp/v1/{afId}/subscriptions**

This resource shall support the resource URI variables defined in table 5.12.1.2.2-1.

Table 5.12.1.2.2-1: Resource URI variables for this resource

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

5.12.1.2.3 Resource Methods

5.12.1.2.3.1 General

The following 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
AcsConfiguration Data	M	1	Parameters to create an individual ACS Configuration subscription resource.

Table 5.12.1.2.3.3-2: Data structures supported by the POST Response Body on this resource

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

Table 5.12.1.2.3.3-3: Headers supported by the 201 Response Code on this resource

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

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

Table 5.12.1.3.2-1: Resource URI variables for this resource

Name	Definition
apiRoot	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 the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.12.1.3.3.2-1.

Table 5.12.1.3.3.2-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description
N/A				

This method shall support the request data structures specified in table 5.12.1.3.3.2-2 and the response data structures and response codes specified in table 5.12.1.3.3.2-3.

Table 5.12.1.3.3.2-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.12.1.3.3.2-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
AcsConfiguration Data	M	1	200 OK	The information for the subscription in the request URI are returned.
N/A			307 Temporary Redirect	Temporary redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in 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
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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 5.12.1.3.3.3A-3: Headers supported by the 307 Response Code on this resource

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

Table 5.12.1.3.3.3A-4: Headers supported by the 308 Response Code on this resource

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

5.12.1.3.3.4 DELETE

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

This method shall support the URI query parameters specified in table 5.12.1.3.3.4-1.

Table 5.12.1.3.3.4-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description
N/A				

This method shall support the request data structures specified in table 5.12.1.3.3.4-2 and the response data structures and response codes specified in table 5.12.1.3.3.4-3.

Table 5.12.1.3.3.4-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.12.1.3.3.4-3: Data structures supported by the DELETE Response Body on this resource

Data type	P	Cardinality	Response codes	Description
N/A			204 No Content	The subscription resource was terminated successfully.

N/A			307 Temporary Redirect	Temporary redirection, during subscription termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in 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.

5.12.1A Custom Operations without associated resources

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

5.12.1B Notifications

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

5.12.2 Data Model

5.12.2.1 General

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

Table 5.12.2.1-1 specifies the data types defined for the ACSPParameterProvision API.

Table 5.12.2.1-1: ACSPParameterProvision 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 ACSPParameterProvision API from other specifications are listed in table 5.12.2.2-1.

Table 5.12.2.2-1: Re-used Data Types

Data type	Reference	Comments
AcsInfo	3GPP TS 29.571 [8]	Contains the information of ACS

ExternalGroupld	3GPP TS 29.122 [4]	External Group Identifier for a user group.
Gpsi	3GPP TS 29.571 [8]	Identifies a GPSI.
Link	3GPP TS 29.122 [4]	Represents a referenced resource.
MtcProviderInformation	3GPP TS 29.571 [8]	Indicates MTC provider information.
SupportedFeatures	3GPP TS 29.571 [8]	Used to negotiate the applicability of the optional features defined in table 5.9.4-1.

5.12.2.3 Structured data types

5.12.2.3.1 Introduction

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

5.12.2.3.2 Type: AcsConfigurationData

Table 5.12.2.3.2-1: Definition of type AcsConfigurationData

Attribute name	Data type	P	Cardinality	Description	Applicability
self	Link	C	0..1	Identifies the individual service parameter subscription resource URI. Shall be present by the NEF in HTTP responses that include an object of AcsConfigurationData Data type.	
gpsi	Gpsi	O	0..1	Identifies GPSI. (NOTE)	
exterGroupld	ExternalGroupld	O	0..1	Represents a group of users. (NOTE)	
acsInfo	AcsInfo	M	1	Contains the information of ACS.	
mtcProviderld	MtcProviderInformation	O	0..1	Indicates MTC provider information.	
supFeat	SupportedFeatures	M	1	Indicates the list of Supported features used as described in 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	MtcProviderInformation	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

5.13.0 Introduction

The Nnef_MoLcsNotify service shall use the MoLcsNotify API.

The API URI of MoLcsNotify API shall be:

{apiRoot}/3gpp-mo-lcs-notify/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-mo-lcs-notify".
- "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.

5.13.1 Resources

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

5.13.1A Custom Operations without associated resources

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

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.	
additionalLocInfo	array(LocationInfo)	O	1..N	Represent additional user location information for exposure when location information for multiple UEs is exposed.	

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

The Nnef_AKMA service shall use the AKMA API.

The API URI of AKMA API shall be:

{apiRoot}/3gpp-akma/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-akma".
- "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.

5.14.2 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.

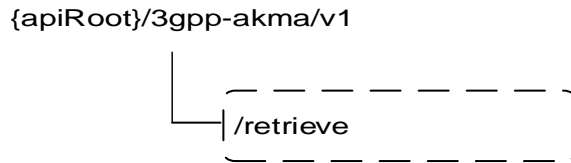


Figure 5.14.3.1-1: Custom operation URI structure of the AKMA API

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 clause 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

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

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]	Represents a data and a time.
Gpsi	3GPP TS 29.571 [8]	Represents a GPSI.
ProblemDetails	3GPP TS 29.122 [4]	Represents error related information.
Supi	3GPP TS 29.571 [8]	Represents a SUPI.
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
Afld	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 Afld: 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:	

		<p>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</p> <p>Routing Indicator, Home Network Id are specified in 3GPP TS 23.003 [55]. A-TID is specified in 3GPP TS 33.535 [38].</p>	
--	--	--	--

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

5.15.0 Introduction

The Nnef_TimeSyncExposure service shall use the TimeSyncExposure API.

The API URI of TimeSyncExposure API shall be:

{apiRoot}/3gpp-time-sync/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-time-sync".
- "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.

5.15.1 Resources

5.15.1.1 Overview

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.

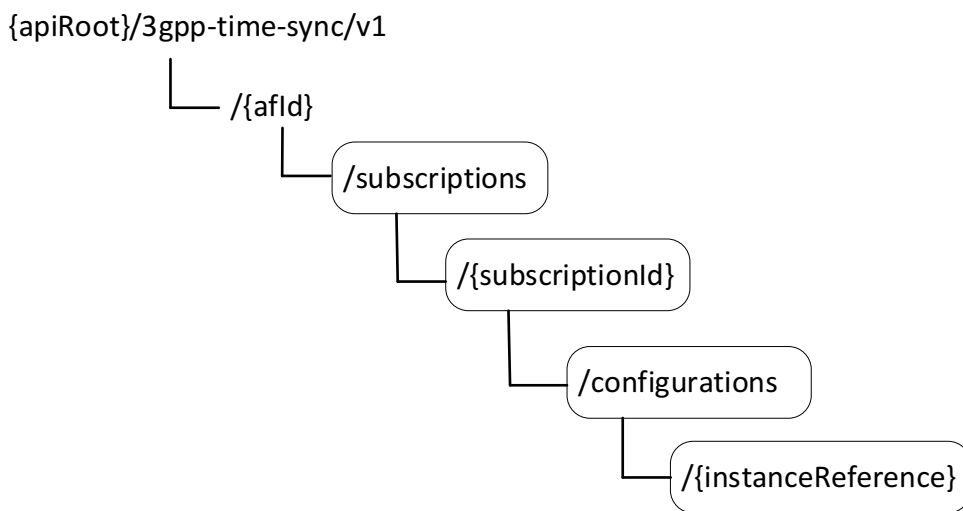


Figure 5.15.1.1-1: Resource URI structure of the TimeSyncExposure API

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
		GET	Read a configuration to time synchronization exposure.

Individual Time Synchronization Exposure Configuration	/{afld}/subscriptions/{subscriptionId}/configurations/{instanceReference}	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
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Location	string	M	1	Contains the URI of the newly created resource, according to the structure: {apiRoot}/3gpp-time-sync/v1/{afld}/subscriptions/{subscriptionId}
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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

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

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
TimeSyncExposureSubsNotif	M	1	Provides the time synchronization capabilities of a list of UEs by the NEF to the AF.

Table 5.15.3.2.3.1-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
N/A			204 No Content	The event notification is received successfully.
N/A			307 Temporary Redirect	Temporary redirection, during event notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative AF where the notification should be sent. Redirection handling is described in 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
TimeSyncExposureConfigNotif	M	1	Provides the current state of time synchronization service configuration by the NEF to the AF.

Table 5.15.3.3.3.1-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
N/A			204 No Content	The notification is received successfully.
N/A			307 Temporary Redirect	Temporary redirection, during event notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative AF where the notification should be sent. Redirection handling is described in 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 5.15.3.3.3.1-3: 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 5.15.3.3.3.1-4: 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 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 Synchronization 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.	
AcceptanceCriteriaResultIndication	5.15.4.4.9	Contains the acceptable/not acceptable indication of the clock quality acceptance criteria result information.	NetTimeSyncStatus
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	Indicates separately whether 5GS supports acting as a gPTP or PTP 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.	
StateOfConfiguration	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 subscribed 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	Applicability
ClockQualityAcceptanceCriterion	3GPP TS 29.571 [8]	Identifies clock quality acceptance criteria information.	NetTimeSyncStatus
ClockQualityDetailLevel	3GPP TS 29.571 [8]	Identifies clock quality detail level information.	NetTimeSyncStatus
DateTime	3GPP TS 29.122 [4]	Represents a data and a time.	
Dnn	3GPP TS 29.571 [8]	Identifies a DNN.	
DurationSec	3GPP TS 29.122 [4]	Indicates the time duration.	DurationSec
ExternalGroupId	3GPP TS 29.122 [4]	External Group Identifier for a user group.	
Gpsi	3GPP TS 29.571 [8]	Identifies a GPSI.	
NotificationMethod	3GPP TS 29.508 [26]	Represents the notification method.	
Snsai	3GPP TS 29.571 [8]	Identifies the S-NSSAI.	
SpatialValidityCond	3GPP TS 29.571 [8]	Represents the Spatial Validity Condition.	CoverageArea
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 29.122 [4]	Identifies a referenced resource.	
WebsocketNotifConfig	3GPP TS 29.122 [4]	Contains the configuration parameters to set up notification delivery over Websocket protocol.	Notification_websocket

5.15.4.3 Structured data types

5.15.4.3.1 Introduction

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

5.15.4.3.2 Type: TimeSyncExposureSubsc

Table 5.15.4.3.2-1: Definition of type TimeSyncExposureSubsc

Attribute name	Data type	P	Cardinality	Description	Applicability
exterGroupld	ExternalGroupld	C	0..1	Identifies a group of UE(s) for which the time synchronization capabilities is requested. (NOTE 1)	
gpsis	array(Gpsi)	C	1..N	Contains a list of UE for which the time synchronization capabilities is requested. (NOTE 1)	
anyUelnd	boolean	C	0..1	Identifies whether the AF request applies to any UE (i.e. all UEs). - "true": the AF request is applicable to any UE. - "false": the AF request is not applicable to any UE. - Default value is "false" if omitted. (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)	
snsai	Snsai	C	0..1	Identifies an S-NSSAI. (NOTE 2)	
afServiceId	string	O	0..1	Identifies a service on behalf of which the AF is issuing the request.	
subscribedEvents	array(SubscribedEvent)	O	1..N	Identifies the requirement to be notified of the event(s).	
eventFilters	array(EventFilter)	O	1..N	Contains the filter conditions to match for notifying the event(s) of time synchronization capabilities for a list of UE(s).	
subsNotifUri	Uri	M	1	Notification URI for time sensitive capability reporting.	
subsNotifId	string	M	1	Notification Correlation ID assigned by the NF service consumer.	
maxReportNbr	UInteger	O	0..1	If omitted, there is no limit.	

expiry	DateTime	C	0..1	This attribute indicates the expiry time of the subscription, after which the NEF shall not send any event notifications and the subscription becomes invalid. It may be included in an event subscription request and may be included in an event subscription response based on operator policies. If an expiry time was included in the request, then the expiry time returned in the response should be less than or equal to that value. If the expiry time is not included in the response, the NF service consumer shall not associate an expiry time for the subscription.	
repPeriod	DurationSec	C	0..1	Is supplied for notification Method "periodic".	
requestTestNotification	boolean	O	0..1	Indicates whether the AF requests the NEF to send a test notification. <ul style="list-style-type: none"> - 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" by the AF not to request the NEF to send a test notification. - Default value is "false" if omitted. 	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	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.	
reqPtplns	PtpInstance	M	1	Identifies the Ptp instance configuration and activation requested by the AF.	
gmEnable	boolean	C	0..1	Indicates whether the AF requests 5GS to act as a grandmaster for PTP or gPTP. <ul style="list-style-type: none"> - "true" indicates that the AF requests the 5GS to act as a grandmaster for PTP or gPTP. - "false" indicates that the AF does not request the 5GS to act as a grandmaster for PTP or gPTP. - Default value is "false" if omitted. 	
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	UInteger	O	0..1	Indicates the time synchronization error 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.	
coverageArea	SpatialValidityCond	O	0..1	Time Synchronization Coverage Area. (NOTE)	CoverageArea
clkQltDetLvl	ClockQualityDetailLevel	O	0..1	Indicates the clock quality detail level. For (g)PTP services, its value, if provided, shall be set to "ACCEPT_INDICATION".	NetTimeSyncStatus
clkQltAcptCri	ClockQualityAcceptanceCriterion	C	0..1	Indicates the clock quality acceptance criteria, and it is used to determine whether the time synchronization status for the (g)PTP service is acceptable / not acceptable. This attribute shall be present when the "clkQltDetLvl" attribute is present.	NetTimeSyncStatus
NOTE: The "trackingAreaList" attribute within the "coverageArea" attribute is not applicable for the untrusted AF.					

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)	C	1..N	Contains a list of time synchronization capabilities for the 5GS (list of User Plane Node Id) and the UE(s) (per User Plane Node Id). This attribute shall be present if the reported event is "AVAILABILITY_FOR_TIME_SYNC_SERVICE".	

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)	
clkQltIndOfNwtt	AcceptanceCriteriaResUltIndication	O	0..1	Indicates the clock quality acceptance criteria changes ("ACCEPTABLE", "NOT_ACCEPTABLE") for any of the PTP port(s) in NW-TT of the PTP instance.	NetTimeSyncStatus
stateOfDsts	array(StateOfDstt)	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 to which the configuration parameters below apply. (NOTE)	
n6Ind	boolean	C	0..1	Indicates whether the N6 termination that the configuration parameters below apply to the N6 interface. - "true" indicates that the N6 termination which the parameters below apply. - "false" indicates that the N6 termination which the parameters below do not apply. - Default value is "false" if omitted. (NOTE)	
ptpEnable	boolean	O	0..1	This is used to set the portDS.portEnable. - "true" indicates to set the portDS.portEnable. - "false" indicates not to set the portDS.portEnable. - Default value is "false" 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	Indicates how the value of the "logSyncInter" attribute is to be used.	

				<ul style="list-style-type: none"> - 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	<p>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.</p> <p>If omitted, the default value as described in the PTP Profile is used.</p>	
logAnnouInterInd	boolean	O	0..1	<p>Indicates how the value of the "logSyncInter" attribute is to be used.</p> <ul style="list-style-type: none"> - When set to "false", the value of "logAnnouInter" attribute is used to set the initialLogAnnounceInterval as described in IEEE Std 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.	
clkQltIndOfDdst	AcceptanceCriteriaRes ultIndication	O	0..1	Indicates the clock quality acceptance criteria changes ("ACCEPTABLE", "NOT_ACCEPTABLE") for the indicated DS-TT port of the PTP instance.	NetTimeSyncStatus
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].					

5.15.4.3.20 Void

5.15.4.3.21 Void

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 about 5GS and/or UE availability and capability 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].	
P2P_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.	

5.15.4.4.9 Enumeration: AcceptanceCriteriaResultIndication

Table 5.15.4.4.9-1: Enumeration AcceptanceCriteriaResultIndication

Enumeration value	Description	Applicability
ACCEPTABLE	PTP port in (g)PTP service meets the clock quality acceptance criteria.	
NON_ACCEPTABLE	PTP port in (g)PTP service does not meet the clock quality acceptance criteria.	

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].
3	CoverageArea	Indicates support of the inclusion of the Time Synchronization Coverage Area in time synch configuration requests.
4	NetTimeSyncStatus	This feature indicates the support of network timing synchronization status and reporting.

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

5.16.0 Introduction

The Nnef_EcsAddressProvision service shall use the EcsAddressProvision API.

The API URI of EcsAddressProvision API shall be:

{apiRoot}/3gpp-ecs-address-provision/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-ecs-address-provision".
- "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.

5.16.1 Resources

5.16.1.1 Overview

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.

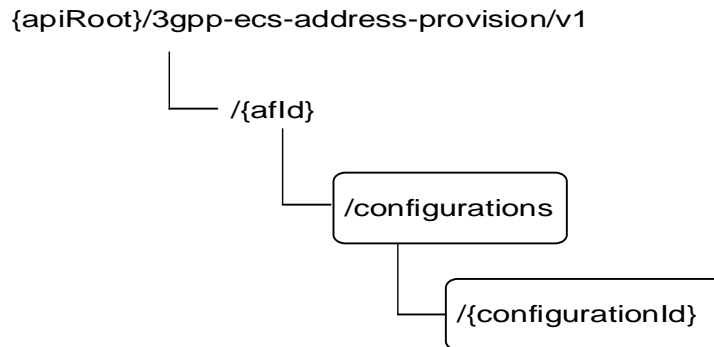


Figure 5.16.1.1-1: Resource URI structure of the EcsAddressProvision API

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	/{afId}/configurations	GET	Read all configurations for a given AF identified by {afId}.
		POST	Create a new configuration to provision ECS address(es).
Individual ECS Address Provision 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}.
		DELETE	Delete a configuration identified by {configurationId}.

5.16.1.2 Resource: ECS Address Provision Configurations

5.16.1.2.1 Introduction

This resource allows a AF to read all active ECS Address Provision Configurations for a given AF, or create a new Individual ECS Address Provision Configuration to the NEF.

5.16.1.2.2 Resource Definition

Resource URI: **{apiRoot}/3gpp-ecs-address-provision/v1/{afId}/configurations**

This resource shall support the resource URI variables defined in table 5.16.1.2.2-1.

Table 5.16.1.2.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	Clause 5.2.4 of 3GPP TS 29.122 [4].
afId	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
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N/A			
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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 Custom Operations without associated resources

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

5.16.1B Notifications

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

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	Applicability
EcsServerAddr	3GPP TS 29.571 [8]	Represents the Edge Configuration Server (ECS) address configuration information.	
Link	3GPP TS 29.122 [4]	Represents a referenced resource.	
MtcProviderInformation	3GPP TS 29.571 [8]	Represents the MTC Provider Information.	enNB1
PlmnIdNid	3GPP TS 29.571 [8]	Represents the PLMN identifier.	HR-SBO
SpatialValidityCond	3GPP TS 29.571 [8]	Represents the Spatial Validity Condition.	
SupportedFeatures	3GPP TS 29.571 [8]	Used to negotiate the applicability of the optional features defined in table 5.16.3-1.	
TargetUeld	5.6.3.3.7	Represents the target UE(s) information.	

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).	
mtcProviderId	MtcProviderInformation	O	0..1	Identifies the MTC Service Provider and/or MTC Application.	enNB1
spatialValidityCond	SpatialValidityCond	O	0..1	Represents the spatial validity condition.	
tgtUe	TargetUeld	O	0..1	Indicates the target UE information.	
plmnId	PlmnIdNid	O	0..1	Identifier of the serving PLMN in which the provisioned information applies.	HR-SBO
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
1	HR-SBO	This feature indicates the support of provisioning ECS Address Configuration Information for when the serving PLMN is different from the PLMN of the NEF.
2	enNB1	This feature indicates the support of Rel-18 enhancements to this northbound API.

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

5.17.0 Introduction

The Nnef_AMPolicyAuthorization service shall use the AMPolicyAuthorization API.

The API URI of AMPolicyAuthorization API shall be:

{apiRoot}/3gpp-am-policyauthorization/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-am-policyauthorization".

- "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.

5.17.1 Resources

5.17.1.1 Overview

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.

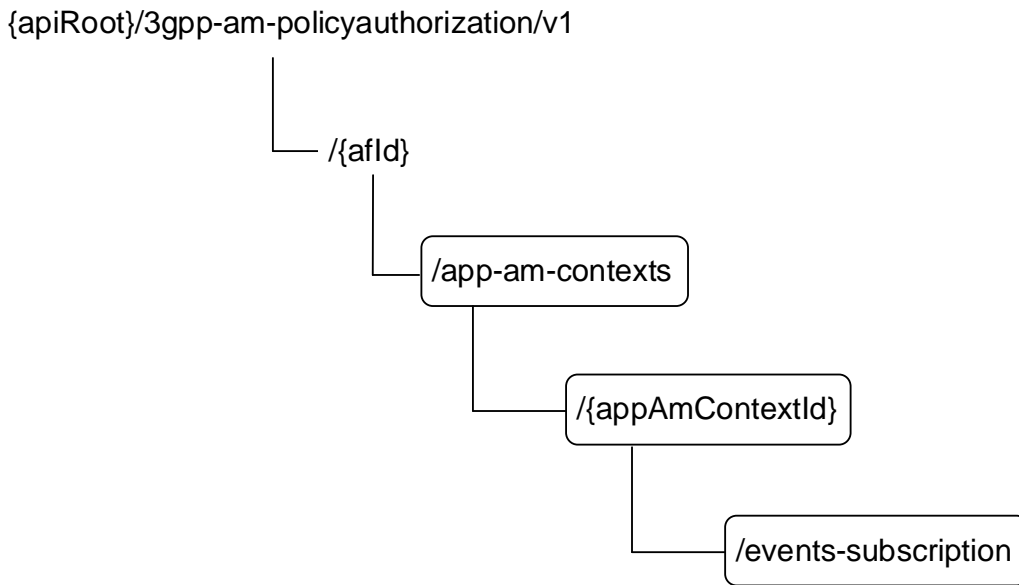


Figure 5.17.1.1-1: Resource URI structure of the AMPolicyAuthorization API

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].
afld	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
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N/A			
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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/{afId}/app-am-contexts/{appAmContextId}/events-subscription

Table 5.17.1.4.3.2-5: Headers supported by the 307 Response Code on this resource

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

Table 5.17.1.4.3.2-6: Headers supported by the 308 Response Code on this resource

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

5.17.1.4.3.3 DELETE

The DELETE method deletes existing subscribed AM policy event(s) within the existing Individual application AM context. The AF shall initiate the HTTP DELETE request message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.17.1.4.3.3-1.

Table 5.17.1.4.3.3-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description
N/A				

This method shall support the request data structures specified in table 5.17.1.4.3.3-2 and the response data structures and response codes specified in table 5.17.1.4.3.3-3 and the Location Headers specified in table 5.17.1.4.3.3-4 and table 5.17.1.4.3.3-5.

Table 5.17.1.4.3.3-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.17.1.4.3.3-3: Data structures supported by the DELETE Response Body on this resource

Data type	P	Cardinality	Response codes	Description
N/A			204 No Content	Successful case. The AM policy event(s) subscription resource is deleted.

N/A			307 Temporary Redirect	Temporary redirection, during the AM policy events deletion. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in 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.

5.17.1A Custom Operations without associated resources

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

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.
ProblemDetails	3GPP TS 29.122 [4]	Represents error related information.
SupportedFeatures	3GPP TS 29.571 [8]	Used to negotiate the applicability of the optional features defined in table 5.17.4-1.
WebsockNotifConfig	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

5.18.0 Introduction

The Nnef_AMInfluence service shall use the AMInfluence API.

The API URI of AMInfluence API shall be:

{apiRoot}/3gpp-am-influence/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-am-influence".

- "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.

5.18.1 Resources

5.18.1.1 Overview

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.

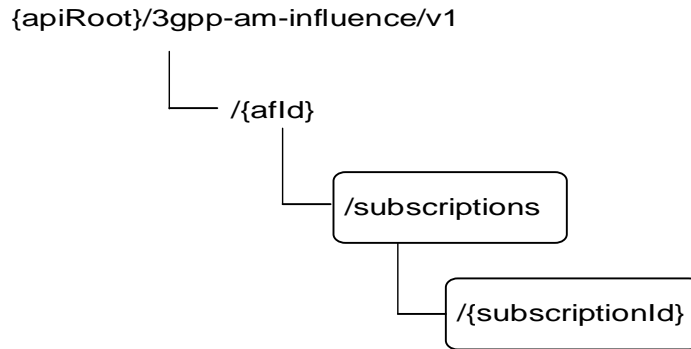


Figure 5.18.1.1-1: Resource URI structure of the AMInfluence API

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 (NOTE)	/{afId}/subscriptions	GET	Read all subscriptions for a given AF.
		POST	Create a new subscription to AM influence.
Individual AM Influence Subscription	/{afId}/subscriptions/{subscriptionId}	GET	Read an existing subscription to AM influence.
		PUT	Update an existing subscription to AM influence.
		PATCH	Modify an existing subscription to AM influence.
		DELETE	Delete an existing subscription to AM influence.
NOTE: The "AM Influence Subscription" resource is a collection resource and corresponds to the collection of AM Influence Subscriptions managed by the NEF.			

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/{afId}/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].
afId	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/{afld}/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/{afld}/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].
afld	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
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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.

5.18.1A Custom Operations without associated resources

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

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.
PlmnId	3GPP TS 29.571 [8]	Identifies a PLMN.
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.
WebsockNotifConfig	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 non-roaming UEs). <ul style="list-style-type: none"> - Set to "true": the AF request is applicable to any UE (i.e. all non-roaming UEs). - Set to "false": the AF request is not applicable to any UE (i.e. all non-roaming UEs). - Default value is "false" if omitted. (NOTE 2) (NOTE 3)	
roamUePlmnIds	array(PlmnId)	O	1..N	Indicates a list of PLMNs representing the home PLMN for the inbound roaming UEs in LBO roaming scenarios. (NOTE 3) (NOTE 5)	DCAMP_Roaming_LBO
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]. The default value is "false" if omitted.	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 non-roaming UE, then "anyUeInd" attribute together with "dnnSnssailInfos" attribute or "afApplds" attribute shall be included.				
NOTE 3:	One of individual UE identifier (i.e. "gpsi" attribute), External Group Identifier (i.e. "externalGroupId" attribute) or any UE indication (i.e. "anyUeInd" attribute) or any inbound roaming UEs PLMN ID (i.e. "roamUePlmnIds") shall be included.				
NOTE 4:	Any of the "highThruInd" attribute or "geoAreas" attribute shall be included.				
NOTE 5:	"roamUePlmnIds" attribute is applicable only in LBO roaming scenarios and if "afApplds" attribute or "dnnSnssailInfos" is provided.				

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; Set to "false" if low 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)	
dnnSnssailInfos	array(DnnSnssailInformation)	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].
3	DCAMP_Roaming_LBO	This feature indicates support for dynamically changing AM policy for LBO roaming scenarios for inbound roaming UE(s).
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 API 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.

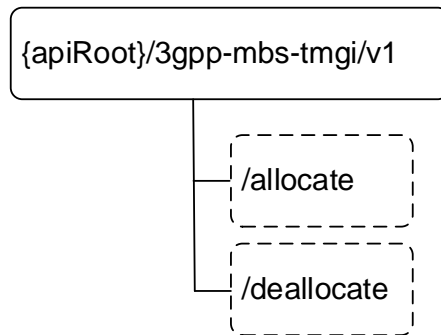


Figure 5.19.3.1-1: Custom operation URI structure of the MBSTMGI API

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].
ProblemDetailsTmgiAlloc	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 clause 5.19.7.				

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
ExpiryNotif	5.19.5.2.5	Represents TMGI(s) timer expiry notification information.	
ExternalMbsServiceArea	3GPP TS 29.571 [8]	Represents an external MBS service area.	
MbsServiceArea	3GPP TS 29.571 [8]	Represents an MBS service area.	
ProblemDetailsTmgiAlloc	5.19.5.4.1	Represents an extension to the ProblemDetails data structure with additional error information related to TMGI Allocation.	
ReducedMbsServArea	5.19.5.2.6	Represents the reduced MBS Service Area information.	
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).	

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
ProblemDetails	3GPP TS 29.122 [4]	Represents error related information.	
SupportedFeatures	3GPP TS 29.571 [8]	Represents the list of supported feature(s) and is used to negotiate the applicability of the optional features.	
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.	
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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
tmgiInfo	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.	

5.19.5.2.6 Type: ReducedMbsServArea

Table 5.19.5.2.6-1: Definition of type ReducedMbsServArea

Attribute name	Data type	P	Cardinality	Description	Applicability
reducedMbsServArea	MbsServiceArea	C	0..1	Represents the reduced MBS Service Area information that can be supported by the network. (NOTE)	
reducedExtMbsServArea	ExternalMbsServiceArea	C	0..1	Represents the reduced external MBS Service Area information that can be supported by the network. (NOTE)	

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

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

5.19.5.4 Data types describing alternative data types or combinations of data types

5.19.5.4.1 Type: ProblemDetailsTmgiAlloc

Table 5.19.5.4.1-1: Definition of type ProblemDetailsTmgiAlloc as a list of to be combined data types

Data type	Cardinality	Description	Applicability
ProblemDetails	1	Contains additional error related information.	
ReducedMbsServArea	0..1	Contains the reduced MBS Service Area information.	

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_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].

5.19.7 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 clauses 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
MBS_SERVICE_AREA_TOO_LARGE	403 Forbidden	Indicates that the TMGI allocation request is rejected because the provided MBS Service Area cannot be supported by the network as it is too large to be served by a single MB-SMF.
MBS_SERVICE_AREA_NOT_SUPPORTED	403 Forbidden	Indicates that the TMGI allocation request is rejected because the requested MBS Service Area is not supported (e.g., the MBS Service Area received from the AF cannot be covered by the service area(s) of any MB-SMF).

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 API 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.

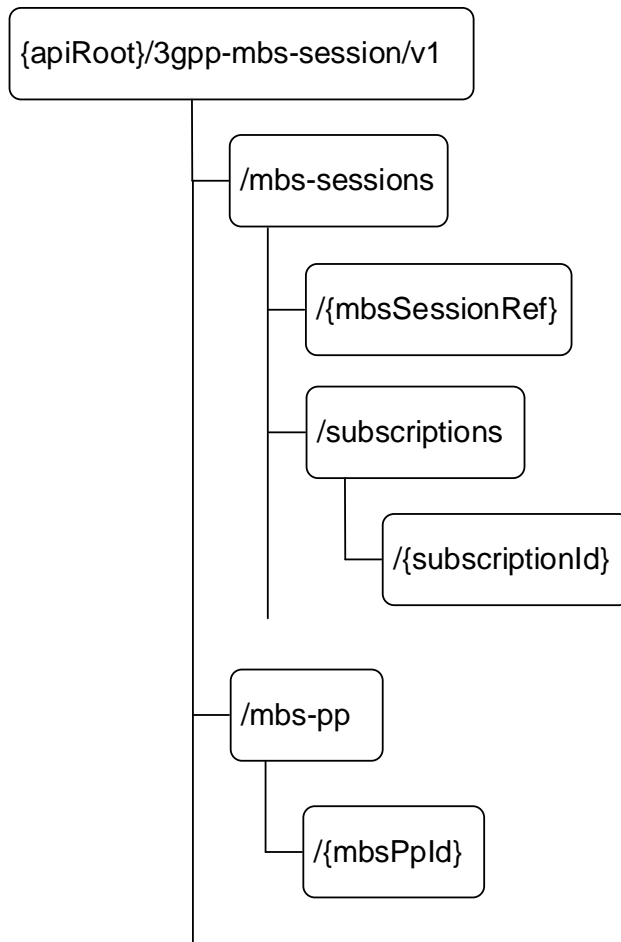


Figure 5.20.2.1-1: Resource URI structure of the MBSSession API

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/{mbsPpld}	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
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MbsSessionCreateReq	M	1	Representation of the MBS session to be created at the NEF.
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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)
ProblemDetailsTmgiAlloc	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 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.
MbsSessionUpdateResp	M	1	200 OK	Successful response. The Individual MBS Session was successfully updated and MBS Session update related information shall 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].
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 5.20.2.3.3.3-5: 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
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Location	string	M	1	An alternative target URI of the resource located in an alternative NEF.
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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.
ProblemDetails	O	0..1	404 Not Found	(NOTE 2)
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	Contain the representation of the new MBS Parameters Provisioning to be created at 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
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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	M	1	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	M	1	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 customoperations without associated resources defined for this API in this release of the specification.

5.20.4 Notifications

5.20.4.1 General

Notifications shall comply to 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.	
MbsSessAssistInfo	5.20.5.2.9	Represents the MBS Session Assistance information.	5MBS2
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.	
MbsSessionUpdateResp	5.20.5.2.10	Represents MBS Session update related information.	ReducedMbsServArea

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.	
ExternalMbsServiceArea	3GPP TS 29.571 [8]	Represents an external MBS service area.	
Gpsi	3GPP TS 29.571 [8]	Represents a GPSI.	
MbsServiceArea	3GPP TS 29.571 [8]	Represents an MBS service area.	
MbsAssistanceInfo	3GPP TS 29.503 [17]	Represents the MBS Session Assistance information.	5MBS2
MbsSession	3GPP TS 29.571 [8]	Represents MBS session information.	
MbsSessionId	3GPP TS 29.571 [8]	Represents the identifier of an MBS Session.	
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	

MtcProviderInformation	3GPP TS 29.571 [8]	Represents the MTC provider information.	enNB1
PatchItem	3GPP TS 29.571 [8]	Represents the requested modifications to a resource via the PATCH method.	
ProblemDetails	3GPP TS 29.122 [4]	Represents error related information.	
ProblemDetailsTmgiAlloc	5.19.5.4.1	Represents an extension to the ProblemDetails data structure with additional information.	
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.	
suppFeat	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 MbsSessionCreateRsp

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.	
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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.	
mtcProviderId	MtcProviderInformation	O	0..1	Identifies the MTC Service Provider and/or MTC Application.	enNB1
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 requests to provision MBS Session Authorization data.	
mbsSessAssistInfo	MbsSessAssistInfo	C	0..1	Contains the MBS Session Assistance information that the AF requests to provision. This attribute shall be present when the AF requests to provision MBS Session Assistance information.	5MBS2
suppFeat	SupportedFeatures	C	0..1	Contains the list of supported features among the ones defined in clause 5.20.6. This attribute shall be present only 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.	
gpsisList	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.	
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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 updated MBS Session Authorization data that the AF requests to provision.	
mbsSessAssistInfo	MbsSessAssistInfo	O	0..1	Contains the updated MBS Session Assistance information that the AF requests to provision.	5MBS2

5.20.5.2.9 Type: MbsSessAssistInfo

Table 5.20.5.2.9-1: Definition of type MbsSessAssistInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
mbsSessAssistData	array(MbsAssistanceInfo)	M	1..N	Contains one or several MBS Session Assistance information data set(s) for one or several MBS Session(s).	

5.20.5.2.10 Type: MbsSessionUpdateResp

Table 5.20.5.2.10-1: Definition of type MbsSessionUpdateResp

Attribute name	Data type	P	Cardinality	Description	Applicability
reducedMbsServiceArea	MbsServiceArea	C	0..1	This attribute shall be present only if the requested MBS Service Area cannot be covered by the MB-SMF Service Area of a single MB-SMF, and the MB-SMF reduced the MBS Service Area accordingly. When present, it shall contain the reduced MBS Service Area in which the MBS session has been updated. (NOTE)	
reducedExtMbsServiceArea	ExternalMbsServiceArea	C	0..1	This attribute shall be present only if the requested MBS Service Area cannot be covered by the MB-SMF Service Area of a single MB-SMF, and the MB-SMF reduced the MBS Service Area accordingly. When present, it shall contain the reduced external MBS Service Area in which the MBS session has been updated. (NOTE)	

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

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
1	5MBS2	<p>This feature indicates the support of the Rel-18 enhancements to the 5G Multicast/Broadcast services.</p> <p>The following functionalities are supported:</p> <ul style="list-style-type: none"> - MBS Session Assistance information provisioning. - Support the provisioning of the Associated Session Identifier to enable 5MBS MOCN Network Sharing scenarios (e.g., MOCN with multiple broadcast MBS sessions transmitting the same content via different CNs). - NR RedCap UEs information provisioning during MBS Session creation/update.
2	ReducedMbsServ Area	<p>This feature indicates the support of the MBS Service Area reduction functionality.</p> <p>The following sub-functionalities are supported:</p> <ul style="list-style-type: none"> - Support to return the reduced MBS Service Area in an MBS Session creation/update response.
3	enNB1	<p>This feature indicates the support of Rel-18 enhancements to this northbound API.</p>

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
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_AREA_TOO_LARGE	403 Forbidden	Indicates that the MBS Session creation request is rejected because the provided MBS Service Area cannot be supported by the network as it is too large to be served by a single MB-SMF.
MBS_SERVICE_AREA_NOT_SUPPORTED	403 Forbidden	Indicates that the MBS Session Creation/Update is rejected because the requested MBS Service Area is not supported (e.g., the MBS Service Area received from the AF cannot be covered by the service area(s) of any MB-SMF).
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

5.21.0 Introduction

The Nnef_EASDeployment service shall use the EASDeployment API.

The API URI of EASDeployment API shall be:

{apiRoot}/3gpp-eas-deployment/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-eas-deployment".
- "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.

5.21.1 Resources

5.21.1.1 Overview

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.

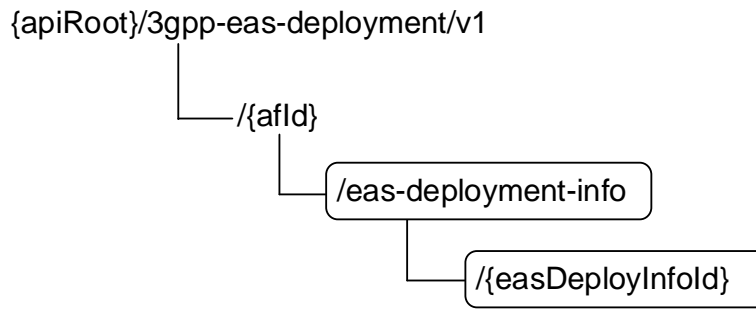


Figure 5.21.1.1-1: Resource URI structure of the northbound EASDeployment API

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	/{afld}/eas-deployment-info	GET	Read all EAS Deployment information for a given AF.
		POST	Create a new Individual EAS Deployment information resource.
Individual EAS Deployment Information	/{afld}/eas-deployment-info/{easDeployInfold}	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(EasDeploymentInfo)	M	0..N	200 OK	The configuration information for the AF in the request URI are returned.
N/A			307 Temporary Redirect	Temporary redirection, during EAS deployment information retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in 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 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].
afId	string	Identifier of the AF.
easDeployInfoId	string	Identifier of the EAS Deployment Information formatted according to IETF RFC 3986 [44].

5.21.1.3.3 Resource Methods

5.21.1.3.3.1 General

The following 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.

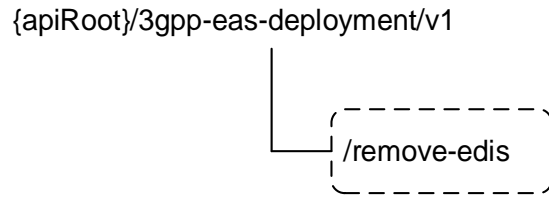


Figure 5.21.2.1-1: Custom operation URI structure of the Nnef_EASDeployment API

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

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

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.
SupportedFeatures	3GPP TS 29.571 [8]	Represents the list of supported feature(s) and used to negotiate the applicability of the optional features.
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(FqdnPattern MatchingRule)	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.	
snssai	Snssai	O	0..1	S-NSSAI for the EAS Deployment Information.	
exterGroupld	ExternalGroupld	O	0..1	External Group ID for the EAS Deployment Information.	
dnailfos	map(DnailInformation)	O	1..N	list of DNS server identifier (consisting of IP address and port) and/or IP address(s) of the EAS in the local DN for each DNAI. The key of map is the DNAI.	
targetAfld	string	O	0..1	Identifier of the AF that is responsible for the EAS associated with this EAS deployment information.	EasRelocationEnh
suppFeat	SupportedFeatures	C	0..1	Indicates the list of Supported features used as described in clause 5.21.5.	

Editor's note: The description of "suppFeat" attribute is FFS.

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	Identify the DNAI.	
dnsServlds	array(DnsServerIdentifier)	C	1..N	list of DNS server identifier (consisting of IP address and port) for each DNAI.	
easIpAdrs	array(IpAddr)	C	1..N	IP address(s) of the EASs in the local DN for each DNAI.	
NOTE: At least one of the "dnsServlds" or "easIpAdrs" 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
1	EasRelocationEnh	This feature indicates enhanced support of EAS relocation procedures via additional information about the AFs that are responsible for certain EAS.

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

5.22.0 Introduction

The Nnef_ASTI service shall use the ASTI API.

The API URI of ASTI API shall be:

{apiRoot}/3gpp-asti/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-asti".
- "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.

5.22.1 Resources

5.22.1.1 Overview

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.

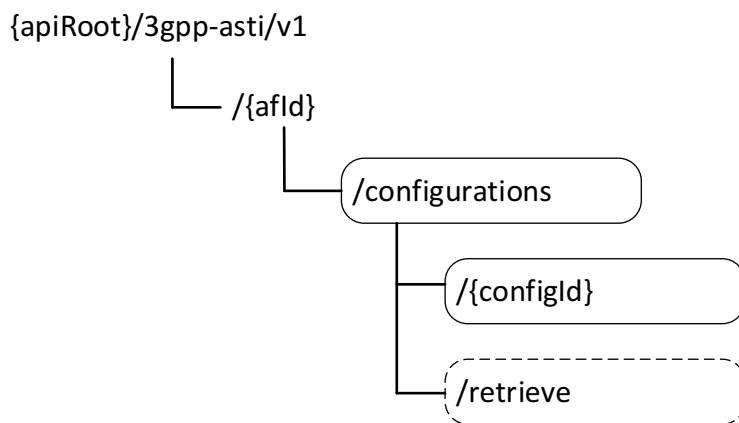


Figure 5.22.1.1-1: Resource URI structure of the ASTI API

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	/{afId}/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.
	/{afId}/configurations/retrieve	retrieve (POST)	Retrieval of the status of access stratum time distribution.
Individual ASTI Configuration	/{afId}/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/{afId}/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].
afId	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(AccessTime DistributionData)	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 5.2.6-1 of 3GPP TS 29.122 [4] 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

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

5.22.3 Notifications

5.22.3.1 General

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

Table 5.22.3.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
ASTI Notification	{astiNotifUri}	POST	ASTI notification.

5.22.3.2 ASTI Notification

5.22.3.2.1 Description

The ASTI Notification is used by the NEF to report the changes on the ASTI service to a previously subscribed AF.

5.22.3.2.2 Target URI

The Callback URI "{astiNotifUri}" shall be used with the callback URI variables defined in table 5.22.3.2.2-1.

Table 5.22.3.2.2-1: Callback URI variables

Name	Definition
astiNotifUri	Callback reference provided by the AF during the creation/update/modification of the corresponding Individual ASTI Configuration.

5.22.3.2.3 Operation Definition

5.22.3.2.3.1 Notification via HTTP POST

This method shall support the request data structures specified in table 5.22.3.2.3.1-1 and the response data structures and response codes specified in table 5.22.3.2.3.1-2.

Table 5.22.3.2.3.1-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
AstiConfigNotification	M	1	Provides information about the change in the 5G Access Stratum Time Distribution configuration notification by the NEF to the AF.

Table 5.22.3.2.3.1-2: 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 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 5.22.3.2.3.1-3: 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 5.22.3.2.3.1-4: 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.

5.22.3.2.3.2 Notification via Websocket

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

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 and for the subscription of 5G access stratum time distribution status.	
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.	
AstiConfigNotification	5.22.4.3.6	Contains the report of a change in the 5G Access Stratum Time Distribution parameters applied to the UE(s).	ASTIConfigReport NetTimeSyncStatus
AstiConfigStateNotification	5.22.4.3.7	Contains the report about a change in the 5G Access Stratum Time Distribution parameters for a UE	ASTIConfigReport NetTimeSyncStatus
ClockQualityAcceptanceCriteriaResult	5.15.4.3.20	Contains the clock quality acceptance criteria result.	NetTimeSyncStatus
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 ASTI 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	Applicability
AstiEvent	3GPP TS 29.565 [50]	Contains the ASTI Event.	ASTIConfigReport NetTimeSyncStatus
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.	
SpatialValidityCond	3GPP TS 29.571 [8]	Represents the Spatial Validity Condition.	

SupportedFeatures	3GPP TS 29.571 [8]	Used to negotiate the applicability of the optional features defined in table 5.22.5-1.	
Uri	3GPP TS 29.571 [8]	Identifies a referenced resource.	

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 1)	
exterGroupld	ExternalGroupld	C	0..1	Represents a group of users. (NOTE 1)	
asTimeDisParam	AsTimeDistributionParam	M	1	5G access stratum time distribution parameters. (NOTE 3)	
coverageArea	SpatialValidityCondition	O	0..1	Time Synchronization Coverage Area. (NOTE 2)	CoverageArea
astiNotifUri	Uri	C	0..1	Notification URI for reporting changes in 5G access stratum time distribution status, and/or reporting the 5G access stratum time distribution information. It shall be provided if the feature ASTIConfigReport is supported.	ASTIConfigReport
astiNotifld	string	C	0..1	Notification Correlation ID assigned by the NF service consumer. It shall be provided if the ASTIConfigReport feature is supported.	ASTIConfigReport
suppFeat	SupportedFeatures	C	0..1	Represents the features supported by the NF service consumer. This parameter shall be supplied by the NF service consumer in the POST request and the response that requested the creation of an Individual ASTI Configuration resource.	
NOTE 1: One of "gpsis" or "externalGroupld" attribute shall be provided.					
NOTE 2: The "trackingAreaList" attribute within the "coverageArea" attribute is not applicable for the untrusted AF.					
NOTE 3: The "clkQltDetLvl" attribute and the "clkQltAcptCri" attribute (if applicable) within "asTimeDisParam" attribute may be provided only if the "NetTimeSyncStatus" feature is supported.					

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.	

5.22.4.3.6 Type AstiConfigNotification

Table 5.22.4.3.6-1: Definition of type AstiConfigNotification

Attribute name	Data type	P	Cardinality	Description	Applicability
astiNotifId	string	M	1	It is used to set the value of Notification Correlation ID in the corresponding notification.	
stateConfigs	array(AstiConfigStateNotification)	M	1..N	Contains change of state of 5G access stratum time distribution configuration.	

5.22.4.3.7 Type AstiConfigStateNotification

Table 5.22.4.3.7-1: Definition of type AstiConfigStateNotification

Attribute name	Data type	P	Cardinality	Description	Applicability
gpsi	Gpsi	M	1	Identifies the UE to which the status below apply.	
event	AstiEvent	M	1	Indicates the reported event.	

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
1	CoverageArea	Indicates support of the inclusion of the Time Synchronization Coverage Area in ASTI requests.
2	ASTIConfigReport	This feature indicates the support of the report of changes in 5G access stratum time distribution status.
3	NetTimeSyncStatus	This feature indicates the support of network timing synchronization status and reporting.

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.

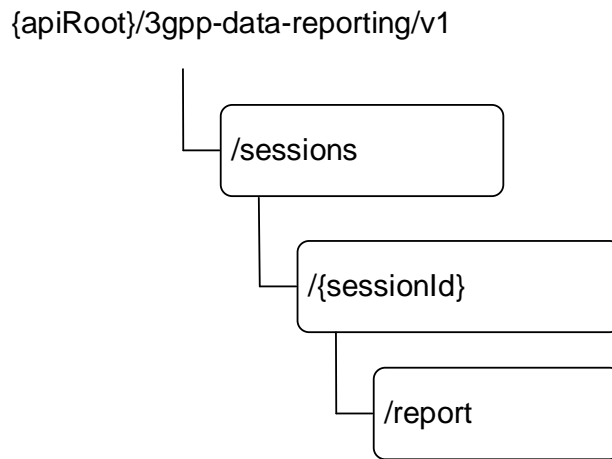


Figure 5.23.2-1: Resource URI structure of the DataReporting API

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
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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.

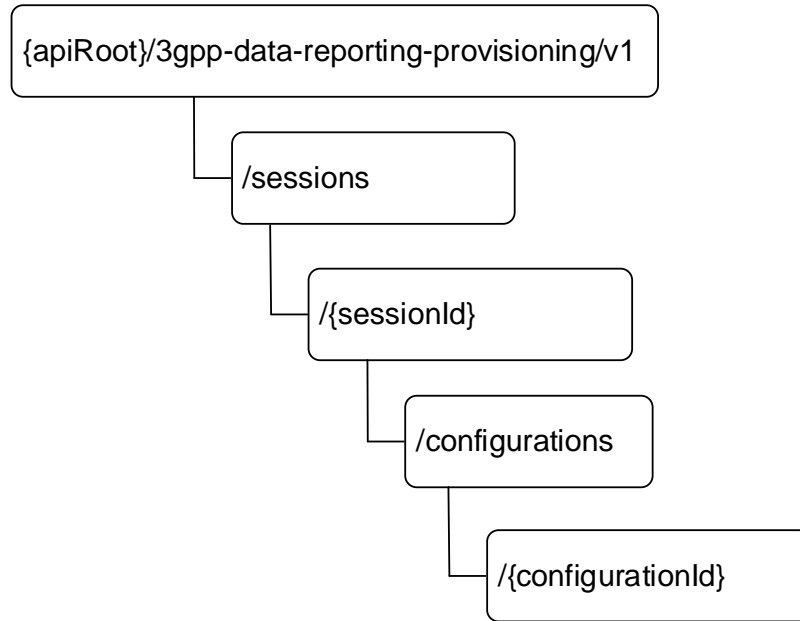


Figure 5.24.2-1: Resource URI structure of the DataReportingProvisioning API

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 5.24.2.2.2-1: 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
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Location	string	M	1	The URI of the newly created resource, according to the structure: {apiRoot}/3gpp-data-reporting-provisioning/v1/sessions/{sessionId}
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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 clause 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 clauses 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
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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-ueid/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 API 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.

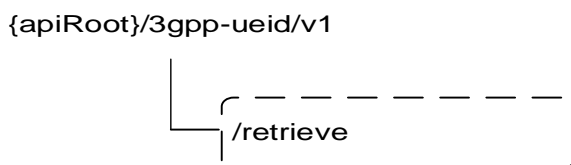


Figure 5.25.3.1-1: Custom operation URI structure of the UEId API

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
UeldReq	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
UeldInfo	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
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UeldReq	5.25.5.2.2	Represents the parameters to requestAF specific UE ID retrieval.	
UeldInfo	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	Applicability
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 a port, unsigned integer with valid values between 0 and 65535.	PortNumber
ProblemDetails	3GPP TS 29.122 [4]	Represents error related information.	
Snssai	3GPP TS 29.571 [8]	Identifies the S-NSSAI.	
SupportedFeatures	3GPP TS 29.571 [8]	Represents the list of supported feature(s) and used to negotiate the applicability of the optional features.	
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)
afld	string	M	1	Represents the identifier of theAF 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 "uelpAddr" attribute.	
mtcProviderId	MtcProviderInformation	O	0..1	Indicates MTC provider information.	
portNumber	Port	O	0..1	Indicates the UDP or TCP port number associated with the UE IP address as provided in the "uelpAddr" attribute.	PortNumber
snssai	Snssai	O	0..1	Identifies an S-NSSAI.	
uelpAddr	IpAddr	C	0..1	Identifies a UE IP Address. (NOTE 2)	
ueMacAddr	MacAddr48	C	0..1	Identifies a UE MAC Address. (NOTE 2)	

supFeat	SupportedFeatures	C	0..1	Indicates the list of Supported features used as described in clause 5.25.6. This attribute shall be provided when feature negotiation needs to take place.	
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.	
supFeat	SupportedFeatures	C	0..1	Represents 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.	

5.25.5.3 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
1	PortNumber	This feature indicates supporting AF providing Port Number associated with the UE IP address in the request.

5.25.7 Error handling

5.25.7.1 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.

5.25.7.2 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 AF specific UE ID retrieval 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 API 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.

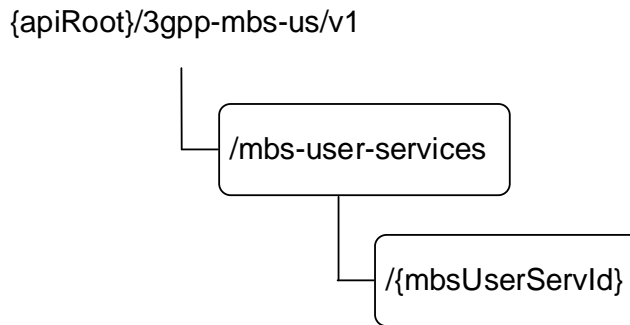


Figure 5.26.2.1-1: Resource URI structure of the MBSUserService API

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
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apiRoot	string	See clause 5.26.1.
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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
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Location	string	M	1	An alternative URI of the resource located in an alternative NEF.
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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 API 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.

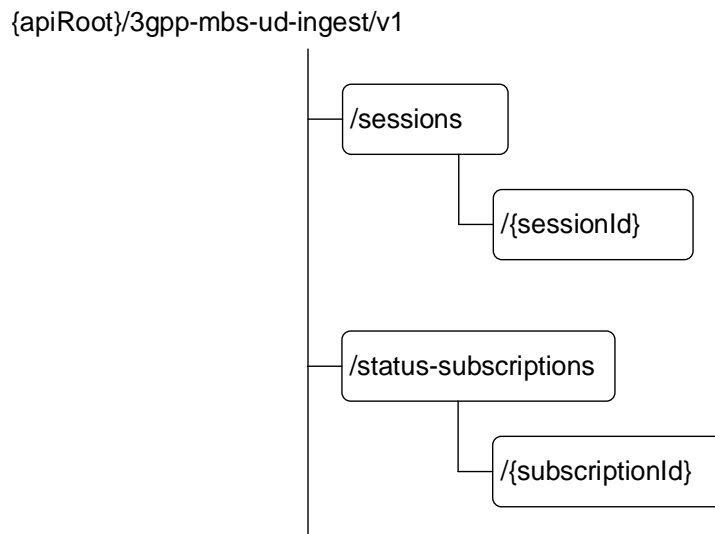


Figure 5.27.2.1-1: Resource URI structure of the MBSUserDataIngestSession API

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	Description
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			codes	
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
MBSUserDataIngSession	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
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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
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MBSUserDataIngestSession	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(MBSUserDataIngStatSubsc)	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
MBSUserDataIngestStatSubsc	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
MBSUserDataIngStatSubsc	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
MBSUserDataIngStatSubsc	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_web_socket	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	5MBS2	This feature indicates the support of the Rel-18 enhancements to 5G Multicast/Broadcast services. The following functionalities are supported: - Support the provisioning of the Associated Session Identifier to enable 5MBS MOCN Network Sharing scenarios (e.g., MOCN with multiple broadcast MBS sessions transmitting the same content via different CNs).

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 API 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.

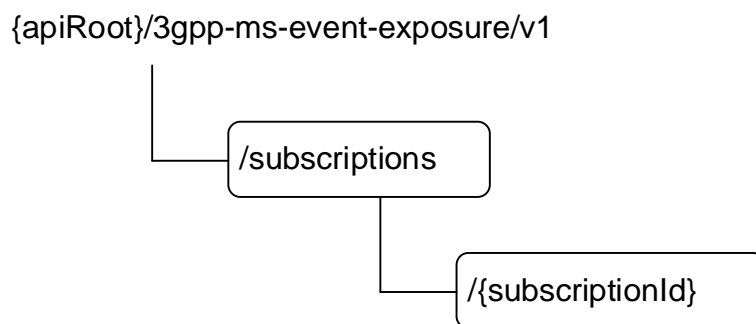


Figure 5.28.2.1-1: Resource URI structure of the MSEventExposure API

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
AfEventExposure Notif	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

5.29 MBSGroupMsgDelivery API

5.29.1 Introduction

The Nnef_MBSGroupMsgDelivery service shall use the MBSGroupMsgDelivery API.

The API URI of the MBSGroupMsgDelivery API shall be:

{apiRoot}/3gpp-mbs-group-msg/v1

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-mbs-group-msg".
- "apiVersion" shall be set to "v1" for the current version defined in the present document.
- The <apiSpecificSuffixes> shall be set as described in clause 5.2.4 of 3GPP TS 29.122 [4].

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

NOTE: When 3GPP TS 29.122 [4] is referenced for the common protocol and interface aspects for API definition in the clauses under clause 5.29, the NEF takes the role of the SCEF and the service consumer (i.e., AF) takes the role of the SCS/AS.

5.29.2 Resources

5.29.2.1 Overview

This clause describes the structure for the Resource URIs as shown in figure 5.29.2.1-1 and HTTP methods used for the MBSGroupMsgDelivery API.

The structure of the resource URIs of the MBSGroupMsgDelivery API is shown in Figure 5.29.2.1-1.

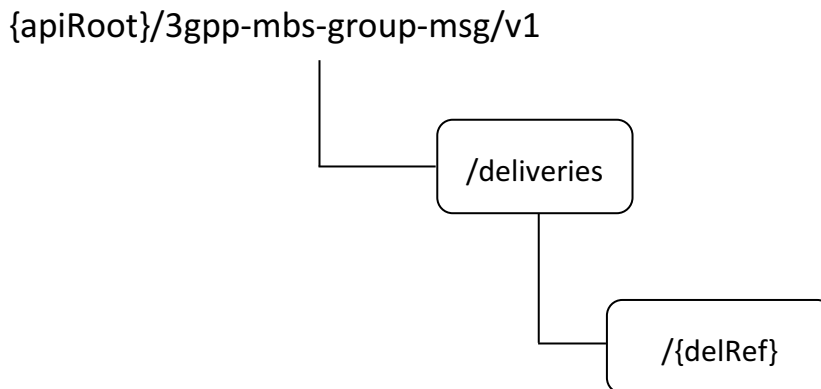


Figure 5.29.2.1-1: Resource URI structure of the MBSGroupMsgDelivery API

Table 5.29.2.1-1 provides an overview of the resources and applicable HTTP methods.

Table 5.29.2.1-1: Resources and methods overview

Resource name	Resource URI (relative path under API URI)	HTTP method or custom operation	Description (service operation)
MBS Group Message Deliveries	/deliveries	GET	Retrieve the existing MBS Group Message Deliveries.
		POST	Request the creation of a new MBS Group Message Delivery.
Individual MBS Group Message Delivery	/deliveries/{delRef}	GET	Retrieve a previously submitted MBS Group Message Delivery.

		PATCH	Request the modification of a previously submitted MBS Group Message Delivery.
		DELETE	Request the deletion of a previously submitted MBS Group Message Delivery.

5.29.2.2 Resource: MBS Group Message Deliveries

5.29.2.2.1 Introduction

This resource represents the collection of MBS Group Message Deliveries managed by the NEF.

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

5.29.2.2.2 Resource Definition

Resource URI: `{apiRoot}/3gpp-mbs-group-msg/v1/deliveries`

This resource shall support the resource URI variables defined in table 5.29.2.2.2-1.

Table 5.29.2.2.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 5.29.1.

5.29.2.2.3 Resource Standard Methods

5.29.2.2.3.1 GET

This method allows an AF to retrieve all the active MBS Group Message Deliveries managed by the NEF.

This method shall support the URI query parameters specified in table 5.29.2.2.3.1-1.

Table 5.29.2.2.3.1-1: 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 5.29.2.2.3.1-2 and the response data structures and response codes specified in table 5.29.2.2.3.1-3.

Table 5.29.2.2.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 5.29.2.2.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
array(MbsGroupMsgDel)	M	0..N	200 OK	Successful case. All the active MBS Group Message Deliveries managed by the NEF shall be returned. If no active MBS Group Message Delivery is available at the NEF, an empty array shall be 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 codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall also apply.				

Table 5.29.2.2.3.1-4: Headers supported by the 307 Response Code on this resource

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

Table 5.29.2.2.3.1-5: Headers supported by the 308 Response Code on this resource

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

5.29.2.2.3.2 POST

This method enables an AF to request the creation of an MBS Group Message Delivery at the NEF.

This method shall support the URI query parameters specified in table 5.29.2.2.3.2-1.

Table 5.29.2.2.3.2-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This operation shall support the request and response data structures and response codes specified in table 5.29.2.2.3.2-2 and table 5.29.2.2.3.2-3.

Table 5.29.2.2.3.2-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
MbsGroupMsgDel	M	1	Represents the Group Message Delivery to be created at the NEF.

Table 5.29.2.2.3.2-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MbsGroupMsgDel	M	1	201 Created	Successful case: A representation of the created "Individual MBS Group Message Delivery" resource is returned in the response body. An HTTP "Location" header that contains the URI of the created "Individual MBS Group Messge Delivery" resource shall also be included.
ProblemDetails	O	0..1	403 Forbidden	(NOTE 2)
NOTE 1: The mandatory HTTP error status codes for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall also apply.				

NOTE 2: Failure cases are described in clause 5.29.7.

Table 5.29.2.2.3.2-4: 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-group-msg/v1/deliveries/{delRef}

5.29.2.2.4 Resource Custom Operations

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

5.29.2.3 Resource: Individual MBS Group Message Delivery

5.29.2.3.1 Introduction

This resource represents an "Individual MBS Group Message Delivery" resource managed by the NEF.

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

5.29.2.3.2 Resource Definition

Resource URI: {apiRoot}/3gpp-mbs-group-msg/v1/deliveries/{delRef}

This resource shall support the resource URI variables defined in table 5.29.2.3.2-1.

Table 5.29.2.3.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 5.29.1.
delRef	string	Contains the identifier of the "Individual MBS Group Message Delivery" resource assigned by the NEF.

5.29.2.3.3 Resource Standard Methods

5.29.2.3.3.1 GET

This method allows an AF to retrieve an existing "Individual MBS Group Message Delivery" resource at the NEF.

This method shall support the URI query parameters specified in table 5.29.2.3.3.1-1.

Table 5.29.2.3.3.1-1: 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 5.29.2.3.3.1-2 and the response data structures and response codes specified in table 5.29.2.3.3.1-3.

Table 5.29.2.3.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 5.29.2.3.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MbsGroupMsgDel	M	1	200 OK	Successful case. The requested "Individual MBS Group Message Delivery" 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 codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall also apply.				

Table 5.29.2.3.3.1-4: Headers supported by the 307 Response Code on this resource

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

Table 5.29.2.3.3.1-5: Headers supported by the 308 Response Code on this resource

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

5.29.2.3.3.2 PATCH

This method enables an AF to request the modification of an existing "Individual MBS Group Message Delivery" resource at the NEF.

This method shall support the URI query parameters specified in table 5.29.2.3.3.2-1.

Table 5.29.2.3.3.2-1: 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 5.29.2.3.3.2-2 and the response data structures and response codes specified in table 5.29.2.3.3.2-3.

Table 5.29.2.3.3.2-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
MbsGroupMsgDel Patch	M	1	Contains the parameters to request the modification of the "Individual MBS Group Message Delivery" resource.

Table 5.29.2.3.3.2-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MbsGroupMsgDel	M	1	200 OK	Successful case. The concerned "Individual MBS Group Message Delivery" 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 Group Message Delivery" 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].
ProblemDetails	O	0..1	403 Forbidden	(NOTE 2)
NOTE 1: The mandatory HTTP error status codes for the HTTP PATCH method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall also apply.				
NOTE 2: Failure cases are described in clause 5.29.7.				

Table 5.29.2.3.3.2-4: Headers supported by the 307 Response Code on this resource

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

Table 5.29.2.3.3.2-5: Headers supported by the 308 Response Code on this resource

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

5.29.2.3.3.3 DELETE

This method enables an AF to request the deletion of an existing "Individual MBS Group Message Delivery" resource at the NEF.

This method shall support the URI query parameters specified in table 5.29.2.3.3.3-1.

Table 5.29.2.3.3.3-1: 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 5.29.2.3.3.3-2 and the response data structures and response codes specified in table 5.29.2.3.3.3-3.

Table 5.29.2.3.3.3-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 5.29.2.3.3.3-3: 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 Group Message Delivery" 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 codes for the HTTP DELETE method listed in Table 5.2.6-1 of 3GPP TS 29.122 [4] shall also apply.				

Table 5.29.2.3.3.3-4: Headers supported by the 307 Response Code on this resource

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

Table 5.29.2.3.3.3-5: Headers supported by the 308 Response Code on this resource

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

5.29.2.3.4 Resource Custom Operations

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

5.29.3 Custom Operations without associated resources

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

5.29.4 Notifications

5.29.4.1 General

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

Table 5.29.4.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
MBS Group Message Delivery Notification	{notifUri}	POST	Enable the NEF to notify an AF of the status of an MBS Group Message Delivery.

5.29.4.2 MBS Group Message Delivery Notification

5.29.4.2.1 Description

This Notification is used by the NEF to report the status of an MBS Group Message Delivery to a previously subscribed AF.

5.29.4.2.2 Target URI

The Callback URI "{notifUri}" shall be used with the callback URI variables defined in table 5.29.4.2.2-1.

Table 5.29.4.2.2-1: Callback URI variables

Name	Definition
notifUri	Represents the callback URI encoded as a string formatted as a URI.

5.29.4.2.3 Operation Definition

This method shall support the request data structures specified in table 5.29.4.2.3-1 and the response data structures and response codes specified in table 5.29.4.2.3.1-2.

Table 5.29.4.2.3-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
MbsGroupMsgDeliveryStatusNotif	M	1	Represents the MBS Group Message Delivery Notification.

Table 5.29.4.2.3-2: 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 notification is successfully received and acknowledged.
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 towards which 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 towards which 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 HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall also apply.

Table 5.29.4.2.3-3: Headers supported by the 307 Response Code on this resource

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

Table 5.29.4.2.3-4: Headers supported by the 308 Response Code on this resource

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

5.29.5 Data Model

5.29.5.1 General

This clause specifies the application data model supported by the MBSGroupMsgDelivery API. Table 5.29.5.1-1 specifies the data types defined for the MBSGroupMsgDelivery API.

Table 5.29.5.1-1: MBSGroupMsgDelivery specific Data Types

Data type	Clause defined	Description	Applicability
MbsGroupMsgDel	5.29.5.2.3	Represents an MBS Group Message Delivery.	
MbsGroupMsgDelPatch	5.29.5.2.5	Represents the parameters to request the modification of an existing MBS Group Message Delivery.	
MbsGroupMsgDelStatusNotif	5.29.5.2.6	Represents an MBS Group Message Delivery Notification.	
MbsServArea	5.29.5.4.1	Represents an MBS Service Area.	

Table 5.29.5.1-2 specifies data types re-used by the MBSGroupMsgDelivery API from other specifications, including a reference to their respective specifications, and when needed, a short description of their use within the MBSGroupMsgDelivery API.

Table 5.29.5.1-2: MBSGroupMsgDelivery API re-used Data Types

Data type	Reference	Comments	Applicability
Bytes	3GPP TS 29.122 [4]	Represents a sequence of bytes.	
DateTime	3GPP TS 29.122 [4]	Represents a date and a time.	
ExternalGroupId	3GPP TS 29.122 [4]	Represents an external Group Identifier.	
ExternalMbsServiceArea	3GPP TS 29.571 [8]	Represents an external MBS service area.	
MbsServiceArea	3GPP TS 29.571 [8]	Represents an MBS service area.	
ProblemDetails	3GPP TS 29.571 [8]	Represents error related information.	
SupportedFeatures	3GPP TS 29.571 [8]	Represents the list of supported feature(s) and is used to negotiate the applicability of the optional features.	
Uri	3GPP TS 29.122 [4]	Contains a Uri.	
UserServiceDescription	3GPP TS 26.517 [71]	Contains MBS User Service Announcement information.	

5.29.5.2 Structured data types

5.29.5.2.1 Introduction

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

5.29.5.2.2 Void

5.29.5.2.3 Type: MbsGroupMsgDel

Table 5.29.5.2.3-1: Definition of type MbsGroupMsgDel

Attribute name	Data type	P	Cardinality	Description	Applicability
afId	string	C	0..1	Contains the identifier of the AF that is sending the request. This attribute shall be present only in MBS Group Message Delivery creation/modification requests.	
extGroupld	ExternalGroupld	M	1	Identifies the targeted group of UEs.	
payload	Bytes	M	1	Contains the payload of the requested MBS Group Message Delivery.	
mbsServArea	MbsServArea	M	1	Represents the targeted MBS Service Area.	
startTime	DateTime	M	1	Represents the start time of the MBS Group Message Delivery.	
endTime	DateTime	M	1	Represents the end time of the MBS Group Message Delivery.	
notifUri	Uri	M	1	The notification URI via which the AF desires to receive notifications on the status of the MBS Group Message Delivery.	
delStatus	boolean	C	0..1	Indicates the status of Group Message Delivery. - "true": Successful delivery. - "false": Failed delivery. This attribute shall be present only in MBS Group Message Delivery creation/modification responses.	
mbsUserServAnmt	UserServiceDescription	C	0..1	Represents the MBS User Service Announcement information currently associated with the MBS group message delivery. This attribute shall be present in the response to an MBS Group Message Delivery Creation request and may be present in the response to an MBS Group Message Delivery Update request.	
servAreaWithoutMbs	MbsServArea	O	0..1	Contains the service area without MBS capability. This attribute may be present only in MBS Group Message Delivery creation/modification responses.	

supFeat	SupportedFeatures	C	0..1	Indicates the list of supported features. This attribute shall be present only when feature negotiation needs to take place.	
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5.29.5.2.4 Void

5.29.5.2.5 Type: MbsGroupMsgDelPatch

Table 5.29.5.2.5-1: Definition of type MbsGroupMsgDelPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
payload	Bytes	O	0..1	Contains the updated payload of the requested MBS Group Message Delivery.	
mbsServArea	MbsServArea	O	0..1	Represents the updated MBS Service Area.	
startTime	DateTime	O	0..1	Represents the updated start time of the MBS Group Message Delivery.	
endTime	DateTime	O	0..1	Represents the updated end time of the MBS Group Message Delivery.	
notifUri	Uri	O	0..1	Contains the updated notification URI via which the AF desires to receive notifications on the status of the MBS Group Message Delivery.	

5.29.5.2.6 Type: MbsGroupMsgDelStatusNotif

Table 5.29.5.2.6-1: Definition of type MbsGroupMsgDelStatusNotif

Attribute name	Data type	P	Cardinality	Description	Applicability
delStatus	boolean	M	1	Indicate the status of Group Message Delivery. - "true": Successful delivery. - "false": Failed delivery.	

5.29.5.3 Simple data types and enumerations

5.29.5.3.1 Introduction

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

5.29.5.3.2 Simple data types

The simple data types defined in Table 5.29.5.3.2-1 shall be supported.

Table 5.29.5.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

5.29.5.4 Data types describing alternative data types or combinations of data types

5.29.5.4.1 Type: MbsServArea

Table 5.29.5.4.1-1: Definition of type MbsServArea as a list of mutually exclusive alternatives

Data type	Cardinality	Description	Applicability
MbsServiceArea	0..1	Represents the internal MBS Service Area (i.e., in the form of a list of cell ID(s) and/or list of TAI(s)).	
ExternalMbsServiceArea	0..1	Represents the external MBS Service Area (i.e., in the form of geographical area(s) or civic address(es)).	

5.29.6 Used Features

The optional features listed in table 5.29.6-1 are defined for the MBSGroupMsgDelivery API. They shall be negotiated using the extensibility mechanism defined in clause 5.2.7 of 3GPP TS 29.122 [4].

Table 5.29.6-1: Features used by the MBSGroupMsgDelivery API

Feature number	Feature Name	Description

5.29.7 Error handling

5.29.7.1 General

For the MBSGroupMsgDelivery API, HTTP error responses shall be supported as specified in clause 5.2.6 of 3GPP TS 29.122 [4]. Protocol errors and application errors specified in clause 5.2.6 of 3GPP TS 29.122 [4] shall be supported for the HTTP status codes specified in table 5.2.6-1 of 3GPP TS 29.122 [4].

In addition, the requirements in the following clauses are applicable for the MBSGroupMsgDelivery API.

5.29.7.2 Protocol Errors

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

5.29.7.3 Application Errors

The application errors defined for the MBSGroupMsgDelivery API are listed in table 5.29.7.3-1.

Table 5.29.7.3-1: Application errors

Application Error	HTTP status code	Description	Applicability
MBS_SERVICE_AREA_NOT_SUPPORTED	403 Forbidden	The requested MBS Service Area is not supported by the 3GPP Core Network.	

5.30 DNAMapping API

5.30.1 Introduction

The Nnef_DNAMapping service shall use the DNAMapping API.

The API URI of the DNAMappingAPI shall be:

{apiRoot}/3gpp-dnai-mapping/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-dnai-mapping".
- "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.

5.30.2 Resources

5.30.2.1 Overview

This clause describes the structure for the Resource URIs as shown in figure 5.30.2.1-1 and the resources and HTTP methods used for the DNAMapping API.

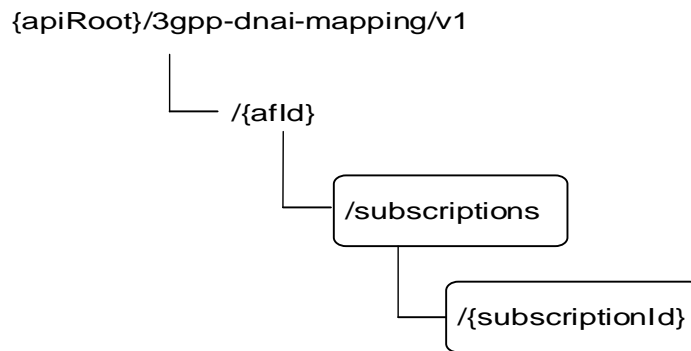


Figure 5.30.2.1-1: Resource URI structure of the DNAMapping API

Table 5.30.2.1-1 provides an overview of the resources and HTTP methods applicable for the DNAMapping API.

Table 5.30.2.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method	Description
DNAI Mapping Subscriptions	/{afId}/subscriptions	GET	Read all subscriptions for a given AF
		POST	Create a new subscription to DNAI Mapping
Individual DNAI Mapping Subscription	/{afId}/subscriptions/{subscriptionId}	GET	Read a subscription to DNAI Mapping
		DELETE	Delete a subscription to DNAI Mapping

5.30.2.2 Resource: DNAI Mapping Subscriptions

5.30.2.2.1 Introduction

This resource allows a AF to read all active DNAI Mapping subscriptions for the given AF.

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

5.30.2.2.2 Resource Definition

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

This resource shall support the resource URI variables defined in table 5.30.2.2.2-1.

Table 5.30.2.2.2-1: 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.

5.30.2.2.3 Resource Methods

5.30.2.2.3.1 General

The following clauses specify the resource methods supported by the resource as described in clause 5.30.2.2.2.

5.30.2.2.3.2 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 5.30.2.2.3.2-1.

Table 5.30.2.2.3.2-1: 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 5.30.2.2.3.2-2 and the response data structures and response codes specified in table 5.30.2.2.3.2-3.

Table 5.30.2.2.3.2-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.30.2.2.3.2-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
array(DnaiMapSub)	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. 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. 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 5.30.2.2.3.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative NEF towards which the request is redirected.

Table 5.30.2.2.3.2-5: Headers supported by the 308 Response Code on this resource

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

Location	string	M	1	Contains an alternative URI of the resource located in an alternative NEF towards which the request is redirected.
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5.30.2.2.3.3 POST

The POST method creates a new subscription resource to DNAI mapping 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 5.30.2.2.3.3-1 and the response data structures and response codes specified in table 5.30.2.2.3.3-2.

Table 5.30.2.2.3.3-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
DnaiMapSub	M	1	Parameters to register a subscription with the NEF.

Table 5.30.2.2.3.3-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
DnaiMapSub	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 5.30.2.2.3.3-3: 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-dnai-mapping/v1/{afId}/subscriptions/{subscriptionId}

5.30.2.3 Resource: Individual DNAI Mapping Subscription

5.30.2.3.1 Introduction

This resource represents an Individual DNAI Mapping Subscription managed by the NEF.

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

5.30.2.3.2 Resource Definition

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

This resource shall support the resource URI variables defined in table 5.30.2.3.2-1.

Table 5.30.2.3.2-1: 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.

5.30.2.3.3 Resource Methods

5.30.2.3.3.1 General

The following clauses specify the resource methods supported by the resource as described in clause 5.30.2.3.2.

5.30.2.3.3.2 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 5.30.2.3.3.2-1.

Table 5.30.2.3.3.2-1: 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 5.30.2.3.3.2-2 and the response data structures and response codes specified in table 5.30.2.3.3.2-3.

Table 5.30.2.3.3.2-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.30.2.3.3.2-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
DnaiMapSub	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. 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. 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 5.30.2.3.3.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative NEF towards which the request is redirected.

Table 5.30.2.3.3.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative NEF towards which the request is redirected.

5.30.2.3.3.3 DELETE

The DELETE method deletes the DNAI Mapping 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 5.30.2.3.3.3-1.

Table 5.30.2.3.3.3-1: 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 5.30.2.3.3.3-2 and the response data structures and response codes specified in table 5.30.2.3.3.3-3.

Table 5.30.2.3.3.3-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.30.2.3.3.3-3: Data structures supported by the DELETE Response Body on this resource

Data type	P	Cardinality	Response codes	Description
N/A			204 No Content	The subscription was terminated successfully.
N/A			307 Temporary Redirect	Temporary redirection, during subscription termination. 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. 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 5.30.2.3.3.3-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative NEF towards which the request is redirected.

Table 5.30.2.3.3.3-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative NEF towards which the request is redirected.

5.30.3 Custom Operations without associated resources

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

5.30.4 Notifications

5.30.4.1 General

Upon receipt of an update of DNAI-EAS address(es) mapping information is detected, the NEF shall send an HTTP POST message including the updated one or more pairs of DNAI(s) and EAS address(es) 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 5.30.4.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
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Notification of the update of DNAI-EAS address(es) information	{notifUri}	POST	The update of the DNAI-EAS address(es) information is notified to the AF by the NEF.
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5.30.4.2 DNAI Mapping Information Update Notification

5.30.4.2.1 Description

This Notification is used by the NEF to report the update of the DNAI Mapping information to a subscribed AF.

5.30.4.2.2 Target URI

The Callback URI "{notifUri}" shall be used with the callback URI variables defined in table 5.30.4.2.2-1.

Table 5.30.4.2.2-1: Callback URI variables

Name	Definition
notifUri	Callback URI provided by the AF during the subscription creation.

5.30.4.2.3 Operation Definition

5.30.4.2.3.1 Notification via HTTP POST

This method shall support the request data structures specified in table 5.30.4.2.3-1 and the response data structures and response codes specified in table 5.30.4.2.3.1-2.

Table 5.30.4.2.3-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
DnaiMapUpdateNotif	M	1	Represents the update of the DNAI Mapping information to be reported to the AF

Table 5.30.4.2.3-2: 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 successfully received.
n/a			307 Temporary Redirect	Temporary redirection. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [4].
n/a			308 Permanent Redirect	Permanent redirection. 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 5.30.4.2.3-3: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	String	M	1	Contains an alternative URI representing the end point of an alternative AF towards which the notification is redirected.

Table 5.30.4.2.3-4: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
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Location	String	M	1	Contains an alternative URI representing the end point of an alternative AF towards which the notification is redirected.
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5.30.4.2.3.2 Notification via Websocket

If supported by both AF and NEF and successfully negotiated, the DNAI Mapping Information Update Notification may alternatively be delivered through the Websocket mechanism as defined in clause 5.2.5.4 of 3GPP TS 29.122 [4].

5.30.5 Data Model

5.30.5.1 General

This clause specifies the application data model supported by the DNAIMapping API. Table 5.30.5.1-1 specifies the data types defined for the DNAIMapping API.

Table 5.30.5.1-1: DNAIMapping specific Data Types

Data type	Clause defined	Description	Applicability
DnaiMapSub	5.30.5.2.2	Represents DNAI Mapping subscription data.	
DnaiMapUpdateNotif	5.30.5.2.3	Represents the notification data of they update of DNAI Mapping information.	

Table 5.30.5.1-2 specifies data types re-used by the DNAIMapping API from other specifications, including a reference to their respective specifications, and when needed, a short description of their use within the DNAIMapping API.

Table 5.30.5.1-2: Re-used Data Types

Data type	Reference	Comments	Applicability
DateTime	3GPP TS 29.122 [4]	Represents a date and a time.	
Dnai	3GPP TS 29.571 [8]	Identifies a DNAI.	
DnaiEasInfo	3GPP TS 29.519 [23]	Contains EAS information for a DNAI.	
Dnn	3GPP TS 29.571 [8]	Identifies the DNN.	
Fqdn	3GPP TS 29.571 [8]	Identifies an FQDN.	
IpAddr	3GPP TS 29.571 [8]	Identifies an IP address.	
ReportingInformation	3GPP TS 29.523 [22]	Represents the event reporting requirements.	
Snsai	3GPP TS 29.571 [8]	Identifies an S-NSSAI.	
SupportedFeatures	3GPP TS 29.571 [8]	Represents the list of supported feature(s) and used to negotiate the applicability of the optional features.	
Uri	3GPP TS 29.122 [4]	Contains a URI.	
WebsockNotifConfig	3GPP TS 29.122 [4]	Contains the configuration parameters to set up notification delivery over Websocket protocol.	

5.30.5.2 Structured data types

5.30.5.2.1 Introduction

This clause defines the structures to be used in resource representations.

5.30.5.2.2 Type: DnaiMapSub

Table 5.30.5.2.2-1: Definition of type DnaiMapSub

Attribute name	Data type	P	Cardinality	Description	Applicability
easIpAddrs	array(IpAddr)	C	1..N	IP address(es) of the EASs in the Local part of the DN or the	

				IP address ranges (IPv4 subnetwork(s) and/or IPv6 prefix(es) of the Local part of the DN where the EAS is deployed. (NOTE)	
fqdns	array(Fqdn)	C	1..N	FQDN(s) of the EAS(s) in the Local part of the DN where the EAS(s) is/are deployed. (NOTE)	
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.	
immReports	array(DnaiEasInfo)	C	1..N	DNAI EAS mapping information. It shall be included in the subscription response if immediate reporting has been requested and the information is available.	
eventReq	ReportingInformation	O	0..1	Indicates the event reporting requirements.	
notifUri	Uri	M	1	Represents the notification URI to be used for DNAI Mapping information reporting.	
notifCorrId	string	M	1	Notification correlation identifier	
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 5.30.4. This attribute shall be provided in the POST request and in the response of successful resource creation.	
NOTE: Either "easIpAddr" or "fqdns" attribute shall be provided.					

5.30.5.2.3 Type: DnaiMapUpdateNotif

Table 5.30.5.2.3-1: Definition of type DnaiMapUpdateNotif

Attribute name	Data type	P	Cardinality	Description	Applicability
dnaiEasAddrMap	array(DnaiEasInfo)	M	1..N	Represents the mapping information between DNAI(s) and EAS address(es).	
notifCorrId	string	M	1	Notification correlation identifier.	

5.30.5.2.4 Void

5.30.5.3 Simple data types and enumerations

5.30.5.3.1 Introduction

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

5.30.5.3.2 Simple data types

The simple data types defined in table 5.30.5.3.2-1 shall be supported.

Table 5.30.5.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

5.30.6 Used Features

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

Table 5.30.6-1: Features used by DNAMapping 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].

5.30.7 Error handling

5.30.7.1 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.

5.30.7.2 Protocol Errors

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

5.30.7.3 Application Errors

The application errors defined for the DNAMapping API are listed in table 5.30.7.3-1.

Table 5.30.7.3-1: Application errors

Application Error	HTTP status code	Description

5.31 PdtqPolicyNegotiation API

5.31.1 Resources

5.31.1.1 Overview

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

{apiRoot}/3gpp-pdtq-policy-negotiation/v1

"apiRoot" is set as described in clause 5.2.4 in 3GPP TS 29.122 [4]. "apiName" shall be set to "3gpp-pdtq-policy-negotiation" 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 5.31.1.1-1 and the resources and HTTP methods used for the PdtqPolicyNegotiation API.

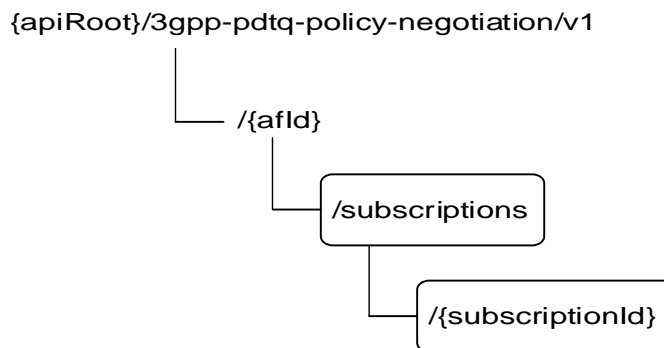


Figure 5.31.1.1-1: Resource URI structure of the PdtqPolicyNegotiation API

Table 5.31.1.1-1 provides an overview of the resources and HTTP methods applicable for the PdtqPolicyNegotiation API.

Table 5.31.1.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method	Description
PDTQ Policy Subscriptions	{afId}/subscriptions	GET	Read all active PDTQ Policy Subscription resources for a given AF.
		POST	Create a new PDTQ Policy Subscription resource.
Individual PDTQ Policy Subscription	{afId}/subscriptions/{subscriptionId}	GET	Read a PDTQ Policy Subscription resource.
		PATCH	Modify a PDTQ Policy Subscription resource.
		DELETE	Delete a PDTQ Policy Subscription resource.

5.31.1.2 Resource: PDTQ Policy Subscriptions

5.31.1.2.1 Introduction

This resource allows an AF to read all active PDTQ policy subscriptions for the given AF.

5.31.1.2.2 Resource Definition

Resource URI: **{apiRoot}/3gpp-pdtq-policy-negotiation/v1/{afId}/subscriptions**

This resource shall support the resource URI variables defined in table 5.31.1.2.2-1.

Table 5.31.1.2.2-1: 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.

5.31.1.2.3 Resource Methods

5.31.1.2.3.1 General

The following clauses specify the resource methods supported by the resource as described in clause 5.31.1.2.2.

5.31.1.2.3.2 GET

The GET method allows to read all active PDTQ 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 5.31.1.2.3.2-1.

Table 5.31.1.2.3.2-1: 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 5.31.1.2.3.2-2 and the response data structures and response codes specified in table 5.31.1.2.3.2-3.

Table 5.31.1.2.3.2-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.31.1.2.3.2-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
array(Pdtq)	M	1..N	200 OK	The resource information for the AF in the request URI is 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 5.31.1.2.3.2-4: 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 5.31.1.2.3.2-5: 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.

5.31.1.2.3.3 POST

The POST method creates a new Individual PDTQ policy subscription resource for a given AF. The AF shall initiate the HTTP POST request message and the NEF shall respond to the message.

This method shall support the request data structures specified in table 5.31.1.2.3.3-1 and the response data structures and response codes specified in table 5.31.1.2.3.3-2.

Table 5.31.1.2.3.3-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
Pdtq	M	1	Contains information for the creation of a new Individual PDTQ Policy Subscription resource.

Table 5.31.1.2.3.3-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
Pdtq	M	1	201 Created	The subscription was created successfully. An Individual PDTQ Policy Subscription resource is created and a representation of that resource is returned. 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 5.31.1.2.3.3-3: 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-pdtq-policy-negotiation/v1/{afId}/subscriptions/{subscriptionId}

5.31.1.3 Resource: Individual PDTQ Policy Subscription

5.31.1.3.1 Introduction

This resource allows an AF to read, modify or delete an active subscription of PDTQ Policy Subscription.

5.31.1.3.2 Resource Definition

Resource URI: {apiRoot}/3gpp-pdtq-policy-negotiation/v1/{afId}/subscriptions/{subscriptionId}

This resource shall support the resource URI variables defined in table 5.31.1.3.2-1.

Table 5.31.1.3.2-1: 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.

5.31.1.3.3 Resource Methods

5.31.1.3.3.1 General

The following clauses specify the resource methods supported by the resource as described in clause 5.31.1.3.2.

5.31.1.3.3.2 GET

The GET method allows to read an individual PDTQ Policy Subscription resource to obtain details of an active resource PDTQ Policy 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 5.31.1.3.3.2-1.

Table 5.31.1.3.3.2-1: 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 5.31.1.3.3.2-2 and the response data structures and response codes specified in table 5.31.1.3.3.2-3.

Table 5.31.1.3.3.2-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.31.1.3.3.2-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
Pdtq	M	1	200 OK	The subscription information for the AF in the request URI is 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 5.31.1.3.3.2-4: 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 5.31.1.3.3.2-5: 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.

5.31.1.3.3.3 PATCH

The PATCH method allows the AF to modify an existing subscription resource, in order to notify the NEF about the selected PDTQ policy and/or enable warning notification. The AF shall initiate the HTTP PATCH message and the NEF shall respond to the message.

This method shall support the request data structures specified in table 5.31.1.3.3.3-1 and the response data structures and response codes specified in table 5.31.1.3.3.3-2.

Table 5.31.1.3.3.3-1: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
PdtqPatch	M	1	Updated PDTQ policy information.

Table 5.31.1.3.3.3-2: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
Pdtq	M	1	200 OK	The subscription was modified successfully. The NEF shall return an updated subscription in the response payload body.
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 5.31.1.3.3.3-3: 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 5.31.1.3.3.3-4: 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.

5.31.1.3.3.4 DELETE

The DELETE method deletes the resource and terminates the PDTQ Policy Subscription. The AF shall initiate the HTTP DELETE message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.31.1.3.3.4-1.

Table 5.31.1.3.3.4-1: 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 5.31.1.3.3.4-2 and the response data structures and response codes specified in table 5.31.1.3.3.4-3.

Table 5.31.1.3.3.4-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.31.1.3.3.4-3: 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 5.31.1.3.3.4-4: 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 5.31.1.3.3.4-5: 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.

5.31.2 Notifications

5.31.2.1 Introduction

The notifications provided by the PdtqPolicyNegotiation API are specified in this clause.

Table 5.31.2.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
PDTQ Warning Notification	{notificationDestination}	POST	Notify the PDTQ warning from the NEF to the AF identified by the notification destination URI.

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

5.31.2.2 PDTQ Warning Notification

5.31.2.2.1 Description

The PDTQ warning notification is used by the NEF to notify the AF about changed conditions for a planned data transfer with QoS requirements e.g. that a network performance or DN performance in the area of interest reaches the criteria set by the operator.

5.31.2.2.2 Target URI

The Callback URI "{**notificationDestination**}" shall be used with the callback URI variables defined in table 5.31.2.2.2-1.

Table 5.31.2.2.2-1: Callback URI variables

Name	Data type	Definition
notificationDestination	Link	Reference provided by the AF when the AF requests to send a PDTQ warning notification when the network performance or DN performance in the area of interest reaches the criteria set by the operator. This URI shall be provided within the "notificationDestination" attribute in the Pdtq data type.

5.31.2.2.3 Operation Definition

5.31.2.2.3.1 Notification via POST

The POST method allows to notify AF identified by the notification destination URI of the PDTQ warning by the NEF and the AF shall respond to the message.

This method shall support the request data structures specified in table 5.31.2.2.3.1-1 and the response data structures and response codes specified in table 5.31.2.2.3.1-2.

Table 5.31.2.2.3.1-1: Data structures supported by the POST Request Body

Data type	Cardinality	Description
Notification	1	Representation of the PDTQ warning notification.

Table 5.31.2.2.3.1-2: Data structures supported by the POST Response Body

Data type	Cardinality	Response codes	Description
none		204 No Content	This case represents a successful notification of PDTQ warning notification.
none		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.
none		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.

NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 also apply.

Table 5.31.2.2.3.1-3: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
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Location	string	M	1	An alternative URI representing the end point of an alternative AF towards which the notification should be redirected.
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Table 5.31.2.2.3.1-4: 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.

5.31.3 Data Model

5.31.3.1 General

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

Table 5.31.3.1-1 specifies the data types defined for the PdtqPolicyNegotiation API.

Table 5.31.3.1-1: PdtqPolicyNegotiation API specific Data Types

Data type	Clause defined	Description	Applicability
Notification	5.31.3.3.4	Represents a PDTQ related notification.	
Pdtq	5.31.3.3.2	Represents a PDTQ policy subscription.	
PdtqPatch	5.31.3.3.3	Represents the modification of an individual PDTQ policy subscription.	

5.31.3.2 Reused data types

The data types reused by the PdtqPolicyNegotiation API from other specifications are listed in table 5.31.3.2-1.

Table 5.31.3.2-1: Re-used Data Types

Data type	Reference	Comments
AltQosParamSet	3GPP TS 29.543 [68]	Contains the alternative QoS requirements expressed as the list of individual QoS parameter sets.
ApplicationId	3GPP TS 29.571 [8]	Contains the application identifier.
LocationArea5G	3GPP TS 29.122 [4]	Contains user location area information.
PdtqPolicy	3GPP TS 29.543 [68]	Represents the PDTQ policy.
PdtqReferenceId	3GPP TS 29.543 [68]	Represents a PDTQ Reference ID.
QosParamSet	3GPP TS 29.543 [68]	Contains the QoS requirements expressed as one or more individual QoS parameters.
SupportedFeatures	3GPP TS 29.571 [8]	Represents the list of supported feature(s) and is used to negotiate the applicability of the optional features.
TimeWindow	3GPP TS 29.122 [4]	Represents a start time and a stop time of a time window.

5.31.3.3 Structured data types

5.31.3.3.1 Introduction

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

5.31.3.3.2 Type: Pdtq

This type represents a PDTQ Policy Subscription.

Table 5.31.3.3.2-1: Definition of type Pdtq

Attribute name	Data type	P	Cardinality	Description	Applicability
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					(NOTE 1)
altQosParamSets	array(AltQosParameterSet)	O	1..N	Contains the alternative QoS requirements expressed as the list of individual QoS parameter sets in a prioritized order. The lower the index of the array for a given entry, the higher the priority. (NOTE 4)	
altQosRefs	array(string)	O	1..N	Contains the alternative QoS requirements expressed as the list of QoS References in a prioritized order. The lower the index of the array for a given entry, the higher the priority. (NOTE 3)	
appld	ApplicationId	O	0..1	Contains an application identifier.	
aspld	string	M	1	Contains an identity of an application service provider.	
desTimeInts	array(TimeWindow)	M	1..N	Identifies the time interval(s).	
locationArea5G	LocationArea5G	O	0..1	Identifies the area within which the AF requests the number of UE.	
notificationDestination	Link	O	0..1	Contains the URI to receive the PDTQ notification from the NEF.	
numberOfUEs	integer	M	1	Identifies the number of UEs.	
pdqtqPolicies	array(PdtqPolicy)	O	1..N	Identifies the PDTQ policies.	
qosParamSet	QosParameterSet	C	0..1	Contains the requested QoS requirements expressed as one or more individual QoS parameters. (NOTE 2)	
qosReference	string	C	0..1	Contains the requested QoS requirements expressed as the QoS Reference which represents a pre-defined QoS information. (NOTE 2)	
referenceId	PdtqReferenceId	O	0..1	Identifies the PDTQ policies of planned data transfer with QoS requirements for an AF.	
selectedPolicy	integer	O	0..1	Contains the identity of the selected PDTQ policy. Shall not be present in initial message exchange, can be provided by NF service consumer in a subsequent message exchange. (NOTE 5)	
self	Link	O	0..1	Link to the resource "Individual PDTQ Subscription". This parameter shall be supplied by the NEF in HTTP responses.	
supportedFeatures	SupportedFeatures	O	0..1	Used to negotiate the supported optional features of the API as described in clause 5.31.4. This attribute shall be provided in the POST request and in the response of successful resource creation.	
warnNotifEnabled	boolean	O	0..1	Indicates whether the PDTQ warning notification is enabled or not. If it is set to true, the PDTQ warning notification is enabled; if it is set to false or absent, the PDTQ warning notification is disabled.	
NOTE 1: Properties marked with a feature as defined in clause 5.31.4 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: Either the "qosReference" attribute or the "qosParamSet" attribute shall be included.					

NOTE 3: The "altQosRefs" attribute may be included only if the "qosReference" attribute is included.
 NOTE 4: The "altQosParamSets" attribute may be included only if the "qosParamSet" attribute is included.
 NOTE 5: The value "0" indicates that no PDTQ policy is selected.

5.31.3.3.3 Type: PdtqPatch

This type represents the updated PDTQ information provided by the AF to the NEF. The structure is used for HTTP PATCH request.

Table 5.31.3.3.3-1: Definition of type PdtqPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
selectedPolicy	integer	O	0..1	Identity of the selected PDTQ policy. (NOTE)	
warnNotifEnabled	boolean	O	0..1	Indicates whether the PDTQ warning notification is enabled. - true: the PDTQ warning notification is enabled; - false: the PDTQ warning notification is not enabled.	
notificationDestination	Link	O	0..1	Contains the URI to receive the PDTQ policy notification from the NEF.	

NOTE: The value "0" indicates that no PDTQ policy is selected.

5.31.3.3.4 Type: Notification

This type represents a PDTQ notification provided by the NEF to the AF. The structure is used for POST request.

Table 5.31.3.3.4-1: Definition of type Notification

Attribute name	Data type	P	Cardinality	Description	Applicability
pdtqRefId	PdtqReferenceId	M	1	This IE identifies the PDTQ policy to which the notification corresponds.	
candPolicies	array(PdtqPolicy)	M	1..N	This IE indicates a list of the candidate PDTQ policies from which the AF may select a new PDTQ policy.	

5.31.3.4 Simple data types and enumerations

5.31.3.4.1 Introduction

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

5.31.3.4.2 Simple data types

The simple data types defined in table 5.31.3.4.2-1 shall be supported.

Table 5.31.3.4.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

5.31.4 Used Features

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

Table 5.31.4-1: Features used by PdtqPolicyNegotiation API

Feature number	Feature Name	Description

5.31.5 Error handling

5.31.5.1 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.

5.31.5.2 Protocol Errors

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

5.31.5.3 Application Errors

The application errors defined for PdtqPolicyNegotiation API are listed in table 5.31.5.3-1.

Table 5.31.5.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

5.32 MemberUESelectionAssistance API

5.32.1 Introduction

The MemberUESelectionAssistance service shall use the MemberUESelectionAssistance API.

The API URI of MemberUESelectionAssistance 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-musa".
- "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.

5.32.2 Resources

This clause describes the structure for the Resource URIs as shown in Figure 5.32.2-1 and the resources and HTTP methods used for the MemberUESelectionAssistance API.

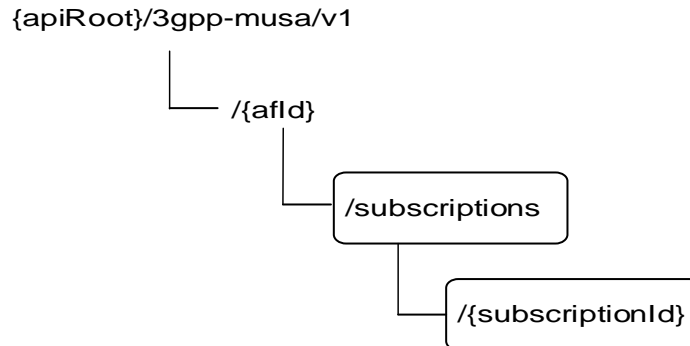


Figure 5.32.2-1: Resource URI structure of the MemberUESelectionAssistance API

Table 5.32.2-1 provides an overview of the resources and applicable HTTP methods.

Table 5.32.2-1: Resources and methods overview

Resource name	Resource URI (relative path under API URI)	HTTP method or custom operation	Description (service operation)
Member UE Selection Assistance Subscriptions	/{afld}/subscriptions	POST	Create a new subscription to Member UE Selection Assistance.
Individual Member UE Selection Assistance Subscription	/{afld}/subscriptions/{subscriptionId}	GET	Retrieve an existing Individual Member UE Selection Assistance Subscription resource.
		PUT	Update an existing Individual Member UE Selection Assistance Subscription resource.
		PATCH	Modify an existing Individual Member UE Selection Assistance Subscription resource.
		DELETE	Delete an existing Individual Member UE Selection Assistance Subscription resource.

5.32.2.2 Resource: Member UE Selection Assistance Subscriptions

5.32.2.2.1 Introduction

This resource allows an AF to create a new Member UE Selection Assistance subscription resource for a given AF.

5.32.2.2.2 Resource definition

Resource URL: {apiRoot}/3gpp-musa/v1/{afld}/subscriptions

This resource shall support the resource URL variables defined in table 5.32.2.2.2-1.

Table 5.32.2.2.2-1: Resource URL 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.

5.32.2.2.3 Resource Methods

5.32.2.2.3.1 POST

This method enables an AF to request the creation of a new Member UE Selection Assistance subscription at the NEF.

This method shall support the URI query parameters specified in table 5.32.2.2.3.1-1.

Table 5.32.2.2.3.1-1: 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 5.32.2.2.3.1-2 and the response data structures and response codes specified in table 5.32.2.2.3.1-3.

Table 5.32.2.2.3.1-2: Data structures supported by the POST request body on this resource

Data type	P	Cardinality	Description
MemUeSelectAssistSubsc	M	1	Representation of Member UE Selection Assistance to be created in the NEF.

Table 5.32.2.2.3.1-3: Data structures supported by the POST response body on this resource

Data type	P	Cardinality	Response codes	Description
MemUeSelectAssistSubsc	M	1	201 Created	Successful case. A representation of the created Individual Member UE Selection Assistance subscription is returned. The URI of the created resource shall be returned in an HTTP "Location" 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 5.32.2.2.3.1-4: 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-musa/v1/{afld}/subscriptions/{subscriptionId}

5.32.2.2.3.2 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 5.32.12.2.3.2-1.

Table 5.32.2.2.3.2-1: 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 5.32.2.2.3.2-2 and the response data structures and response codes specified in table 5.32.2.2.3.2-3.

Table 5.32.2.2.3.2-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.32.2.2.3.2-3-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
array(MemUeSelectAssistSubsc)	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 5.32.2.2.3.2-3-4: 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 5.32.2.2.3.2-3-5: 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.

5.32.2.3 Resource: Individual Member UE Selection Assistance Subscription

5.32.2.3.1 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]).

5.32.2.3.2 Resource Definition

Resource URL: `{apiRoot}/3gpp-musa/v1/{afId}/subscriptions/{subscriptionId}`

This resource shall support the resource URI variables defined in table 5.32.2.3.2-1.

Table 5.32.2.3.2-1: Resource URL 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.

5.32.2.3.3 Resource standard methods

5.32.2.3.3.1 GET

This method enables an AF to retrieve an existing Individual Member UE Selection Assistance Subscription resource at the NEF.

This method shall support the URI query parameters specified in table 5.32.2.3.3.1-1.

Table 5.32.2.3.3.1-1: 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 5.32.2.3.3.1-2 and the response data structures and response codes specified in table 5.32.2.3.3.1-3.

Table 5.32.2.3.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 5.32.2.3.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MemUeSelectAssistSubsc	M	1	200 OK	Successful case. The requested Individual Member UE Selection Assistance Subscription 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: 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 5.32.2.3.3.1-4: 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 5.32.2.3.3.1-5: 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.

5.32.2.3.3.2 PUT

This method enables an AF to update an existing Individual Member UE Selection Assistance Subscription resource at the NEF.

This method shall support the URI query parameters specified in table 5.32.2.3.3.2-1.

Table 5.32.2.3.3.2-1: 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 5.32.2.3.3.2-2 and the response data structures and response codes specified in table 5.32.2.3.3.2-4.

Table 5.32.2.3.3.2-2: Data structures supported by the PUT request body on this resource

Data type	P	Cardinality	Description
MemUeSelectAssistSubsc	M	1	Parameters to update the Individual Member UE Selection Assistance Subscription resource.

Table 5.32.2.3.3.2-3: Data structures supported by the PUT response body on this resource

Data type	P	Cardinality	Response codes	Description
MemUeSelectAssistSubsc	M	1	200 OK	The Individual Member UE Selection Assistance Subscription resource was updated successfully and a representation of the created resource is returned in the response body.
n/a			204 No Content	The Individual Member UE Selection Assistance Subscription 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: 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 5.32.2.3.3.2-4: 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 5.32.2.3.3.2-5: 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.

5.32.2.3.3.3 PATCH

This method enables an AF to request the modification of an existing Individual Member UE Selection Assistance Subscription resource at the NEF.

This method shall support the URI query parameters specified in table 5.32.2.3.3.3-1.

Table 5.32.2.3.3.3-1: 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 5.32.2.3.3.3-2 and the response data structures and response codes specified in table 5.32.2.3.3.3-3.

Table 5.32.2.3.3.3-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
MemUeSelectAssistSubscPatch	M	1	Contains the parameters to request the modification of the Individual Member UE Selection Assistance Subscription resource.

Table 5.32.2.3.3.3-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MemUeSelectAssistSubsc	M	1	200 OK	Successful case. The concerned Individual Member UE Selection Assistance Subscription 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 Member UE Selection Assistance Subscription 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 HTTP PATCH method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall also apply.				

Table 5.32.2.3.3.3-4: 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 5.32.2.3.3.3-5: 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.

5.32.2.3.3.4 DELETE

This method enables an AF to request the deletion of an Individual Member UE Selection Assistance Subscription resource at the NEF.

This method shall support the URI query parameters specified in table 5.32.2.3.3.4-1.

Table 5.32.2.3.3.4-1: 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 5.32.2.3.3.4-2 and the response data structures and response codes specified in table 5.32.2.3.3.4-3.

Table 5.32.2.3.3.4-2: Data structures supported by the DELETE request body on this resource

Data type	P	Cardinality	Description
n/a			

Table 5.32.2.3.3.4-3: 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 Member UE Selection Assistance Subscription 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 5.32.2.3.3.4-4: 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 5.32.2.3.3.4-5: 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.

5.32.3 Custom Operations without associated resources

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

5.32.4 Notifications

5.32.4.1 General

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

Table 5.32.4.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
Member UE Selection Assistance Notification	{notifUri}	POST	Enable the NEF to notify an AF of Member UE Selection Assistance information.

5.32.4.2 Member UE Selection Assistance Notification

5.32.4.2.1 Description

This Notification is used by the NEF to report Member UE Selection Assistance information to a previously subscribed AF.

5.32.4.2.2 Target URI

The Callback URI “{notifUri}” shall be used with the callback URI variables defined in table 5.32.4.2.2-1.

Table 5.32.4.2.2-1: Callback URI variables

Name	Definition
notifUri	Callback URI provided by the AF during Member UE Selection Assistance creation/modification.

5.32.4.2.3 Operation Definition

This method shall support the request data structures specified in table 5.32.4.2.3-1 and the response data structures and response codes specified in table 5.32.4.2.3-2.

Table 5.32.4.2.3-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
MemUeSeletAssistNotif	M	1	Represents the notification on Member UE Selection Assistance information.

Table 5.32.4.2.3-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response	Description
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			codes	
n/a			204 No Content	The 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 towards which 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 towards which 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 5.32.4.2.3-3: Headers supported by the 307 Response Code on this resource

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

Table 5.32.4.2.3-4: Headers supported by the 308 Response Code on this resource

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

5.32.5 Data Model

5.32.5.1 General

This clause specifies the application data model supported by the MemberUESelectionAssistance API. Table 5.32.5.1-1 specifies the data types defined for the MemberUESelectionAssistance API.

Table 5.32.5.1-1: MemberUESelectionAssistance API specific Data Types

Data type	Clause defined	Description
AccessRatTypeFilterCriteria	5.32.5.2.5	The Access types and Rat types filtering criteria for Member UE selection.
CandiUeInfo	5.32.5.2.13	Identifies the lists of candidate UEs and recommended time window for performing the application operation.
DnnFilterCriteria	5.32.5.2.12	The DNN filtering criteria for Member UE selection.
E2ETransTimeFilterCriteria	5.32.5.2.6	The End-to-end data volume transfer time filtering criteria for Member UE selection.
FilterCriterionType	5.32.5.3.3	Indicates the filter criterion type.
MemUeSeletAssistNotif	5.32.5.2.3	The notification for Member UE selection.
MemUeSelectAssistSubsc	5.32.5.2.2	The subscription for Member UE selection.
MemUeSelectAssistSubscPatch	5.32.5.2.15	Represents parameters to request the modification of a Member UE Selection Assistance Subscription.
MemUeSeletReport	5.32.5.2.14	Indicates the Member UE selection report.
UeDirectionFilterCriteria	5.32.5.2.9	The UE direction filtering criteria for Member UE selection.

UeDistanceFilterCriteria	5.32.5.2.10	The UE distance filtering criteria for Member UE selection.
UeHisLocFilterCriteria	5.32.5.2.8	The UE historical location filtering criteria for Member UE selection.
UeLocFilterCriteria	5.32.5.2.7	The UE location filtering criteria for Member UE selection.
QoSFilterCriteria	5.32.5.2.4	The QoS filtering criteria for Member UE selection.
ServiceExpFilterCriteria	5.32.5.2.11	The Service Experience filtering criteria for Member UE selection.

Table 5.32.5.1-2 specifies data types re-used by the MemberUESelectionAssistance API from other specifications, including a reference to their respective specifications, and when needed, a short description of their use within the MemberUESelectionAssistance API.

Table 5.32.5.1-2: Re-used Data Types

Data type	Reference	Comments	Applicability
AccessType	3GPP TS 29.571 [8]	Indicates the access type.	
AmfEventType	3GPP TS 29.518 [18]	Indicates the events exposed by AMF.	
DataVolumeTransferTime	3GPP TS 29.520 [27]	Indicates the End-to-end data volume transfer time.	
DateTime	3GPP TS 29.122 [4]	Represents a date and a time.	
DurationSec	3GPP TS 29.122 [4]	Represents the duration time in seconds.	
Gpsi	3GPP TS 29.571 [8]	Identifies a GPSI.	
Direction	3GPP TS 29.520 [27]	Represents the UE direction.	
Dnai	3GPP TS 29.571 [8]	Identifies a user plane access to one or more DN(s).	
Dnn	3GPP TS 29.571 [8]	Represents a DNN.	
GeoDistributionInfo	3GPP TS 29.520 [27]	Represents the geographical distribution of the UEs.	
IpAddr	3GPP TS 29.571 [8]	Identifies an IP address.	
LocationArea5G	3GPP TS 29.122 [4]	Represents a user location area when the UE is attached to 5G.	
NwdafEvent	3GPP TS 29.520 [27]	Indicates the events exposed by NWDAF.	
RatType	3GPP TS 29.571 [8]	Represents the RAT types.	
ServiceExperienceType	3GPP TS 29.520 [27]	Represents the type of Service Experience Analytics.	
SmfEvent	3GPP TS 29.508 [26]	Indicates the events exposed by SMF.	
Snsai	3GPP TS 29.571 [8]	Represents an S-NSSAI.	
SupportedFeatures	3GPP TS 29.571 [8]	Represents the list of supported feature(s) and used to negotiate the applicability of the optional features.	
TimeWindow	3GPP TS 29.122 [4]	Represents a time window.	
UInteger	3GPP TS 29.571 [8]	Unsigned integer.	
Uri	3GPP TS 29.122 [4]	Identifies a referenced resource.	

5.32.5.2 Structured data types

5.32.5.2.1 Introduction

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

5.32.5.2.2 Type: MemUeSelectAssistSubsc

Table 5.32.5.2.2-1: Definition of type MemUeSelectAssistSubsc

Attribute name	Data type	P	Cardinality	Description	Applicability
aflId	string	O	0..1	The AF Identifier.	
tgtUeIds	array(Gpsi)	C	1..N	Identifies the GPSIs of a list of UEs for Member UE Selection Assistance Reporting. (NOTE 2)	
tgtUeIps	array(IpAddr)	C	1..N	Identifies the IP addresses of a list of UEs for Member UE Selection Assistance Reporting. (NOTE 2)	
notifUri	Uri	M	1	Notification URI for reporting.	
notifId	string	M	1	Notification Correlation ID assigned by the AF.	
qosFilters	array(QoSFilterCriteria)	C	1..N	The QoS filtering criteria for Member UE selection. (NOTE 1)	
accRatTypeFilters	array(AccessRatTypeFilterCriteria)	C	1..N	The Access types and Rat types filtering criteria for Member UE selection. (NOTE 1)	
e2eTransTimeFilters	array(E2ETransTimeFilterCriteria)	C	1..N	The End-to-end data volume transfer time filtering criteria for Member UE selection. (NOTE 1)	
ueLocFilters	array(UeLocFilterCriteria)	C	1..N	The UE location filtering criteria for Member UE selection. (NOTE 1)	
ueHisLocFilters	array(UeHisLocFilterCriteria)	C	1..N	The UE historical location filtering criteria for Member UE selection. (NOTE 1)	
ueDirFilters	array(UeDirectionFilterCriteria)	C	1..N	The UE direction filtering criteria for Member UE selection. (NOTE 1)	
ueDistanceFilters	array(UeDistanceFilterCriteria)	C	1..N	The UE distance filtering criteria for Member UE selection. (NOTE 1)	
serviceExpFilters	array(ServiceExpFilterCriteria)	C	1..N	The Service Experience filtering criteria for Member UE selection. (NOTE 1)	
dnnFilters	array(DnnFilterCriteria)	C	1..N	The DNN filtering criteria for Member UE selection. (NOTE 1)	
memUpdatePeriod	DurationSec	O	0..1	Indicates the periodicity of updating the member UEs.	
maxUeNum	UInteger	O	0..1	The maximum number of candidate UEs.	

timeWin	TimeWindow	O	0..1	Indicates the start time and stop time for selecting the candidate UEs.	
expTime	DateTime	O	0..1	Indicates the expiry time.	
suppFeat	SupportedFeatures	C	0..1	Indicates the list of Supported features used as described in clause 5.32.6. This attribute shall be provided in the POST request and in the response of successful resource creation when feature negotiation needs to take place.	
NOTE 1: At least one of the attributes shall be present.					
NOTE 2: Either "tgtUelds" or "tgtUelps" attribute shall be present.					

5.32.5.2.3 Type: MemUeSeletAssistNotif

Table 5.32.5.2.3-1: Definition of type MemUeSeletAssistNotif

Attribute name	Data type	P	Cardinality	Description	Applicability
notifId	string	M	1	Notification Correlation ID assigned by the AF.	
candiUeInfo	array(CandiUeInfo)	M	1..N	Identifies the lists of candidate UEs' information.	
memUeSelectRpts	array(MemUeSelet Report)	O	1..N	Each element indicates the number of UEs that do not meet the certain criterion.	

5.32.5.2.4 Type: QoSFilterCriteria

Table 5.32.5.2.4-1: Definition of type QoSFilterCriteria

Attribute name	Data type	P	Cardinality	Description	Applicability
event	SmfEvent	O	0..1	Indicates the SMF event which may be used to retrieve the QoS monitoring information. The event value shall be set as "QOS_MON".	
appld	string	O	0..1	Identifies an application.	
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.	
snssai	Snssai	O	0..1	Identifies the network slice information.	
ulDelay	UInteger	O	0..1	Uplink packet delay in units of milliseconds.	
dlDelay	UInteger	O	0..1	Downlink packet delay in units of milliseconds.	
rtDelay	UInteger	O	0..1	Round trip delay in units of milliseconds.	

5.32.5.2.5 Type: AccessRatTypeFilterCriteria

Table 5.32.5.2.5-1: Definition of type AccessRatTypeFilterCriteria

Attribute name	Data type	P	Cardinality	Description	Applicability
events	array(SmfEvent)	O	1..N	Indicates the SMF event(s) which may be used to retrieve	

				the Access Type and/or RAT Type of the selected UE. The event value shall be set as "AC_TY_CH" and/or "RAT_TY_CH".	
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.	
snssai	Snssai	O	0..1	Identifies the network slice information.	
accTypes	array(AccessType)	O	1..N	Indicates the Access Type of the selected UE.	
ratTypes	array(RatType)	O	1..N	Indicate the RAT Type of the selected UE.	

5.32.5.2.6 Type: E2ETransTimeFilterCriteria

Table 5.32.5.2.6-1: Definition of type E2ETransTimeFilterCriteria

Attribute name	Data type	P	Cardinality	Description	Applicability
event	NwdafEvent	O	0..1	Indicates the NWDAF event which may be used to retrieve the End-to-end data volume transfer time. The event value shall be set as "E2E_DATA_VOL_TRANS_TIME".	
appld	string	O	0..1	Identifies an application.	
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.	
snssai	Snssai	O	0..1	Identifies the network slice information.	
dataVolTransTime	DataVolumeTransferTime	O	0..1	Indicates the E2E data volume transfer time and the data volume used to derive the transfer time.	
geoDistrInfos	array(GeoDistributionInfo)	O	1..N	Indicates the request for geographical distribution of UEs.	
locationArea	LocationArea5G	O	0..1	Indicates the location area of the candidate UEs.	
numDataTrans	UInteger	O	0..1	Represents the target number of data transmission repetitions.	
timeInterval	DurationSec	O	0..1	Indicate target time interval (in seconds) between data transmissions.	

5.32.5.2.7 Type: UeLocFilterCriteria

Table 5.32.5.2.7-1: Definition of type UeLocFilterCriteria

Attribute name	Data type	P	Cardinality	Description	Applicability
event	AmfEventType	O	0..1	Indicates the AMF event which may be used to retrieve the UE location. The event value shall be set as "LOCATION_REPORT".	

loc	LocationArea5G	O	0..1	Indicate the certain area that the selected UE currently located in.	
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5.32.5.2.8 Type: UeHisLocFilterCriteria

Table 5.32.5.2.8-1: Definition of type UeHisLocFilterCriteria

Attribute name	Data type	P	Cardinality	Description	Applicability
event	NwdafEvent	O	0..1	Indicates the NWDAF event which may be used to retrieve the UE Mobility. The event value shall be set as "UE_MOBILITY".	
loc	LocationArea5G	O	0..1	Indicates the historical location of the UEs.	

5.32.5.2.9 Type: UeDirectionFilterCriteria

Table 5.32.5.2.9-1: Definition of type UeDirectionFilterCriteria

Attribute name	Data type	P	Cardinality	Description	Applicability
event	NwdafEvent	O	0..1	Indicates the NWDAF event which may be used to retrieve the UE Mobility. The event value shall be set as "UE_MOBILITY".	
directions	array(Direction)	O	1..N	Indicates the moving directions of the UEs.	

5.32.5.2.10 Type: UeDistanceFilterCriteria

Table 5.32.5.2.10-1: Definition of type UeDistanceFilterCriteria

Attribute name	Data type	P	Cardinality	Description	Applicability
event	NwdafEvent	O	0..1	Indicates the NWDAF event which may be used to retrieve the Relative Proximity. The event value shall be set as "RELATIVE_PROXIMITY".	
distance	UInteger	O	0..1	Indicates the minimum separation distance between each other of the selected UEs.	

5.32.5.2.11 Type: ServiceExpFilterCriteria

Table 5.32.5.2.11-1: Definition of type ServiceExpFilterCriteria

Attribute name	Data type	P	Cardinality	Description	Applicability
event	NwdafEvent	O	0..1	Indicates the NWDAF event which may be used to retrieve the Service Experience. The event value shall be set as "SERVICE_EXPERIENCE".	
snssai	Snssai	O	0..1	Identifies the network slice information.	
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.	
appld	string	O	0..1	Identifies an application.	
dnai	Dnai	O	0..1	Identification of user plane access to DN which the subscription applies.	
loc	LocationArea5G	O	0..1	Indicates the Area of Interest.	
contribWeightThr	UInteger	O	0..1	Indicates the Service Experience Contribution weight reporting threshold.	
expTypes	array(ServiceExperienceType)	O	1..N	Indicates the Service Experience Type.	

5.32.5.2.12 Type: DnnFilterCriteria

Table 5.32.5.2.12-1: Definition of type DnnFilterCriteria

Attribute name	Data type	P	Cardinality	Description	Applicability
event	SmfEvent	O	0..1	Indicates the SMF event which may be used to retrieve the DNN. The event value shall be set as "QFI_ALLOC".	
dnn	Dnn	O	0..1	Indicates the DNN of the selected UE for the PDU Session used by the application.	

5.32.5.2.13 Type: CandiUeInfo

Table 5.32.5.2.13-1: Definition of type CandiUeInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
candUelds	array(Gpsi)	C	1..N	Identifies the Gpsi(s) of a list of candidate UE(s). (NOTE)	
candUelps	array(IpAddr)	C	1..N	Identifies the IP addresses of a list of UEs. (NOTE)	
remdTimeWin	TimeWindow	O	0..1	Indicates the recommended time window for performing the application operation. It is a subset of the time window specified by "timeWin" attribute in the request.	

NOTE: Either "candUelds" or "candUelps" attribute shall be present.

5.32.5.2.14 Type: MemUeSeletReport

Table 5.32.5.2.14-1: Definition of type MemUeSeletReport

Attribute name	Data type	P	Cardinality	Description	Applicability
criterionType	FilterCriterionType	M	1	Indicates the filter criterion type.	
numForCriterion	UInteger	M	1	Indicates the number of UEs that do not meet the filter criterion.	

5.32.5.2.15 Type: MemUeSelectAssistSubscPatch

Table 5.32.5.2.15-1: Definition of type MemUeSelectAssistSubscPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
notifUri	Uri	O	0..1	Notification URI for reporting.	
notifId	string	O	0..1	Notification Correlation ID assigned by the AF.	
qosFilters	array(QoSFilterCriteria)	O	1..N	The QoS filtering criteria for Member UE selection.	
accRatTypeFilters	array(AccessRatTypeFilterCriteria)	O	1..N	The Access types and Rat types filtering criteria for Member UE selection.	
e2eTransTimeFilters	array(E2ETransTimeFilterCriteria)	O	1..N	The End-to-end data volume transfer time filtering criteria for Member UE selection.	
ueLocFilters	array(UeLocFilterCriteria)	O	1..N	The UE location filtering criteria for Member UE selection.	
ueHisLocFilters	array(UeHisLocFilterCriteria)	O	1..N	The UE historical location filtering criteria for Member UE selection.	
ueDirFilters	array(UeDirectionFilterCriteria)	O	1..N	The UE direction filtering criteria for Member UE selection.	
ueDistanceFilters	array(UeDistanceFilterCriteria)	O	1..N	The UE distance filtering criteria for Member UE selection.	
serviceExpFilters	array(ServiceExpFilterCriteria)	O	1..N	The Service Experience filtering criteria for Member UE selection.	
dnnFilters	array(DnnFilterCriteria)	O	1..N	The DNN filtering criteria for Member UE selection.	
expTime	DateTime	O	0..1	Indicates the expiry time.	
memUpdatePeriod	DurationSec	O	0..1	Indicates the periodicity of updating the member UEs.	
maxUeNum	UIntegerRm	O	0..1	The maximum number of candidate UEs.	
timeWin	TimeWindow	O	0..1	Indicates the start time and stop time for selecting the candidate UEs.	

5.32.5.3 Simple data types and enumerations

5.32.5.3.1 Introduction

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

5.32.5.3.2 Simple data types

The simple data types defined in table 5.32.5.3.2-1 shall be supported.

Table 5.32.5.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

5.32.5.3.3 Enumeration: FilterCriterionType

The enumeration FilterCriterionType represents the type of filter criterion event for which the AF requests to be notified. It shall comply with the provisions defined in table 5.32.5.2.13-1.

Table 5.32.5.3.3-1: Enumeration FilterCriterionType

Enumeration value	Description
QOS	Indicates QoS criterion.
ACCESS_RAT_TYPE	Indicates Access and Rat types criterion.
E2E_DATA_VOLUME_TRANSFER_TIME	Indicates End-to-end data volume transfer time criterion.
UE_LOCATION	Indicates UE location criterion.
UE_HISTORICAL_LOCATION	Indicates UE historical location criterion.
UE_DIRECTION	Indicates UE direction criterion.
UE_DISTANCE	Indicates UE distance criterion.
SERVICE_EXPERIENCE	Indicates the Service Experience criterion.
DNN	Indicates the DNN criterion.

5.32.6 Used Features

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

Table 5.32.6-1: Features used by MemberUESelectionAssistance API

Feature number	Feature Name	Description

5.32.7 Error handling

5.32.7.1 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.

5.32.7.2 Protocol Errors

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

5.32.7.3 Application Errors

The application errors defined for the MemberUESelectionAssistance API are listed in table 5.32.7.3-1.

Table 5.32.7.3-1: Application errors

Application Error	HTTP status code	Description

5.33 GroupParametersProvisioning API

5.33.1 Introduction

The Nnef_ParameterProvision service shall use the GroupParametersProvisioning API for:

- DNN and S-NSSAI specific Group Parameters provisioning.

The API URI of the GroupParametersProvisioning API shall be:

{apiRoot}/3gpp-grp-pp/<apiVersion>

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-grp-pp".
- "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.

5.33.2 Resources

5.33.2.1 Overview

This clause describes the structure for the Resource URIs as shown in figure 5.33.2.1-1 and the resources and HTTP methods used for the GroupParametersProvisioning API.

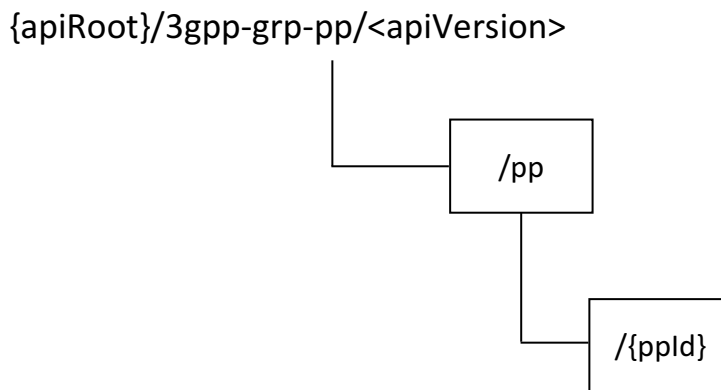


Figure 5.33.2.1-1: Resource URI structure of the GroupParametersProvisioning API

Table 5.33.2.1-1 provides an overview of the resources and applicable HTTP methods.

Table 5.33.2.1-1: Resources and methods overview

Resource name	Resource URI (relative path under API URI)	HTTP method or custom operation	Description (service operation)
Group Parameters Provisionings	/pp	GET	Retrieve all the active Group Parameters Provisionings managed by the NEF.
		POST	Request the creation of a new Group Parameters Provisioning at the NEF.
Individual Group Parameters Provisioning	/pp/{ppId}	GET	Retrieve an existing "Individual Group Parameters Provisioning" managed by the NEF.
		PUT	Update an existing "Individual Group Parameters Provisioning" managed by the NEF.
		PATCH	Modify an existing "Individual Group Parameters Provisioning" managed by the NEF.
		DELETE	Delete an existing "Individual Group Parameters Provisioning" managed by the NEF.

5.33.2.2 Resource: Group Parameters Provisionings

5.33.2.2.1 Introduction

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

This resource is modelled with the Collection resource archetype (see clause C.2 of 3GPP TS 29.501 [32]).

5.33.2.2.2 Resource Definition

Resource URI: {apiRoot}/3gpp-grp-pp/<apiVersion>/pp

This resource shall support the resource URI variables defined in table 5.33.2.2.2-1.

Table 5.33.2.2.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 5.33.1.

5.33.2.2.3 Resource Methods

5.33.2.2.3.1 GET

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

This method shall support the URI query parameters specified in table 5.33.2.2.3.1-1.

Table 5.33.2.2.3.1-1: 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 5.33.2.2.3.1-2 and the response data structures and response codes specified in table 5.33.2.2.3.1-3.

Table 5.33.2.2.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 5.33.2.2.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
array(GrpPpData)	M	0..N	200 OK	Successful case. All the "Individual Group Parameters Provisioning" 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 5.33.2.2.3.1-4: Headers supported by the 307 Response Code on this resource

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

Table 5.33.2.2.3.1-5: Headers supported by the 308 Response Code on this resource

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

5.33.2.2.3.2 POST

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

This method shall support the URI query parameters specified in table 5.33.2.2.3.2-1.

Table 5.33.2.2.3.2-1: 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 5.33.2.2.3.2-2 and the response data structures and response codes specified in table 5.33.2.2.3.2-3.

Table 5.33.2.2.3.2-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
GrpPpData	M	1	Representation of the Group Parameters Provisioning to be created at the NEF.

Table 5.33.2.2.3.2-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
GrpPpData	M	1	201 Created	Successful case. A representation of the created "Individual Group Parameters Provisioning" resource is returned in the response body. 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 5.33.2.2.3.2-4: 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-grp-pp/<apiVersion>/pp/{ppId}

5.33.2.2.4 Resource Custom Operations

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

5.33.2.3 Resource: Individual Group Parameters Provisioning

5.33.2.3.1 Introduction

This resource represents an "Individual Group 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 [32]).

5.33.2.3.2 Resource Definition

Resource URI: **{apiRoot}/3gpp-grp-pp/<apiVersion>/pp/{ppId}**

This resource shall support the resource URI variables defined in table 5.33.2.3.2-1.

Table 5.33.2.3.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 5.33.1.
ppId	string	Represents the identifier of the "Individual Group Parameters Provisioning" resource.

5.33.2.3.3 Resource Methods

5.33.2.3.3.1 GET

This method enables an AF to request to retrieve an existing "Individual Group Parameters Provisioning" resource at the NEF.

This method shall support the URI query parameters specified in table 5.33.2.3.3.1-1.

Table 5.33.2.3.3.1-1: 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 5.33.2.3.3.1-2 and the response data structures and response codes specified in table 5.33.2.3.3.1-3.

Table 5.33.2.3.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 5.33.2.3.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
GrpPpData	M	1	200 OK	Successful case. The requested "Individual Group Parameters Provisioning" resource is successfully 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 GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.				

Table 5.33.2.3.3.1-4: Headers supported by the 307 Response Code on this resource

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

Table 5.33.2.3.3.1-5: 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.

5.33.2.3.3.2 PUT

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

This method shall support the URI query parameters specified in table 5.33.2.3.3.2-1.

Table 5.33.2.3.3.2-1: 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 5.33.2.3.3.2-2 and the response data structures and response codes specified in table 5.33.2.3.3.2-3.

Table 5.33.2.3.3.2-2: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
GrpPpData	M	1	Represents the updated "Individual Group Parameters Provisioning" resource representation.

Table 5.33.2.3.3.2-3: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description
GrpPpData	M	1	200 OK	Successful response. The "Individual Group 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 Group Parameters Provisioning" 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 5.33.2.3.3.2-4: 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 5.33.2.3.3.2-5: 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.

5.33.2.3.3.3 PATCH

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

This method shall support the URI query parameters specified in table 5.33.2.3.3.3-1.

Table 5.33.2.3.3.3-1: 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 5.33.2.3.3.3-2 and the response data structures and response codes specified in table 5.33.2.3.3.3-3.

Table 5.33.2.3.3.3-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
GrpPpDataPatch	M	1	Represents the requested modifications to the "Individual Group Parameters Provisioning" resource.

Table 5.33.2.3.3.3-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
GrpPpData	M	1	200 OK	Successful response. The "Individual Group 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 Group Parameters Provisioning" 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 5.33.2.3.3.3-4: 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 5.33.2.3.3.3-5: 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.

5.33.2.3.3.4 DELETE

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

This method shall support the URI query parameters specified in table 5.33.2.3.3.4-1.

Table 5.33.2.3.3.4-1: 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 5.33.2.3.3.4-2 and the response data structures and response codes specified in table 5.33.2.3.3.4-3.

Table 5.33.2.3.3.4-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 5.33.2.3.3.4-3: Data structures supported by the DELETE Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	Successful case. The concerned "Individual Group 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 5.33.2.3.3.4-4: Headers supported by the 307 Response Code on this resource

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

Table 5.33.2.3.3.4-5: Headers supported by the 308 Response Code on this resource

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

5.33.2.3.4 Resource Custom Operations

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

5.33.3 Custom Operations without associated resources

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

5.33.4 Notifications

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

5.33.5 Data Model

5.33.5.1 General

This clause specifies the application data model supported by the GroupParametersProvisioning API. Table 5.33.5.1-1 specifies the data types defined for the GroupParametersProvisioning API.

Table 5.33.5.1-1: GroupParametersProvisioning API specific Data Types

Data type	Clause defined	Description	Applicability
AfReqDefaultQoS	5.33.5.2.5	Represents the AF requested default QoS.	
DnnSnssaiGrpData	5.33.5.2.4	Represents DNN and S-NSSAI specific Group Parameters data.	
GrpPpData	5.33.5.2.2	Represents Group Parameters Provisioning data.	
GrpPpDataPatch	5.33.5.2.3	Represents the requested modification to an existing Group Parameters Provisioning data.	
LadnServArea	5.33.5.2.6	Represents an LADN Service Area.	

Table 5.33.5.1-2 specifies data types re-used by the GroupParametersProvisioning API from other specifications, including a reference to their respective specifications, and when needed, a short description of their use within the GroupParametersProvisioning API.

Table 5.33.5.1-2: GroupParametersProvisioning API re-used Data Types

Data type	Reference	Comments	Applicability
5Qi	3GPP TS 29.571 [8]	Represents a 5G QoS Identifier.	
5QiPriorityLevelRm	3GPP TS 29.571 [8]	Represents the 5QI Priority Level.	
Arp	3GPP TS 29.571 [8]	Represents an ARP.	
BitRate	3GPP TS 29.571 [8]	Represents a bit rate.	

BitRateRm	3GPP TS 29.571 [8]	This data type is defined in the same way as the "BitRate" data type, but with the OpenAPI "nullable: true" property.	
CivicAddress	3GPP TS 29.572 [34]	Represents a civic address.	
Dnn	3GPP TS 29.571 [8]	Represents a DNN.	
ExternalGroupId	3GPP TS 29.122 [4]	Represents the External Group Identifier for a user group.	
GeographicArea	3GPP TS 29.572 [34]	Represents a geographical area.	
MtcProviderInformation	3GPP TS 29.571 [8]	Represents the MTC provider information.	
Snsai	3GPP TS 29.571 [8]	Represents an S-NSSAI.	
SupportedFeatures	3GPP TS 29.571 [8]	Represents the list of supported feature(s) and used to negotiate the applicability of the optional features.	
Tai	3GPP TS 29.571 [8]	Represents a Tracking Area Identifier.	

5.33.5.2 Structured data types

5.33.5.2.1 Introduction

This clause defines the structures to be used in resource representations.

5.33.5.2.2 Type: GrpPpData

Table 5.33.5.2.2-1: Definition of type GrpPpData

Attribute name	Data type	P	Cardinality	Description	Applicability
afId	string	M	1	Contains the identifier of the AF that is sending the request.	
mtcProviderId	MtcProviderInformation	O	0..1	Identifies the MTC Service Provider and/or MTC Application.	
dnnSnsaiGrpData	DnnSnsaiGrpData	C	0..1	Contains the DNN and S-NSSAI specific Group data that the AF requests to provision. This attribute shall be present only when the AF requests to provision DNN and S-NSSAI specific Group parameters.	
supFeat	SupportedFeatures	C	0..1	Contains the list of supported features among the ones defined in clause 5.33.6. This attribute shall be provided when feature negotiation needs to take place.	

5.33.5.2.3 Type: GrpPpDataPatch

Table 5.33.5.2.3-1: Definition of type GrpPpDataPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
dnnSnsaiGrpData	DnnSnsaiGrpData	O	0..1	Contains the modified DNN and S-NSSAI specific Group data that the AF requests to provision.	

5.33.5.2.4 Type: DnnSnsaiGrpData

Table 5.33.5.2.4-1: Definition of type DnnSnsaiGrpData

Attribute name	Data type	P	Cardinality	Description	Applicability
extGroupId	ExternalGroupId	M	1	Represents the external group identifier of the targeted group.	
dnn	Dnn	M	1	Represents the concerned DNN.	

snsai	Snsai	M	1	Represents the concerned S-NSSAI.	
defQos	AfReqDefaultQoS	C	0..1	Represents the AF-requested default QoS parameters to be applied to each UE within the targeted group. (NOTE)	
ladnServArea	LadnServArea	C	0..1	Represents the AF-requested LADN Service Area to be applied to each UE within the targeted group. (NOTE)	
NOTE: At least one of these attributes shall be present.					

5.33.5.2.5 Type: AfReqDefaultQoS

Table 5.33.5.2.5-1: Definition of type AfReqDefaultQoS

Attribute name	Data type	P	Cardinality	Description	Applicability
5qi	5Qi	M	1	Represents the AF requested default 5G QoS Identifier.	
arp	Arp	M	1	Represents the AF requested default Allocation and Retention Priority.	
priorityLevel	5QiPriorityLevelRm	O	0..1	Represents the AF requested 5QI Priority Level.	

5.33.5.2.6 Type: LadnServArea

Table 5.33.5.2.6-1: Definition of type LadnServArea

Attribute name	Data type	P	Cardinality	Description	Applicability
geographicAreas	array(Geographic Area)	C	1..N	Represents the AF requested list of geographic area(s). (NOTE)	
civicAddresses	array(CivicAddresses)	C	1..N	Represents the AF requested list of civic address(es). (NOTE)	
tais	array(Tai)	C	1..N	Represents the AF requested list of Tracking Area Identifier(s). (NOTE)	
NOTE: These attributes are mutually exclusive. Either one of them shall be present.					

5.33.5.3 Simple data types and enumerations

5.33.5.3.1 Introduction

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

5.33.5.3.2 Simple data types

The simple data types defined in table 5.33.5.3.2-1 shall be supported.

Table 5.33.5.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

5.33.6 Used Features

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

Table 5.33.6-1: Supported Features

Feature number	Feature Name	Description

5.33.7 Error handling

5.33.7.1 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.

5.33.7.2 Protocol Errors

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

5.33.7.3 Application Errors

The application errors defined for the GroupParametersProvisioning API are listed in table 5.33.7.3-1.

Table 5.33.7.3-1: Application errors

Application Error	HTTP status code	Description

5.34 SliceParamProvision API

5.34.1 Introduction

The Nnef_ParameterProvision service shall use the SliceParamProvision API for:

- Network Slice Parameters provisioning.

The API URI of the SliceParamProvision API shall be:

{apiRoot}/3gpp-slice-pp/<apiVersion>

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-slice-pp".
- "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.

5.34.2 Resources

5.34.2.1 Overview

This clause describes the structure for the Resource URIs as shown in figure 5.34.2.1-1 and the resources and HTTP methods used for the SliceParamProvision API.

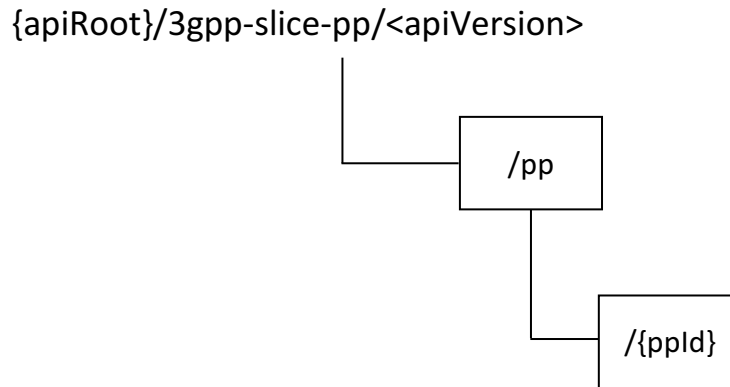


Figure 5.34.2.1-1: Resource URI structure of the SliceParamProvision API

Table 5.34.2.1-1 provides an overview of the resources and applicable HTTP methods.

Table 5.34.2.1-1: Resources and methods overview

Resource name	Resource URI (relative path under API URI)	HTTP method or custom operation	Description (service operation)
Slice Parameters Provisionings	/pp	GET	Retrieve all the active Slice Parameters Provisionings managed by the NEF.
		POST	Request the creation of a new Slice Parameters Provisioning at the NEF.
Individual Slice Parameters Provisioning	/pp/{ppId}	GET	Retrieve an existing "Individual Slice Parameters Provisioning" managed by the NEF.
		PUT	Update an existing "Individual Slice Parameters Provisioning" managed by the NEF.
		PATCH	Modify an existing "Individual Slice Parameters Provisioning" managed by the NEF.
		DELETE	Delete an existing "Individual Slice Parameters Provisioning" managed by the NEF.

5.34.2.2 Resource: Slice Parameters Provisionings

5.34.2.2.1 Introduction

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

This resource is modelled with the Collection resource archetype (see clause C.2 of 3GPP TS 29.501 [32]).

5.34.2.2.2 Resource Definition

Resource URI: {apiRoot}/3gpp-slice-pp/<apiVersion>/pp

This resource shall support the resource URI variables defined in table 5.34.2.2.2-1.

Table 5.34.2.2.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 5.34.1.

5.34.2.2.3 Resource Methods

5.34.2.2.3.1 GET

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

This method shall support the URI query parameters specified in table 5.34.2.2.3.1-1.

Table 5.34.2.2.3.1-1: 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 5.34.2.2.3.1-2 and the response data structures and response codes specified in table 5.34.2.2.3.1-3.

Table 5.34.2.2.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 5.34.2.2.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
array(SlicePpData)	M	0..N	200 OK	Successful case. All the "Individual Slice Parameters Provisioning" 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 5.34.2.2.3.1-4: Headers supported by the 307 Response Code on this resource

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

Table 5.34.2.2.3.1-5: Headers supported by the 308 Response Code on this resource

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

5.34.2.2.3.2 POST

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

This method shall support the URI query parameters specified in table 5.34.2.2.3.2-1.

Table 5.34.2.2.3.2-1: 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 5.34.2.2.3.2-2 and the response data structures and response codes specified in table 5.34.2.2.3.2-3.

Table 5.34.2.2.3.2-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
SlicePpData	M	1	Representation of the Slice Parameters Provisioning to be created at the NEF.

Table 5.34.2.2.3.2-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SlicePpData	M	1	201 Created	Successful case. A representation of the created "Individual Slice Parameters Provisioning" resource is returned in the response body. 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 5.34.2.2.3.2-4: 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-slice-pp/<apiVersion>/pp/{ppId}

5.34.2.2.4 Resource Custom Operations

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

5.34.2.3 Resource: Individual Slice Parameters Provisioning

5.34.2.3.1 Introduction

This resource represents an "Individual Slice 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 [32]).

5.34.2.3.2 Resource Definition

Resource URI: {apiRoot}/3gpp-slice-pp/<apiVersion>/pp/{ppId}

This resource shall support the resource URI variables defined in table 5.34.2.3.2-1.

Table 5.34.2.3.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 5.34.1.
ppId	string	Represents the identifier of the "Individual Slice Parameters Provisioning" resource.

5.34.2.3.3 Resource Methods

5.34.2.3.3.1 GET

This method enables an AF to request to retrieve an existing "Individual Slice Parameters Provisioning" resource at the NEF.

This method shall support the URI query parameters specified in table 5.34.2.3.3.1-1.

Table 5.34.2.3.3.1-1: 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 5.34.2.3.3.1-2 and the response data structures and response codes specified in table 5.34.2.3.3.1-3.

Table 5.34.2.3.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 5.34.2.3.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SlicePpData	M	1	200 OK	Successful case. The requested "Individual Slice Parameters Provisioning" resource is successfully 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 GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.				

Table 5.34.2.3.3.1-4: Headers supported by the 307 Response Code on this resource

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

Location	string	M	1	An alternative target URI of the resource located in an alternative NEF.
----------	--------	---	---	--

Table 5.34.2.3.3.1-5: 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.

5.34.2.3.3.2 PUT

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

This method shall support the URI query parameters specified in table 5.34.2.3.3.2-1.

Table 5.34.2.3.3.2-1: 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 5.34.2.3.3.2-2 and the response data structures and response codes specified in table 5.34.2.3.3.2-3.

Table 5.34.2.3.3.2-2: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
SlicePpData	M	1	Represents the updated "Individual Slice Parameters Provisioning" resource representation.

Table 5.34.2.3.3.2-3: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SlicePpData	M	1	200 OK	Successful response. The "Individual Slice 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 Slice Parameters Provisioning" 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 5.34.2.3.3.2-4: 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 5.34.2.3.3.2-5: 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.

5.34.2.3.3.3 PATCH

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

This method shall support the URI query parameters specified in table 5.34.2.3.3.3-1.

Table 5.34.2.3.3.3-1: 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 5.34.2.3.3.3-2 and the response data structures and response codes specified in table 5.34.2.3.3.3-3.

Table 5.34.2.3.3.3-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
SlicePpDataPatch	M	1	Represents the requested modifications to the "Individual Slice Parameters Provisioning" resource.

Table 5.34.2.3.3.3-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SlicePpData	M	1	200 OK	Successful response. The "Individual Slice 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 Slice Parameters Provisioning" 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 5.34.2.3.3.3-4: 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 5.34.2.3.3.3-5: 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.

5.34.2.3.3.4 DELETE

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

This method shall support the URI query parameters specified in table 5.34.2.3.3.4-1.

Table 5.34.2.3.3.4-1: 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 5.34.2.3.3.4-2 and the response data structures and response codes specified in table 5.34.2.3.3.4-3.

Table 5.34.2.3.3.4-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 5.34.2.3.3.4-3: Data structures supported by the DELETE Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	Successful case. The concerned "Individual Slice 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 5.34.2.3.3.4-4: Headers supported by the 307 Response Code on this resource

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

Table 5.34.2.3.3.4-5: Headers supported by the 308 Response Code on this resource

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

Location	string	M	1	An alternative target URI of the resource located in an alternative NEF.
----------	--------	---	---	--

5.34.2.3.4 Resource Custom Operations

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

5.34.3 Custom Operations without associated resources

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

5.34.4 Notifications

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

5.34.5 Data Model

5.34.5.1 General

This clause specifies the application data model supported by the SliceParamProvision API. Table 5.34.5.1-1 specifies the data types defined for the SliceParamProvision API.

Table 5.34.5.1-1: SliceParamProvision API specific Data Types

Data type	Clause defined	Description	Applicability
SlicePpData	5.34.5.2.1	Represents Slice Parameters Provisioning data.	
SlicePpDataPatch	5.34.5.2.2	Represents the requested modification to existing Slice Parameters Provisioning data.	

Table 5.34.5.1-2 specifies data types re-used by the SliceParamProvision API from other specifications, including a reference to their respective specifications, and when needed, a short description of their use within the SliceParamProvision API.

Table 5.34.5.1-2: SliceParamProvision API re-used Data Types

Data type	Reference	Comments	Applicability
MtcProviderInformation	3GPP TS 29.571 [8]	Represents the MTC provider information.	
SliceUsageControllInfo	3GPP TS 29.571 [8]	Represents the Network Slice Usage Control information.	
SupportedFeatures	3GPP TS 29.571 [8]	Represents the list of supported feature(s) and used to negotiate the applicability of the optional features.	

5.34.5.2 Structured data types

5.34.5.2.1 Introduction

This clause defines the structures to be used in resource representations.

5.34.5.2.2 Type: SlicePpData

Table 5.34.5.2.2-1: Definition of type SlicePpData

Attribute name	Data type	P	Cardinality	Description	Applicability
afId	string	M	1	Represents the identifier of the AF that is sending the request.	

mtcProviderId	MtcProviderInformation	O	0..1	Identifies the MTC Service Provider and/or MTC Application.
sliceUsgCtrlData	map(SliceUsageControlInfo)	C	1..N	Represents the Network Slice Usage Control information to be provisioned. The key of the map shall be the AF-dedicated S-NSSAI to which the Network Slice Usage Control information are related and that is provided within the "snssai" attribute of the corresponding map value encoded via the SliceUsageControlInfo data structure. This attribute shall be present only when the AF requests to provision Network Slice Usage Control information.
suppFeat	SupportedFeatures	C	0..1	Represents the list of supported features among the ones defined in clause 5.34.6. This attribute shall be provided when feature negotiation needs to take place.

5.34.5.2.3 Type: SlicePpDataPatch

Table 5.34.5.2.3-1: Definition of type SlicePpDataPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
sliceUsgCtrlData	map(SliceUsageControlInfo)	O	1..N	Represents the Network Slice Usage Control information to be provisioned. The key of the map shall be the AF-dedicated S-NSSAI to which the Network Slice Usage Control information are related and that is provided within the "snssai" attribute of the corresponding map value encoded via the SliceUsageControlInfo data structure.	

5.34.5.3 Simple data types and enumerations

5.34.5.3.1 Introduction

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

5.34.5.3.2 Simple data types

The simple data types defined in table 5.34.5.3.2-1 shall be supported.

Table 5.34.5.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

5.34.6 Used Features

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

Table 5.34.6-1: Supported Features

Feature number	Feature Name	Description

5.34.7 Error handling

5.34.7.1 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.

5.34.7.2 Protocol Errors

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

5.34.7.3 Application Errors

The application errors defined for the SliceParamProvision API are listed in table 5.34.7.3-1.

Table 5.34.7.3-1: Application errors

Application Error	HTTP status code	Description

5.35 UeAddress API

5.35.1 Introduction

The Nnef_UeAddress service shall use the UeAddress API.

The API URI of UeAddress API shall be:

{apiRoot}/3gpp-ue-address/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-ue-address".
- "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.

5.35.2 Resources

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

5.35.3 Custom Operations without associated resources

5.35.3.1 Overview

The structure of the custom operation URIs of the UeAddress API is shown in Figure 5.35.3.1-1.

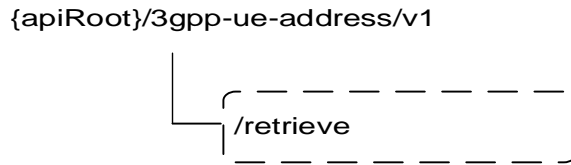


Figure 5.35.3.1-1: Custom operation URI structure of the UeAddress API

Table 5.35.3.1-1 provides an overview of the custom operations and applicable HTTP methods.

Table 5.35.3.1-1: Custom operations without associated resources

Operation name	Custom operation URI	Mapped HTTP method	Description
Retrieve	/retrieve	POST	Request to retrieve UE Address information.

5.35.3.2 Operation: Retrieve

5.35.3.2.1 Description

The custom operation allows a service consumer to retrieve UE Address information via the NEF.

5.35.3.2.2 Operation Definition

This operation shall support the request and response data structures and response codes specified in table 5.35.3.2.2-1 and table 5.35.3.2.2-2.

Table 5.35.3.2.2-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
UeAddressReq	M	1	Parameters to request to retrieve UE Address information.

Table 5.35.3.2.2-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
UeAddressInfo	M	1	200 OK	The requested UE Address information was returned 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 POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.

Table 5.35.3.2.2-3: 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 5.35.3.2.2-4: 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.

5.35.4 Notifications

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

5.35.5 Data Model

5.35.5.1 General

This clause specifies the application data model supported by the UeAddress API. Table 5.35.5.1-1 specifies the data types defined for the UeAddress API.

Table 5.35.5.1-1: UeAddress service specific Data Types

Data type	Clause defined	Description	Applicability
UeAddressReq	5.35.5.2.2	Represents the parameters to request UE Address retrieval.	
UeAddressInfo	5.35.5.2.3	Represents UE Address information.	

Table 5.35.5.1-2 specifies data types re-used by the UeAddress API from other specifications, including a reference to their respective specifications, and when needed, a short description of their use within the UeAddress API.

Table 5.35.5.1-2: Re-used Data Types

Data type	Reference	Comments
Gpsi	3GPP TS 29.571 [8]	Identifies a GPSI of the UE.
IpAddr	3GPP TS 29.571 [8]	Identifies an IP address.
SupportedFeatures	3GPP TS 29.571 [8]	Used to negotiate the applicability of the optional features.

5.35.5.2 Structured data types

5.35.5.2.1 Introduction

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

5.35.5.2.2 Type: UeAddressReq

Table 5.35.5.2.2-1: Definition of type UeAddressReq

Attribute name	Data type	P	Cardinality	Description	Applicability
afId	string	M	1	Represents the identifier of the AF that is sending the request.	
gpsi	Gpsi	M	1	Identifies a GPSI of the UE.	
supFeat	SupportedFeatures	C	0..1	Indicates the list of supported features. This attribute shall be provided if feature negotiation needs to take place.	

5.35.5.2.3 Type: UeAddressInfo

Table 5.35.5.2.3-1: Definition of type UeAddressInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
ueIpAdrs	array(lpAddr)	M	1..N	Contains the UE Address(es) corresponding to the requested GPSI.	

5.35.5.3 Simple data types and enumerations

5.35.5.3.1 Introduction

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

5.35.5.3.2 Simple data types

The simple data types defined in table 5.35.5.3.2-1 shall be supported.

Table 5.35.5.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

5.35.6 Used Features

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

Table 5.35.6-1: Features used by UeAddress API

Feature number	Feature Name	Description

5.35.7 Error handling

5.35.7.1 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.

5.35.7.2 Protocol Errors

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

5.35.7.3 Application Errors

The application errors defined for the UeAddress API are listed in table 5.35.7.3-1.

Table 5.35.7.3-1: Application errors

Application Error	HTTP status code	Description

5.36 ECSAddress API

5.36.1 Introduction

The Nnef_ECSAddress service shall use the ECSAddress API.

The API URI of ECSAddress API shall be:

{apiRoot}/3gpp-ecs-address/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-ecs-address".
- "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.

5.36.2 Resources

5.36.2.1 Overview

This clause describes the structure for the Resource URIs as shown in figure 5.36.2.1-1 and the resources and HTTP methods used for AF provisioned ECS Address Configuration Information management in the ECSAddress API.

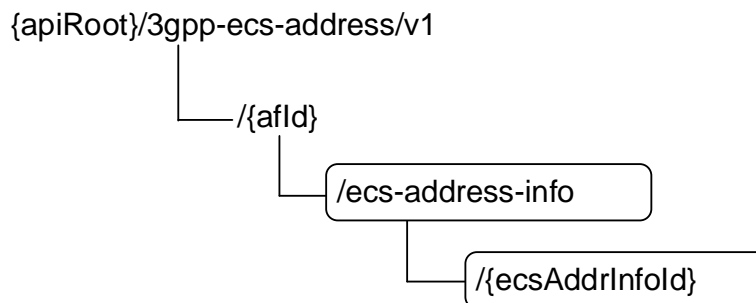


Figure 5.36.2.1-1: Resource URI structure of the northbound ECSAddress API

Table 5.36.2.1-1 provides an overview of the resources and HTTP methods applicable for the northbound ECSAddress API.

Table 5.36.2.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method	Description
ECS Address Configuration Information	/{afId}/ecs-address-info	GET	Read all ECS Address Configuration Information for a given AF.
		POST	Create a new Individual ECS Address Configuration Information resource.
Individual ECS Address Configuration Information	/{afId}/ecs-address-info/{ecsAddrInfoId}	GET	Reads an active Individual ECS Address Configuration Information resource.

		PUT	Update an existing Individual ECS Address Configuration Information resource.
		DELETE	Deletes an existing Individual ECS Address Configuration Information resource.

5.36.2.2 Resource: ECS Address Configuration Information

5.36.2.2.1 Introduction

This resource allows an AF to request the creation of a new Individual ECS Address Configuration Information resource.

5.36.2.2.2 Resource Definition

Resource URI: **{apiRoot}/3gpp-ecs-address/v1/{afId}/ecs-address-info**

This resource shall support the resource URI variables defined in table 5.36.2.2.2-1.

Table 5.36.2.2.2-1: Resource URI variables for this resource

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

5.36.2.2.3 Resource Methods

5.36.2.2.3.1 General

The following clauses specify the resource methods supported by the resource as described in clause 5.36.2.2.2.

5.36.2.2.3.2 GET

The GET method allows to read all active ECS Address Configuration Information for a given AF.

This method shall support the URI query parameters specified in table 5.36.2.2.3.2-1.

Table 5.36.2.2.3.2-1: 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 5.36.2.2.3.2-2, the response data structures and response codes specified in table 5.36.2.2.3.2-3, and the location headers specified in table 5.36.2.2.3.2-4 and table 5.36.2.2.3.2-5.

Table 5.36.2.2.3.2-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.36.2.2.3.2-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
array(EcsAddrInfo)	M	0..N	200 OK	The ECS Address Configuration Information for the AF in the request URI are returned.

N/A			307 Temporary Redirect	Temporary redirection, during ECS Address Configuration Information retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative V-NEF. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [4].
N/A			308 Permanent Redirect	Permanent redirection, during ECS Address Configuration Information retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative V-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 5.36.2.2.3.2-4: 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 V-NEF.

Table 5.36.2.2.3.2-5: 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 V-NEF.

5.36.2.2.3.3 POST

The POST method creates a new resource of Individual ECS Address Configuration Information for a given AF.

This method shall support the request data structures specified in table 5.36.2.2.3.3-1, the response data structures and response codes specified in table 5.36.2.2.3.3-2, and the Location Headers specified in table 5.36.2.2.3.3-3.

Table 5.36.2.2.3.3-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
EcsAddrInfo	M	1	ECS Address Configuration Information, indicates how edge configuration servers are assigned with IP addresses.

Table 5.36.2.2.3.3-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
EcsAddrInfo	M	1	201 Created	The Individual ECS Address Configuration Information resource was created successfully. The URI of the created resource shall be returned in the "Location" HTTP header.

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

Table 5.36.2.2.3.3-3: 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/v1/{afld}/ecs-address-info/{ecsAddrInfofld}

5.36.2.3 Resource: Individual ECS Address Configuration Information

5.36.2.3.1 Introduction

This resource allows an AF to read, update or delete an existing Individual ECS Address Configuration Information.

5.36.2.3.2 Resource Definition

Resource URI: `{apiRoot}/3gpp-ecs-address/v1/{afId}/ecs-address-info/{ecsAddrInfoId}`

This resource shall support the resource URI variables defined in table 5.36.2.3.2-1.

Table 5.36.2.3.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 5.2.4 of 3GPP TS 29.122 [4].
afId	string	Identifier of the AF.
ecsAddrInfoId	string	Identifier of the ECS Address Configuration Information

5.36.2.3.3 Resource Methods

5.36.2.3.3.1 General

The following clauses specify the resource methods supported by the resource as described in clause 5.36.2.3.2.

5.36.2.3.3.2 GET

The GET method allows to read the existing ECS Address Configuration Information for a given AF and a given ECS Address Configuration Information Id.

This method shall support the URI query parameters specified in table 5.36.2.3.3.2-1.

Table 5.36.2.3.3.2-1: 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 5.36.2.3.3.2-2, the response data structures and response codes specified in table 5.36.2.3.3.2-3, and the Location Headers specified in table 5.36.2.3.3.2-4 and table 5.36.2.3.3.2-5.

Table 5.36.2.3.3.2-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.36.2.3.3.2-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
EcsAddrInfo	M	1	200 OK	Successful case. The contents of the Individual ECS Address Configuration Information in the request URI are returned.
N/A			307 Temporary Redirect	Temporary redirection, during the ECS Address Configuration Information retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative V-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 ECS Address Configuration Information retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative V-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 5.36.2.3.3.2-4: 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 V-NEF.

Table 5.36.2.3.3.2-5: 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 V-NEF.

5.36.2.3.3.3 PUT

The PUT method is used to modify an existing Individual ECS Address Configuration Information resource.

This method shall support the URI query parameters specified in table 5.36.2.3.3.3-1.

Table 5.36.2.3.3.3-1: 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 5.36.2.3.3.3-2, the response data structures and response codes specified in table 5.36.2.3.3.3-3, and the Location Headers specified in table 5.36.2.3.3.3-4 and table 5.36.2.3.3.3-5.

Table 5.36.2.3.3.3-2: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
EcsAddrInfo	M	1	Modify the Individual ECS Address Configuration Information resource.

Table 5.36.2.3.3.3-3: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description
EcsAddrInfo	M	1	200 OK	Successful case. The representation of the updated ECS Address Configuration Information is returned.
N/A			204 No Content	Successful case. The ECS Address Configuration Information was updated successfully.
N/A			307 Temporary Redirect	Temporary redirection, during the ECS Address Configuration Information modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative V-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 ECS Address Configuration Information modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative V-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 5.36.2.3.3.3-4: 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 V-NEF.

Table 5.36.2.3.3.3-5: 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 V-NEF.

5.36.2.3.3.4 DELETE

The DELETE method deletes an existing Individual ECS Address Configuration Information resource.

This method shall support the URI query parameters specified in table 5.36.2.3.3.4-1.

Table 5.36.2.3.3.4-1: 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 5.36.2.3.3.4-2, the response data structures and response codes specified in table 5.36.2.3.3.4-3, and the Location Headers specified in table 5.36.2.3.3.4-4 and table 5.36.2.3.3.4-5.

Table 5.36.2.3.3.4-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.36.2.3.3.4-3: Data structures supported by the DELETE Response Body on this resource

Data type	P	Cardinality	Response codes	Description
N/A			204 No Content	The Individual ECS Address Configuration 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 V-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 V-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 5.36.2.3.3.4-4: 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 V-NEF.

Table 5.36.2.3.3.4-5: 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 V-NEF.

5.36.3 Custom Operations without associated resources

5.36.3.1 Overview

The structure of the custom operation URIs of the Nnef_ECSAddress service is shown in Figure 5.36.3.1-1.

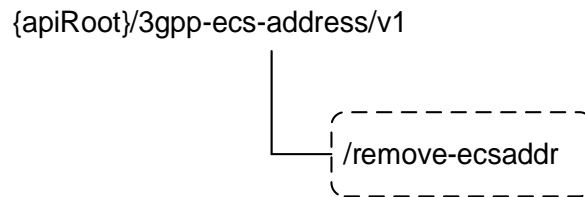


Figure 5.36.3.1-1: Custom operation URI structure of the Nnef_ECSAddress API

Table 5.36.3.1-1 provides an overview of the custom operations and applicable HTTP methods.

Table 5.36.3.1-1: Custom operations without associated resources

Custom operation URI	Mapped HTTP method	Description
<code>{apiRoot}/3gpp-ecs-address/<apiVersion>/remove-ecsaddr</code>	POST	Request the V-NEF to delete ECS Address Configuration Information based on given attributes.

5.36.3.2 Operation: remove-ecsaddr

5.36.3.2.1 Description

The operation is used by the NF service consumer to delete ECS Address Configuration Information based on given attributes.

5.36.3.2.2 Operation Definition

This operation shall support the request data structures shown in Table 5.36.3.2.2-1 and the response data structures and error codes specified in Table 5.36.3.2.2-2.

Table 5.36.3.2.2-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
EcsAddrDeleteCriteria	M	1	Information about the criteria to be used for ECS Address Configuration Information deletion.

Table 5.36.3.2.2-2: 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 ECS Address Configuration Information based on given criteria.
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 5.36.3.2.2-3: 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 5.36.3.2.2-4: 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.

5.36.4 Notifications

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

5.36.5 Data Model

5.36.5.1 General

This clause specifies the application data model supported by the ECSAddress API. Table 5.36.5.1-1 specifies the data types defined for the ECSAddress API.

Table 5.36.5.1-1: ECSAddress API specific Data Types

Data type	Clause defined	Description	Applicability
EcsAddrDeleteCriteria	5.36.5.3.3	Contains criteria for deleting ECS Address Configuration Information.	
EcsAddrInfo	5.36.5.3.2	Contains ECS Address Configuration Information.	

5.36.5.2 Reused data types

The data types reused by the ECSAddress API from other specifications are listed in table 5.36.5.2-1.

Table 5.36.5.2-1: Re-used Data Types

Data type	Reference	Comments
Afld	5.14.5.4.2	Represents an AF identifier.
Dnn	3GPP TS 29.571 [8]	Represents a DNN.
EcsServerAddr	3GPP TS 29.571 [8]	Represents the Edge Configuration Server (ECS) address configuration information.
Link	3GPP TS 29.122 [4]	Identifies a referenced resource.
Snsai	3GPP TS 29.571 [8]	Represents an S-NSSAI.
TargetUeld	5.6.3.3.7	Represents the target UE(s) information.

5.36.5.3 Structured data types

5.36.5.3.1 Introduction

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

5.36.5.3.2 Type: EcsAddrInfo

Table 5.36.5.3.2-1: Definition of type EcsAddrInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
self	Link	C	0..1	Identifies the individual resource. It 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	Indicates the spatial validity condition.	
tgtUe	TargetUeld	O	0..1	Target UE information. Only the attributes "anyUeInd" and "exterGroupId" are applicable.	
suppFeat	SupportedFeatures	C	0..1	Indicates the negotiated supported features. It shall be provided in an HTTP POST response if it was provided in the HTTP POST request.	

5.36.5.3.3 Type: EcsAddrDeleteCriteria

Table 5.36.5.3.3-1: Definition of type EcsAddrDeleteCriteria

Attribute name	Data type	P	Cardinality	Description	Applicability
aflds	array(Afld)	C	1..N	AF identifiers to be used as deletion criterion. (NOTE 1)	
dnn	Dnn	C	0..1	DNN to be used as deletion criterion. (NOTE 1)	
snsai	Snsai	C	0..1	S-NSSAI to be used as deletion criterion. (NOTE 1)	
ecsAddrInfo	EcsAddrInfo	C	0..1	ECS Address Configuration Information to be used as	

				deletion criterion. Only entries that are exact matches of this attribute shall be deleted. (NOTE 1) (NOTE 2)	
NOTE 1: At least one of those attributes shall be provided.					
NOTE 2: The attributes "self" and "suppFeat" of EcsAddrInfo shall not be provided and shall not be considered when finding the matching entries.					

5.36.5.4 Simple data types and enumerations

5.36.5.4.1 Introduction

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

5.36.5.4.2 Simple data types

The simple data types defined in table 5.36.5.4.2-1 shall be supported.

Table 5.36.5.4.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

5.36.6 Used Features

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

Table 5.36.6-1: Features used by ECSAddress API

Feature number	Feature Name	Description

5.36.7 Error handling

5.36.7.1 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.

5.36.7.2 Protocol Errors

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

5.36.7.3 Application Errors

The application errors defined for ECSAddress API are listed in table 5.36.7.3-1.

Table 5.36.7.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

6 Security

TLS shall be used to support the security communication between the NEF and the AF over NEF Northbound interface as defined in 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: 1.3.0-alpha.4
  description: |
    API for AF traffic influence
    © 2023, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.522 V18.4.0; 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'

delete:
  summary: Deletes an already existing subscription
  operationId: DeleteAnSubscription
  tags:
    - Individual Traffic Influence Subscription
  responses:
    '204':
      description: No Content (Successful deletion of the existing subscription)
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'

```

```

'400':
  $ref: 'TS29122_CommonData.yaml#/components/responses/400'
'401':
  $ref: 'TS29122_CommonData.yaml#/components/responses/401'
'403':
  $ref: 'TS29122_CommonData.yaml#/components/responses/403'
'404':
  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
'429':
  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'

```

components:

```

securitySchemes:
  oAuth2ClientCredentials:
    type: oauth2
    flows:
      clientCredentials:
        tokenUrl: '{tokenUrl}'
        scopes: {}

```

schemas:

```

TrafficInfluSub:
  description: Represents a traffic influence subscription.
  type: object
  properties:
    afServiceId:
      type: string
      description: Identifies a service on behalf of which the AF is issuing the request.
    afAppId:
      type: string
      description: Identifies an application.
    afTransId:
      type: string
      description: Identifies an NEF Northbound interface transaction, generated by the AF.
    appReloInd:
      type: boolean
      description: >
        Identifies whether an application can be relocated once a location of
        the application has been selected.
    dnn:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
    snssai:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
    externalGroupId:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/ExternalGroupId'
    externalGroupIds:
      type: array
      items:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/ExternalGroupId'
      minItems: 1
      description: Each element identifies a group of users.
    extSubscCats:
      type: array
      items:
        type: string
      minItems: 1
    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.
  sfcIdDl:
    type: string
    description: >
      Reference to a pre-configured steering of user traffic to service function chain in
      downlink.
  sfcIdUl:
    type: string
    description: >
      Reference to a pre-configured steering of user traffic to service function chain in
      uplink.
  metadata:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Metadata'
  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
candDnaiInd:
  type: boolean
  description: >
    Indication of reporting candidate DNAI(s). If it is included and set to "true", the
    candidate DNAI(s) for the PDU session need to be reported. Otherwise set to "false" or
    omitted.
tfcCorreInfo:
  $ref: 'TS29519_Application_Data.yaml#/components/schemas/TrafficCorrelationInfo'
plmnId:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/PlmnId'
portNumber:
  $ref: 'TS29122_CommonData.yaml#/components/schemas/Port'
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.
sfcIdDl:
type: string
description: >
  Reference to a pre-configured steering of user traffic to service function chain in
  downlink.
nullable: true
sfcIdUl:
type: string
description: >
  Reference to a pre-configured steering of user traffic to service function chain in
  uplink.
nullable: true
metadata:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/Metadata'
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'
tfcCorreInfo:
  $ref: 'TS29519_Application_Data.yaml#/components/schemas/TrafficCorrelationInfo'
```

```

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'
    candidateDnais:
      type: array
      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnai'
      minItems: 1
      description: The candidate DNAI(s) for the PDU Session.
    candDnaisPrioInd:
      type: boolean
      description: >
        If provided and set to true, it indicates that the candidate DNAs provided
        in the candidateDnais attribute are in descending priority order, i.e.,
        the lower the array index the higher the priority of the respective DNAI.
        If omitted, the default value is false.
    easRediscoverInd:
      type: boolean
      description: >
        Indication of EAS re-discovery. If present and set to "true", it indicates the EAS
        re-discovery is performed, e.g. due to change of common EAS. Default value is "false" if
        omitted. May be included for event "UP_PATH_CHANGE".
    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: |
    Represents the type of UP path management events for which the AF requests to be notified.
    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: |
    Represents the status of application handling result.
    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: 1.2.0-alpha.6
  description: |
    API for Analytics Exposure.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.522 V18.5.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'

security:
  - {}
  - oAuth2ClientCredentials: []

servers:
  - url: '{apiRoot}/3gpp-analyticsexposure/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in 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: 'TS29122_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.

websockNotifConfig:

\$ref: 'TS29122_CommonData.yaml#/components/schemas/WebsockNotifConfig'

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

termCause:

\$ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/TermCause'

required:

- notifId

- analyEventNotifs

```

AnalyticsEventNotif:
  description: Represents an analytics event to be reported.
  type: object
  properties:
    analyEvent:
      $ref: '#/components/schemas/AnalyticsEvent'
    expiry:
      $ref: 'TS29122_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
    dataVlTrnsTmIfs:
      type: array
      items:
        $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/E2eDataVolTransTimeInfo'
      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
    movBehavInfos:
      type: array
      items:
        $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/MovBehavInfo'
      minItems: 1
    wlanInfos:
      type: array
      items:
        $ref: '#/components/schemas/WlanPerformInfo'
      minItems: 1
    relProxInfos:
      type: array

```

```

    items:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/RelProxInfo'
    minItems: 1
  start:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'
  timeStampGen:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'
  locArea:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea5G'
  pauseInd:
    type: boolean
    description: >
      Pause analytics consumption indication. Set to "true" to indicate the consumer to stop
      the consumption of the analytics. Default value is "false" if omitted.
  resumeInd:
    type: boolean
    description: >
      Resume analytics consumption indication. Set to "true" to indicate the consumer to
      resume the consumption of the analytics. Default value is "false" if omitted.
  accuInfo:
    $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/AccuracyInfo'
  nsiLoadLevelData:
    type: array
    items:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/NsiLoadLevelInfo'
    minItems: 1
  required:
    - analyEvent
    - timeStamp

AnalyticsEventSubsc:
  description: Represents a subscribed analytics event.
  type: object
  properties:
    analyEvent:
      $ref: '#/components/schemas/AnalyticsEvent'
    analyEventFilter:
      $ref: '#/components/schemas/AnalyticsEventFilterSubsc'
    tgtUe:
      $ref: '#/components/schemas/TargetUeId'
  required:
    - analyEvent

AnalyticsEventFilterSubsc:
  description: Represents an analytics event filter.
  type: object
  properties:
    nwPerfReqs:
      type: array
      items:
        $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/NetworkPerfRequirement'
      minItems: 1
    locArea:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea5G'
    fineGranAreas:
      type: array
      items:
        $ref: 'TS29522_AMPolicyAuthorization.yaml#/components/schemas/GeographicalArea'
      minItems: 1
      description: Indicates the fine granularity areas to which the subscription applies.
    temporalGranSize:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
    spatialGranSizeTa:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
    spatialGranSizeCell:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
    appIds:
      type: array
      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/ApplicationId'
      minItems: 1
    dnn:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
    dnns:
      type: array
      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
      minItems: 1

```

```

dnais:
  type: array
  items:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnai'
  minItems: 1
dataVlTrnsTmRqs:
  type: array
  items:
    $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/E2eDataVolTransTimeReq'
  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'
snssais:
  type: array
  items:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
  minItems: 1
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
dataVlTrnsTmReqs:
  type: array
  items:
    $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/E2eDataVolTransTimeReq'
  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
  wlanReqs:
    type: array
    items:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/WlanPerformanceReq'
  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
  pduSesInfos:
    type: array
    items:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/PduSessionInfo'
  minItems: 1
  ueCommReqs:
    type: array
    items:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/UeCommReq'
  minItems: 1
  userDataConOrderCri:
    $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/UserDataConOrderCrit'
  locGranularity:
    $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/LocInfoGranularity'
  locOrientation:
    $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/LocationOrientation'
  ueMobilityReqs:
    type: array
    items:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/UeMobilityReq'
  minItems: 1
  movBehavReqs:
    type: array
    items:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/MovBehavReq'
  minItems: 1
  relProxReqs:
    type: array
    items:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/RelProxReq'
  minItems: 1
  useCaseCxt:
    type: string
    description: >
      Indicates the context of usage of the analytics. The value and format of this parameter
      are not standardized.
  pauseFlg:
    type: boolean
    description: >
      Pause analytics consumption flag. Set to "true" to indicate the NWDAF to stop sending
      the notifications of analytics. Default value is "false" if omitted.
  resumeFlg:
    type: boolean
    description: >
      Resume analytics consumption flag. Set to "true" to indicate the NWDAF to resume sending
      the notifications of analytics. Default value is "false" if omitted.
  accuReq:
    $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/AccuracyReq'
  feedback:
    $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/AnalyticsFeedbackInfo'

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
    directionInfos:
      type: array
      items:
        $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/DirectionInfo'
      minItems: 1
  required:
    - duration
    - locInfo

UeLocationInfo:
  description: Represents a UE location information.
  type: object
  properties:
    loc:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea5G'
    geoLoc:
      $ref: 'TS29522_AMPolicyAuthorization.yaml#/components/schemas/GeographicalArea'
    ratio:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SamplingRatio'
    confidence:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
    geoDistrInfos:
      type: array
      items:
        $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/GeoDistributionInfo'
      minItems: 1
  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'
    fineGranAreas:
```



```

    type: array
    items:
      $ref: 'TS29522_AMPolicyAuthorization.yaml#/components/schemas/GeographicalArea'
    minItems: 1
    description: Indicates the fine granularity areas to which the request applies.
  temporalGranSize:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
  spatialGranSizeTa:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
  spatialGranSizeCell:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
  dnn:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
  dnns:
    type: array
    items:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
    minItems: 1
  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'
  snssais:
    type: array
    items:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
    minItems: 1
  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
  bwRequ:
    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
  wlanReqs:
    type: array
    items:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/WlanPerformanceReq'
    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
  pduSesInfos:
    type: array
    items:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/PduSessionInfo'
    minItems: 1
  ueCommReqs:
    type: array
    items:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/UeCommReq'
    minItems: 1
  userDataConReq:
    $ref: 'TS29520_Nnwdaf_AnalyticsInfo.yaml#/components/schemas/UserDataCongestReq'
  locGranularity:
    $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/LocInfoGranularity'
  locOrientation:
    $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/LocationOrientation'
  ueMobilityReqs:
    type: array
    items:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/UeMobilityReq'
    minItems: 1
  movBehavReqs:
    type: array
    items:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/MovBehavReq'
    minItems: 1
  useCaseCxt:
    type: string
    description: >
      Indicates the context of usage of the analytics. The value and format of this parameter
      are not standardized.
  accuReq:
    $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/AccuracyReq'
  relProxReqs:
    type: array
    items:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/RelProxReq'
    minItems: 1

AnalyticsData:
  description: Represents analytics data.
  type: object
  properties:
    start:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'
    expiry:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'
    timeStampGen:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'
    ueMobilityInfos:
      type: array
      items:
        $ref: '#/components/schemas/UeMobilityExposure'
      minItems: 1
    ueCommInfos:
      type: array
      items:
        $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/UeCommunication'
      minItems: 1
    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
  dataVlTrnsTmInfos:
    type: array
    items:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/E2eDataVolTransTimeInfo'
    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
  movBehavInfos:
    type: array
    items:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/MovBehavInfo'
    minItems: 1
  wlanInfos:
    type: array
    items:
      $ref: '#/components/schemas/WlanPerformInfo'
    minItems: 1
  accuInfo:
    $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/AccuracyInfo'
  relProxInfos:
    type: array
    items:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/RelProxInfo'
    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'
  anaPeriod:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
  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'
  rscUsgReq:
    $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/ResourceUsageRequirement'
  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

```

```

QoS Sustainability Exposure:
  description: Represents a QoS sustainability information.
  type: object
  properties:
    locArea:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea5G'
    fineAreaInfos:
      type: array
      items:
        $ref: 'TS29522_AMPolicyAuthorization.yaml#/components/schemas/GeographicalArea'
      minItems: 1
      description: This attribute contains the geographical locations in a fine granularity.
    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

Wlan Perform Info:
  description: The WLAN performance related information.
  type: object
  properties:
    locArea:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea5G'
    wlanPerSsidInfos:
      type: array
      items:
        $ref:
'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/WlanPerSsidPerformanceInfo'
      minItems: 1
    wlanPerUeIdInfos:
      type: array
      items:
        $ref:
'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/WlanPerUeIdPerformanceInfo'
      minItems: 1
      description: >
        WLAN performance information for UE Id(s) of WLAN access points deployed in the Area
        of Interest.
  required:
    - wlanPerSsidInfos

Analytics Failure Event Info:
  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

Analytics Event:
  anyOf:
    - type: string
  enum:
    - UE_MOBILITY
    - UE_COMM
    - ABNORMAL_BEHAVIOR
    - CONGESTION
    - NETWORK_PERFORMANCE
    - QOS_SUSTAINABILITY

```

```

- DISPERSION
- DN_PERFORMANCE
- SERVICE_EXPERIENCE
- E2E_DATA_VOL_TRANS_TIME
- MOVEMENT_BEHAVIOUR
- RELATIVE_PROXIMITY
- WLAN_PERFORMANCE
- NS_LOAD_LEVEL
- 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: |
  Represents the analytics event that is subscribed or notified.
  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.
- E2E_DATA_VOL_TRANS_TIME: The AF requests to be notified about analytics information of
  E2E data volume transfer time.
- MOVEMENT_BEHAVIOUR: The AF requests to be notified about analytics information of
  Movement Behaviour.
- RELATIVE_PROXIMITY: The AF requests to be notified about analytics information of
  Relative Proximity.
- WLAN_PERFORMANCE: Indicates that the event subscribed is the Wlan Performance
  information.
- NS_LOAD_LEVEL: Indicates that the event subscribed is load level information of Network
  Slice.

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: |
  Identifies the failure reason.
  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: 1.2.0-alpha.4
description: |
  API for 5G LAN Parameter Provision.
  © 2023, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
  All rights reserved.
```

```
externalDocs:
  description: >
    3GPP TS 29.522 V18.3.0; 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: '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:
    - 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'
callbacks:
  5GLANParamProvNotif:
    '{request.body#/notifUri}':
      post:
        requestBody:
          required: true
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/5GLanParamProvNotif'
        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'

/{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'
  gpsi:
    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
    description: >
      This attribute shall contain at most 2 array elements. It is however kept
      defined as it is (i.e. with a cardinality of "1..N") for backward
      compatibility considerations.
  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.
  vnGroupCommInd:
    type: boolean
    description: >
      Indicates whether the 5G VN group is associated with 5G VN group communication when
      When set to "true", it indicates that the 5G VN group is associated with 5G VN group
      communication. When set to "false", it indicates that the 5G VN group is not
      associated with 5G VN group communication. The default value when omitted is "false".

```

```

maxGrpDataRateInfo:
  $ref: '#/components/schemas/MaxGrpDataRateInfo'
cpParams:
  $ref: '#/components/schemas/CpParams'
npConfigParams:
  $ref: '#/components/schemas/NpConfigParams'
lpiParams:
  $ref: '#/components/schemas/LpiParams'
acsParams:
  $ref: '#/components/schemas/AcsParams'
ecsAddrParams:
  $ref: '#/components/schemas/ECSAddrParams'
dnnSnssaiParams:
  $ref: '#/components/schemas/DnnSnssaiParams'
notifUri:
  $ref: 'TS29122_CommonData.yaml#/components/schemas/Link'
requestTestNotification:
  type: boolean
  description: >
    Set to true to request 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'
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.
  cpParams:
    $ref: '#/components/schemas/CpParams'
  npConfigParams:
    $ref: '#/components/schemas/NpConfigParams'
  lpiParams:
    $ref: '#/components/schemas/LpiParams'
  acsParams:
    $ref: '#/components/schemas/AcsParams'
  ecsAddrParams:
    $ref: '#/components/schemas/ECSAddrParams'
  dnnSnssaiParams:
    $ref: '#/components/schemas/DnnSnssaiParams'
  notifUri:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/Link'

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.

MaxGrpDataRateInfo:

description: >
Represents the Maximum Group Data Rate related information.

type: object

properties:

maxGrpDataRateUl:

\$ref: 'TS29571_CommonData.yaml#/components/schemas/BitRate'

maxGrpDataRateDl:

\$ref: 'TS29571_CommonData.yaml#/components/schemas/BitRate'

anyOf:

- required: [maxGrpDataRateUl]
- required: [maxGrpDataRateDl]

CpParams:

description: Represents Communication Pattern parameters.

type: object

properties:

cpParameterSets:

type: object

additionalProperties:

\$ref: 'TS29122_CpProvisioning.yaml#/components/schemas/CpParameterSet'

minProperties: 1

description: >
Contains one or more set(s) of CP parameters information for the 5G VN group.
Any string value may be used as a key of the map.

cpReports:

type: object

additionalProperties:

\$ref: 'TS29122_CpProvisioning.yaml#/components/schemas/CpReport'

minProperties: 1

description: >
Contains the identifier(s) of the set(s) of CP parameters for which the provided CP parameters are not added or modified successfully with the corresponding failure reason.
Each element provides the related information for one or more CP set identifier(s).
The key of the map is a string representing the failure identifier.

readOnly: true

required:

- cpParameterSets

NpConfigParams:

description: Represents Network Parameters Configuration information.

type: object

properties:

maximumLatency:

\$ref: 'TS29122_CommonData.yaml#/components/schemas/DurationSec'

maximumResponseTime:

\$ref: 'TS29122_CommonData.yaml#/components/schemas/DurationSec'

suggestedNumberOfDlPackets:

type: integer

minimum: 0

description: >
Contains the number of packets that the serving gateway shall buffer in case the UE is not reachable.

groupReportingGuardTime:

\$ref: 'TS29122_CommonData.yaml#/components/schemas/DurationSec'

validityTime:

\$ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'

```
LpiParams:
  description: Represents Location Privacy Indication parameters.
  type: object
  properties:
    lpi:
      $ref: 'TS29503_Nudm_SDM.yaml#/components/schemas/Lpi'
  required:
    - lpi

AcsParams:
  description: Represents ACS configuration parameters.
  type: object
  properties:
    acsInfo:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/AcsInfo'
  required:
    - acsInfo

ECSAddrParams:
  description: Represents ECS address configuration parameters.
  type: object
  properties:
    ecsServerAddr:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/EcsServerAddr'
    spatialValidityCond:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SpatialValidityCond'
  required:
    - ecsServerAddr

DnnSnssaiParams:
  description: Represents DNN and S-NSSAI specific Group Parameters.
  type: object
  properties:
    defQos:
      $ref: 'TS29522_GroupParametersProvisioning.yaml#/components/schemas/AfReqDefaultQoS'
    ladnServArea:
      $ref: 'TS29522_GroupParametersProvisioning.yaml#/components/schemas/LadnServArea'
  anyOf:
    - required: [ defQos ]
    - required: [ ladnServArea ]

5GLanParamProvNotif:
  description: Represents a 5G LAN Parameter Provisioning Event Notification.
  type: object
  properties:
    npConfigNotif:
      $ref: '#/components/schemas/NpConfigNotif'

NpConfigNotif:
  description: Represents a Network Parameters Configuration related notification.
  type: object
  properties:
    configResults:
      type: array
      items:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/ConfigResult'
      minItems: 1
    appliedParam:
      $ref: 'TS29122_MonitoringEvent.yaml#/components/schemas/AppliedParameterConfiguration'

AaaUsage:
  anyOf:
    - type: string
      enum:
        - AUTH
        - IP_ALLOC
    - type: string
      description: >
        This string provides forward-compatibility with future extensions to the enumeration
        and is not used to encode content defined in the present version of this API.
  description: |
    Represents the usage of the DN-AAA server.
    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: '#/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: 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: 1.2.0-alpha.1
  description: |
    API for IPTV configuration.
    © 2023, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.522 V18.1.0; 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: '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: 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: |
    Represents the access right status for parameter provision.
    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: 1.2.0-alpha.1
  description: |
    API for Location Privacy Indication Parameters Provisioning.
    © 2023, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.522 V18.1.0; 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: 1.2.0-alpha.6
  description: |
    API for AF service paramter
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.522 V18.5.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'

security:
  - {}
  - oAuth2ClientCredentials: []

servers:
  - url: '{apiRoot}/3gpp-service-parameter/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in 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 non-roaming UE. This attribute,
        when provided, shall set to "true" if applicable for any UE, otherwise, set to "false".
    roamUeNetDescs:
      type: array
      items:
        $ref: '#/components/schemas/NetworkDescription'
      minItems: 1
      description: Each element identifies one or more PLMN IDs of inbound roamers.
    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
      description: >
        Identifies the AF subscribed event(s) notifications related to AF provisioned
        service parameters.
    notificationDestination:
      $ref: 'TS29122_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'
  paramForProSeU2URelUe:
    $ref: '#/components/schemas/ParamForProSeU2URelUe'
  paramForProSeEndUe:
    $ref: '#/components/schemas/ParamForProSeEndUe'
  paramForRangingSlPos:
    $ref: '#/components/schemas/ParamForRangingSlPos'
  mappingInfo:
    $ref: '#/components/schemas/MappingInfo'
  urspGuidance:
    type: array
    items:
      $ref: '#/components/schemas/UrspRuleRequest'
    minItems: 1
    description: Contains the service parameter used to guide the URSP.
  a2xParamsPc5:
    $ref: '#/components/schemas/A2xParamsPc5'
  tnaps:
    type: array
    items:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/TnapId'
    minItems: 1
    description: Contains the TNAP IDs collocated with the 5G-RG(s) of a specific user.
  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'
  paramForProSeU2URelUe:
    $ref: '#/components/schemas/ParamForProSeU2URelUeRm'
  paramForProSeEndUe:
    $ref: '#/components/schemas/ParamForProSeEndUeRm'
  paramForRangingSlPos:
    $ref: '#/components/schemas/ParamForRangingSlPosRm'
  mappingInfo:
    $ref: '#/components/schemas/MappingInfoRm'
  urspGuidance:
    type: array
    items:
      $ref: '#/components/schemas/UrspRuleRequest'
    minItems: 1
    description: Contains the service parameter used to guide the URSP.
  a2xParamsPc5:

```

```
  $ref: '#/components/schemas/A2xParamsPc5Rm'
tnaps:
  type: array
  items:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/TnapId'
  minItems: 1
  description: Contains the TNAP IDs collocated with the 5G-RG(s) of a specific user.
  nullable: true
subNotifEvents:
  type: array
  items:
    $ref: '#/components/schemas/Event'
  minItems: 1
  nullable: true
  description: >
    Identifies the AF subscribed event(s) notifications related to AF provisioned
    service parameters.
notificationDestination:
  $ref: 'TS29122_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 Remote 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

ParamForProSeU2URelUe:
description: Represents the service parameters for 5G ProSe UE-to-UE relay UE.
type: string

ParamForProSeU2URelUeRm:
description: >
This data type is defined in the same way as the ParamForProSeU2URelay data type,
but with the OpenAPI nullable property set to true.
type: string
nullable: true

ParamForProSeEndUe:
description: Represents the service parameters for 5G ProSe End UE.
type: string

ParamForProSeEndUeRm:
description: >
This data type is defined in the same way as the ParamForProSeEndUe data type,
but with the OpenAPI nullable property set to true.
type: string
nullable: true

ParamForRangingSlPos:
description: Represents the service parameters for ranging and sidelink positioning.
type: string

ParamForRangingSlPosRm:
description: >
This data type is defined in the same way as the ParamForRangingslpos data type,
but with the OpenAPI nullable property set to true.
type: string
nullable: true

A2xParamsPc5:
description: >
Represents configuration parameters for A2X communications over PC5 reference point.
type: string

A2xParamsPc5Rm:
description: >
Represents the same as the A2xParamsPc5 data type but with the nullable:true property.
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'
visitedNetDescs:
type: array
items:
\$ref: '#/components/schemas/NetworkDescription'
minItems: 1
description: >
Each element identifies one or more PLMN IDs where AF guidance for VPLMN-specific
URSP rule applies.
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.
  pduSessType:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/PduSessionType'

Event:
  anyOf:
  - type: string
    enum:
      - SUCCESS_UE_POL_DEL_SP
      - UNSUCCESS_UE_POL_DEL_SP
  - type: string
    description: >
      This string provides forward-compatibility with future extensions to the enumeration
      and is not used to encode content defined in the present version of this API.
  description: |
    Represents the AF subscribe to event notification of the outcome related to the
    invocation of AF provisioned service parameters.
    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.
    pinId:
      type: string
      description: This is matched against a PIN ID for a specific PIN configured in the PEGC.
  oneOf:
    - required: [pinId]
    - anyOf:
      - required: [appDescs]
      - required: [flowDescs]
      - required: [domainDescs]
      - required: [ethFlowDescs]
      - required: [dnns]
      - required: [connCaps]

NetworkDescription:
  description: >
    Represents the description of a PLMN, by the definition of the PLMN ID, the MCC (and
    applicable MNC(s)) or the indication of any PLMN.
  type: object
  properties:
    plmnId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/PlmnId'
    mcc:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Mcc'

```



```

    mncs:
      type: array
      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Mnc'
      minItems: 1
      description: Represents the applicable MNC(s) for the indicated MCC.
    anyPlmnInd:
      type: boolean
      description: Indicates any PLMN.
  oneOf:
    - required: [plmnId]
    - required: [mcc]
    - required: [anyPlmnInd]

AuthorizationResult:
  anyOf:
    - type: string
      enum:
        - AUTH_REVOKED
    - type: string
      description: >
        This string provides forward-compatibility with future extensions to the enumeration
        and is not used to encode content defined in the present version of this API.
  description: |
    Represents the NEF notify the AF about the service parameters authorization updates result,
    e.g. to revoke an authorization.
    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'
    plmnId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/PlmnIdNid'

MappingInfo:
  description: >
    Contains the mapping information between the Application Layer ID and the GPSI.
  type: object
  properties:
    appLayerId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/ApplicationlayerId'
    gpsi:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
  required:
    - appLayerId
    - gpsi

MappingInfoRm:
  description: >
    This data type is defined in the same way as the MappingInfo data type but with the OpenAPI
    nullable property set to true.
  type: object
  properties:
    appLayerId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/ApplicationlayerId'
    gpsi:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
  nullable: true
  required:
    - appLayerId
    - gpsi

Failure:
  oneOf:
    - type: string
      enum:
        - UNSPECIFIED
        - UE_NOT_REACHABLE
        - UNKNOWN
        - UE_TEMP_UNREACHABLE
    - type: string
      description: >
        This string provides forward-compatibility with future extensions to the enumeration
        and is not used to encode content defined in the present version of this API.

```

```

description: |
  Represents the failure reason for the unsuccessful result.
  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 and is not used to encode
      content defined in the present version of this API.
  description: |
    Represents the information provided by a UE application when it requests a network
    connection with certain capabilities.
    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 ACSPParameterProvision 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
'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: 1.2.0-alpha.1
  description: |
    API for UE updated location information notification.
    © 2023, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
externalDocs:
  description: >
    3GPP TS 29.522 V18.3.0; 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'
        additionalLocInfo:
          type: array
          items:
            $ref: 'TS29122_MonitoringEvent.yaml#/components/schemas/LocationInfo'
          minItems: 1
      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: 1.1.0-alpha.1
  description: |
    API for AKMA.
    © 2023, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).

```



```
All rights reserved.
externalDocs:
  description: >
    3GPP TS 29.522 V18.3.0; 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:
            nef-akma:gpsi-access: >
              Return GPSI in the AKMA Application Key information for the UE.
  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: 1.1.0-alpha.6
  description: |
    API for time synchronization exposure.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.522 V18.5.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'

security:
- {}
- oAuth2ClientCredentials: []

servers:
- url: '{apiRoot}/3gpp-time-sync/v1'
  variables:
    apiRoot:
      default: https://example.com
      description: apiRoot as defined in 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: CreateNewConfirguation
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: 'TS29122_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: 'TS29122_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
    oneOf:
      - required: [gpsis]
      - required: [anyUeInd]
      - required: [externalGroupId]

  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'
    description: >
      Indicates whether user plane node supports acting as a gPTP and/or PTP grandmaster.
  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: 'TS29122_CommonData.yaml#/components/schemas/Uri'
    tempValidity:
      $ref: 'TS29514_Npcf_PolicyAuthorization.yaml#/components/schemas/TemporalValidity'
    coverageArea:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SpatialValidityCond'
    clkQltDetLvl:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/ClockQualityDetailLevel'
    clkQltAcptCri:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/ClockQualityAcceptanceCriterion'
  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
      description: >
        Notifications about subscribed Individual Events.
  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
 description: >
 Contains a list of time synchronization capabilities for the UE(s).
 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
 description: >
 Contains the reported PTP capabilities for the UE.
 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
 description: >
 Indicates the PTP instance type(s).
 transProtocols:
 type: array
 items:
 \$ref: '#/components/schemas/Protocol'
 minItems: 1
 description: >
 Indicates the transport protocol type(s).
 ptpProfiles:
 type: array
 items:
 type: string
 minItems: 1
 description: >
 Identifies the supported PTP profiles.

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
    description: Identifies the PTP profile.
  portConfigs:
    type: array
    items:
      $ref: '#/components/schemas/ConfigForPort'
    minItems: 1
    description: >
      Contains the configurations for the PTP port(s) in the PTP instance.
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
    description: >
      Indicates the N6 termination which the parameters below apply.
  ptpEnable:
    type: boolean
    description: >
      This is used to set the portDS.portEnable. If omitted, the default value as described
      in the PTP Profile is used.
  logSyncInter:
    type: integer
    description: >
      Specifies the mean time interval between successive Sync messages.
  logSyncInterInd:
    type: boolean
    description: >
      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].
  logAnnouInter:
    type: integer
    description: >
      Specifies the mean time interval between successive Announce messages.
  logAnnouInterInd:
    type: boolean
    description: >
      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].
oneOf:
- required: [gpsi]
- required: [n6Ind]

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.
  clkQltIndOfNwtt:
    $ref: '#/components/schemas/AcceptanceCriteriaResultIndication'
  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.
    clkQltIndOfDstt:
      $ref: '#/components/schemas/AcceptanceCriteriaResultIndication'
  required:
    - gpsi
    - state

Protocol:
  anyOf:
    - type: string
      enum:
        - ETH
        - IPV4
        - IPV6
    - type: string
      description: >
        This string provides forward-compatibility with future extensions to the enumeration
        and is not used to encode content defined in the present version of this API.
  description: |
    Identifies the supported protocol.
    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 provides forward-compatibility with future extensions to the enumeration
        and is not used to encode content defined in the present version of this API.
  description: |
    Identifies the supported grandmaster.
    Possible values are:
    - GPTP: gPTP grandmaster is supported.
    - PTP: PTP grandmaste is supported.

InstanceType:
  anyOf:
    - type: string
      enum:
        - BOUNDARY_CLOCK
        - E2E_TRANS_CLOCK
        - P2P_TRANS_CLOCK
        - P2P_RELAY_INSTANCE
    - type: string
      description: >
        This string provides forward-compatibility with future extensions to the enumeration
        and is not used to encode content defined in the present version of this API.
  description: |
    Identifies the supported PTP instance type.
    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 provides forward-compatibility with future extensions to the enumeration
        and is not used to encode content defined in the present version of this API.
      description: |
        Identifies the supported event.
        Possible values are:
        - AVAILABILITY_FOR_TIME_SYNC_SERVICE: 5GS and/or UE availability and capability 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 provides forward-compatibility with future extensions to the enumeration
        and is not used to encode content defined in the present version of this API.
      description: |
        Identifies the supported 5G clock quality.
        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.

AcceptanceCriteriaResultIndication:
  anyOf:
    - type: string
      enum:
        - ACCEPTABLE
        - NON_ACCEPTABLE
    - type: string
      description: >
        Contains the acceptable/not acceptable indication of the clock quality acceptance criteria
        result information.
      description: |
        Identifies the supported acceptable / not acceptable indication.
        Possible values are:
        - ACCEPTABLE: PTP port in (g)PTP service meets the clock quality acceptance criteria.
        - NON_ACCEPTABLE: PTP port in (g)PTP service does not meet the clock quality acceptance
        criteria.

```

A.14 EcsAddressProvision API

openapi: 3.0.0

info:

```

title: 3gpp-ecs-address-provision
version: 1.1.0-alpha.3
description: |
  API for ECS Address Provisioning.
  © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
  All rights reserved.

```

externalDocs:


```
description: >
  3GPP TS 29.522 V18.5.0; 5G System; Network Exposure Function Northbound APIs.
url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'

security:
- {}
- oAuth2ClientCredentials: []

servers:
- url: '{apiRoot}/3gpp-ecs-address-provision/v1'
  variables:
    apiRoot:
      default: https://example.com
      description: apiRoot as defined in 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: '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:
        - 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'
      mtcProviderId:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/MtcProviderInformation'
      spatialValidityCond:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/SpatialValidityCond'
      tgtUe:
        $ref: 'TS29522_AnalyticsExposure.yaml#/components/schemas/TargetUeId'
      plmnId:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/PlmnIdNid'
      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: 1.1.0-alpha.1
  description: |
    AMInfluence API Service.
    © 2023, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
externalDocs:
  description: >
    3GPP TS 29.522 V18.2.0; 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".
      roamUePlmnIds:
        type: array
        items:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/PlmnId'
        minItems: 1
        description: >
          Indicates a list of PLMNs representing the home PLMN for the inbound roaming
          UEs.
      dnnSnsaiInfos:
        type: array
        items:
          $ref: '#/components/schemas/DnnSnsaiInformation'
        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]
      - required: [roamUePlmnIds]

```



```

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: 1.1.0-alpha.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 V18.4.0; 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':
        description: >
          The request is rejected by the NEF and more details (along with ProblemDetails) may be
          returned.
        content:
          application/problem+json:
            schema:
              $ref: '#/components/schemas/ProblemDetailsTmgiAlloc'
      '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
      websocketNotifConfig:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/WebsocketNotifConfig'
      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

ReducedMbsServArea:
  description: >
    Represents the reduced MBS Service Area information.
  type: object
  properties:
    reducedMbsServArea:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/MbsServiceArea'
    reducedExtMbsServArea:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/ExternalMbsServiceArea'
  oneOf:
    - required: [reducedMbsServArea]
    - required: [reducedExtMbsServArea]

ProblemDetailsTmgiAlloc:
  description: >
    Represents an extension to the ProblemDetails data structure with additional error
    information related to TMGI Allocation.
  allOf:
    - $ref: 'TS29122_CommonData.yaml#/components/schemas/ProblemDetails'
    - $ref: '#/components/schemas/ReducedMbsServArea'

```

A.18 MBSSession API

openapi: 3.0.0

```

info:
  title: 3gpp-mbs-session
  version: 1.2.0-alpha.3
  description: |
    API for MBS Session Management.
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    All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.522 V18.5.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'

servers:
  - url: '{apiRoot}/3gpp-mbs-session/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in clause 4.4 of 3GPP TS 29.501

security:
  - {}
  - oAuth2ClientCredentials: []

paths:
  /mbs-sessions:
    post:
      summary: 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':
    description: >
      The request is rejected by the NEF and more details (along with ProblemDetails) may be
      returned.
    content:
      application/problem+json:
        schema:
          $ref: 'TS29522_MBSTMGI.yaml#/components/schemas/ProblemDetailsTmgiAlloc'
  '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:
      '200':
        description: >
          OK. The Individual MBS Session was successfully updated and MBS Session update related
          information shall be returned in the response body.
        content:

```

```

    application/json:
      schema:
        $ref: '#/components/schemas/MbsSessionUpdateResp'
  '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

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      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
    mtcProviderId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/MtcProviderInformation'
    mbsSessAuthData:
      $ref: '#/components/schemas/MbsSessAuthData'
    mbsSessAssistInfo:
      $ref: '#/components/schemas/MbsSessAssistInfo'
    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 GPSSI(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'
    mbsSessAssistInfo:
      $ref: '#/components/schemas/MbsSessAssistInfo'
```

```
MbsSessAssistInfo:
  description: >
    Represents the MBS Session Assistance information.
  type: object
  properties:
    mbsSessAssistData:
      type: array
      items:
        $ref: 'TS29503_Nudm_PP.yaml#/components/schemas/MbsAssistanceInfo'
      minItems: 1
  required:
    - mbsSessAssistData
```

```
MbsSessionUpdateResp:
  description: >
    Represents the parameters to be returned in an MBS Session update response during
    partial success.
  type: object
  properties:
    reducedMbsServArea:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/MbsServiceArea'
    reducedExtMbsServArea:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/ExternalMbsServiceArea'
  not:
    required: [reducedMbsServArea, reducedExtMbsServArea]
```

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

A.19 EASDeployment API

openapi: 3.0.0

```
info:
  title: 3gpp-eas-deployment
  version: 1.1.0-alpha.3
  description: |
```

API for AF provisioned EAS Deployment.
© 2023, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
All rights reserved.

```
externalDocs:
  description: >
    3GPP TS 29.522 V18.4.0; 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: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '406':
          $ref: 'TS29122_CommonData.yaml#/components/responses/406'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'

    post:
      summary: Create a new Individual EAS Deployment information resource.
      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.
    targetAfId:
      type: string
      description: >
        Identifier of the AF that is responsible for the EAS associated with this EAS
        deployment information.
    suppFeat:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  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: 1.1.0-alpha.3
  description: |
    API for ASTI.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

```

```

externalDocs:
  description: >
    3GPP TS 29.522 V18.5.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'

```

```

security:
  - {}
  - oAuth2ClientCredentials: []

```

```

servers:
  - url: '{apiRoot}/3gpp-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'
  callbacks:

```

```

astiNotification:
  '{$request.body#/astiNotifUri}':
    post:
      requestBody:
        description: Notification of an ASTI configuration change event.
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/AstiConfigNotification'
      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}/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/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/{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'
    coverageArea:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SpatialValidityCond'
    suppFeat:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
    astiNotifUri:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
    astiNotifId:
      type: string
      description: Notification correlation identifier.
  required:
    - asTimeDisParam
  oneOf:
    - required: [gpsis]
    - required: [interGrpId]

AstiConfigNotification:
  description: >
    Contains the report of a change in the 5G Access Stratum Time Distribution
parameters applied to the UE(s).
  type: object
  properties:
    astiNotifId:
      type: string
      description: >
        It is used to set the value of Notification Correlation ID in the
        corresponding notification
    stateConfigs:
      type: array
      items:
        $ref: '#/components/schemas/AstiConfigStateNotification'
      minItems: 1
      description: >
        It contains the reported event(s) and event information.
  required:
    - astiNotifId
    - stateConfigs

AstiConfigStateNotification:
  description: >
    Contains the report of a change in the 5G Access Stratum Time Distribution
parameters applied to a UE.

```

```

    type: object
    properties:
      gpsi:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
      event:
        $ref: 'TS29565_Ntsctsf_ASTI.yaml#/components/schemas/AstiEvent'
    required:
      - event
      - gpsi

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:
      - gpsis

StatusResponseData:
  description: >
    Contains the parameters for the status of the access stratum time distribution for a list of
    UEs.
  type: object
  properties:
    inactiveUes:
      type: array
      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
      minItems: 1
    activeUes:
      type: array
      items:
        $ref: '#/components/schemas/ActiveUe'
      minItems: 1

ActiveUe:
  description: >
    Contains the UE identifier whose status of the access stratum time distribution is active
    and the optional requested time synchronization error budget.
  type: object
  properties:
    gpsi:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
    timeSyncErrBdgt:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'

```

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_Ndcap_DataReportingProvisioning.yaml#/components/schemas/DataReportingConfiguration'
    responses:
      '201':
        description: Created. Successful creation of a new Data Reporting Configuration.
        content:
          application/json:
            schema:
              $ref:
' TS26532_Ndcap_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: 1.1.0-alpha.2
description: |
  API for UE ID service.
  © 2023, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
  All rights reserved.

```

externalDocs:

```

description: 3GPP TS 29.522 V18.4.0; 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'
        portNumber:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Port'
        snssai:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
        ueIpAddr:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/IpAddr'
        ueMacAddr:

```

```

    $ref: 'TS29571_CommonData.yaml#/components/schemas/MacAddr48'
  suppFeat:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  required:
  - afId
  oneOf:
  - required: [ueIpAddr]
  - required: [ueMacAddr]

  UeIdInfo:
    description: Represents UE ID information.
    type: object
    properties:
      externalId:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/ExternalId'
      suppFeat:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
    required:
    - externalId

```

A.24 MBSUserService API

openapi: 3.0.0

```

info:
  title: 3gpp-mbs-us
  version: 1.1.0-alpha.1
  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 V18.1.0; 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_Nmbssf_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_Nmbmf_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_Nmbmf_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_Nmbssf_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_Nmbfsf_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_Nmbfsf_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: 1.1.0-alpha.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 V18.3.0; 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_Nmbsf_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_Nmbsf_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_Nmbsf_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_Nmbsf_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_Nmbssf_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_Nmbssf_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_Nmbssf_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: RetrieveMBSUserDataIngestStatSubscs

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_Nmbssf_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_Nmbssf_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_Nmbfsf_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: 1.1.0-alpha.1
description: |
  API for Media Streaming Event Exposure.
  © 2023, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
  All rights reserved.
```

externalDocs:

```
description: >
  3GPP TS 29.522 V18.1.0; 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
#
```

A.27 MBSGroupMsgDelivery API

openapi: 3.0.0

```
info:
  title: 3gpp-mbs-group-msg
  version: 1.0.0-alpha.5
  description: |
    API for MBS Group Message Delivery.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
```

```
externalDocs:
  description: >
    3GPP TS 29.522 V18.5.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'
```

```
security:
  - {}
  - oAuth2ClientCredentials: []
```

```
servers:
  - url: '{apiRoot}/3gpp-mbs-group-msg/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in clause 5.2.4 of 3GPP TS 29.122.
```

```
paths:
  /deliveries:
    get:
      summary: Retrieve all the active MBS Group Message Deliveries.
      operationId: GetMbsGroupMsgDeliveries
      tags:
        - MBS Group Message Deliveries (Collection)
      responses:
        '200':
          description: >
            OK. All the active MBS Group Message Deliveries managed by the NEF are returned.
          content:
            application/json:
              schema:
                type: array
                items:
                  $ref: '#/components/schemas/MbsGroupMsgDel'
                minItems: 0
        '307':
          $ref: '#/components/responses/307'
        '308':
          $ref: '#/components/responses/308'
        '400':
          $ref: '#/components/responses/400'
        '401':
          $ref: '#/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 an MBS Group Message Delivery.
  operationId: CreateMbsGroupMsgDelivery
  tags:
    - MBS Group Message Deliveries (Collection)
  requestBody:
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/MbsGroupMsgDel'
  responses:
    '201':
      description: >
        Created. Successful case. The requested MBS Group Message Delivery is successfully
        created.
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/MbsGroupMsgDel'
      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:
  MbsGroupMsgDelStatusNotif:
    '{$request.body#/notifUri}':
      post:
        requestBody:
          description: >
            Represents the notification on the status of MBS Group Message Delivery.
          required: true
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/MbsGroupMsgDelStatusNotif'
        responses:
          '204':
            description: >

```



```

    No content. The MBS Group Message Delivery Status 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'

/deliveries/{delRef}:
  parameters:
    - name: delRef
      in: path
      description: >
        Contains the identifier of the Individual MBS Group Message Delivery resource.
      required: true
      schema:
        type: string

  get:
    summary: Retrieve an existing MBS Group Message Delivery.
    operationId: GetMbsGroupMsgDelivery
    tags:
      - Individual MBS Group Message Delivery (Document)
    responses:
      '200':
        description: >
          OK. All the requested MBS Group Message Delivery is successfully returned.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/MbsGroupMsgDel'
      '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: Request the modification of an existing MBS Group Message Delivery.

```

```
operationId: ModifyMbsGroupMsgDelivery
tags:
  - Individual MBS Group Message Delivery (Document)
requestBody:
  required: true
  content:
    application/merge-patch+json:
      schema:
        $ref: '#/components/schemas/MbsGroupMsgDelPatch'
responses:
  '200':
    description: >
      OK. Successful case. The MBS Group Message Delivery is successfully modified and a
      representation of the updated resource is returned in the response body.
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/MbsGroupMsgDel'
  '204':
    description: >
      No Content. Successful case. The MBS Group Message Delivery 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: Request the deletion of an existing Individual MBS Group Message Delivery resource.

operationId: DeleteMbsGroupMsgDelivery

tags:

- Individual MBS Group Message Delivery (Document)

responses:

```
'204':
  description: >
    No Content. The targeted MBS Group Message Delivery 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

MbsGroupMsgDel:
  description: Represents the MBS Group Message Delivery.
  type: object
  properties:
    afId:
      type: string
    extGroupId:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/ExternalGroupId'
    payload:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/Bytes'
    mbsServArea:
      $ref: '#/components/schemas/MbsServArea'
    startTime:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'
    endTime:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'
    notifUri:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
    delStatus:
      type: boolean
      description: >
        Indicates the status of Group Message Delivery.
        true indicates a successful delivery.
        false indicates a failed delivery.
    mbsUserServAnmt:
      $ref: 'TS26517_MBSUserServiceAnnouncement.yaml#/components/schemas/UserServiceDescription'
    servAreaWithoutMbs:
      $ref: '#/components/schemas/MbsServArea'
    suppFeat:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  required:
    - extGroupId
    - mbsServArea
    - startTime
    - endTime
    - notifUri

MbsGroupMsgDelPatch:
  description: Represents the requested modifications to an existing MBS Group Message Delivery.
  type: object
  properties:
    gpayload:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/Bytes'
    mbsServArea:
      $ref: '#/components/schemas/MbsServArea'
    startTime:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'
    endTime:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'
    notifUri:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'

MbsGroupMsgDelStatusNotif:
  description: Represents the status notification information for an MBS group message delivery.
  type: object
  properties:
    delStatus:
      type: boolean
      description: >
        Indicates the status of Group Message Delivery.
        true indicates a successful delivery.
        false indicates a failed delivery.
  required:
    - delStatus

```

```
# SIMPLE DATA TYPES
#
#
# ENUMERATIONS
#
# Data types describing alternative data types or combinations of data types

MbsServArea:
  description: Represents an MBS Service Area.
  oneOf:
    - $ref: 'TS29571_CommonData.yaml#/components/schemas/MbsServiceArea'
    - $ref: 'TS29571_CommonData.yaml#/components/schemas/ExternalMbsServiceArea'
```

A.28 DNAIMapping API

openapi: 3.0.0

```
info:
  title: 3gpp-dnaimapping
  version: 1.0.0-alpha.4
  description: |
    API for DNAI Mapping.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.522 V18.5.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'

security:
  - {}
  - oAuth2ClientCredentials: []

servers:
  - url: '{apiRoot}/3gpp-dnai-mapping/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:
        - DNAI Mapping 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/DnaiMapSub'
                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:
    - DNAI Mapping 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/DnaiMapSub'
  callbacks:
    notification:
      '{request.body#/notifUri}':
        post:
          requestBody: # contents of the callback message
            required: true
            content:
              application/json:
                schema:
                  $ref: '#/components/schemas/DnaiMapUpdateNotif'
  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/DnaiMapSub'
  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 DNAI Mapping 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/DnaiMapSub'
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '406':
        $ref: 'TS29122_CommonData.yaml#/components/responses/406'
      '429':
        $ref: 'TS29122_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29122_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29122_CommonData.yaml#/components/responses/503'

```

```

    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'

delete:
  summary: Deletes an already existing subscription
  operationId: DeleteAnSubscription
  tags:
    - Individual Dnai Mapping 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:
  DnaiMapSub:
    description: Represents a DNAI Mapping subscription.
    type: object
    properties:
      easIpAddrs:
        type: array
        items:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/IpAddr'
        minItems: 1
        description: >
          IP address(es) of the EASs in the Local part of the DN or the IP address ranges(IPv4
          subnetwork(s) and/or IPv6 prefix(es) of the Local part of the DN where the EAS is
          deployed.
      fqdns:
        type: array
        items:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Fqdn'
        minItems: 1
        description: FQDN(s) where the EAS(s) is/are deployed.
      dnn:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
      snssai:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'

```

```

eventReq:
  $ref: 'TS29523_Npcf_EventExposure.yaml#/components/schemas/ReportingInformation'
immReport:
  type: array
  items:
    $ref: 'TS29519_Application_Data.yaml#/components/schemas/DnaiEasInfo'
  minItems: 1
  description: DNAI EAS mapping information.
notifUri:
  $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
notifCorrId:
  type: string
  description: Notification correlation identifier.
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'
oneOf:
  - required: [easIpAddrs]
  - required: [fqdn]
required:
  - notifUri
  - notifCorrId

DnaiMapUpdateNotif:
  description: Represents an updated DNAI Mapping notification.
  type: object
  properties:
    dnaiEasAddrMap:
      type: array
      items:
        $ref: 'TS29519_Application_Data.yaml#/components/schemas/DnaiEasInfo'
      minItems: 1
      description: >
        Contains the mapping information between DNAI(s) and EAS address(es).
    notifCorrId:
      type: string
      description: Notification correlation identifier.
  required:
    - dnaiEasAddrMap
    - notifCorrId

```

A.29 PDTQPolicyNegotiation API

openapi: 3.0.0

```

info:
  title: 3gpp-pdtq-policy-negotiation
  version: 1.0.0-alpha.3
  description: |
    API for PDTQ policy negotiation.
    © 2023, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.522 V18.4.0; 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-pdtq-policy-negotiation/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
      description: String identifying the AF.
      in: path
      required: true
      schema:
        type: string

  get:
    summary: Fetches all active PDTQ policy subscription resources for a given AF.
    operationId: FetchAllActivePDTQSubscriptions
    tags:
      - PDTQ Policy Subscriptions
    responses:
      '200':
        description: OK, all active PDTQ policy subscriptions resources returned.
        content:
          application/json:
            schema:
              type: array
              items:
                $ref: '#/components/schemas/Pdtq'
              minItems: 1
            description: Contains individual PDTQ policy subscriptions.
      '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 PDTQ policy subscription resource.
    operationId: CreatePDTQSubscription
    tags:
      - PDTQ Policy Subscriptions
    requestBody:
      description: Contains the data to create a PDTQ Policy Subscription.
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/Pdtq'
    responses:
      '201':
        description: >
          An Individual PDTQ Policy Subscription resource is created and a representation
          of that resource is returned.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/Pdtq'
        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:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'
callbacks:
  PDTQWarningNotification:
    '{$request.body#/notificationDestination}':
      post:
        requestBody:
          required: true
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/Notification'
        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'

/{afId}/subscriptions/{subscriptionId}:
  parameters:
    - name: afId
      description: String identifying the AF.
      in: path
      required: true
      schema:
        type: string
    - name: subscriptionId
      description: String identifying the individual PDTQ policy resource in the NEF.
      in: path
      required: true
      schema:
        type: string

  get:
    summary: Read a PDTQ subscription resource.
    operationId: FetchIndPDTQSubscription

```

```

tags:
- Individual PDTQ Policy Subscription
responses:
'200':
  description: >
    OK, a representation of an Individual Policy Subscription resource is returned.
  content:
    application/json:
      schema:
        $ref: '#/components/schemas/Pdtq'
'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: Modifies an existing PDTQ policy subscription resource.
operationId: ModifyIndPDTQSubscription
tags:
- Individual PDTQ Policy Subscription
requestBody:
  description: Contains modifications to be performed on the Pdtq data structure.
  required: true
  content:
    application/merge-patch+json:
      schema:
        $ref: '#/components/schemas/PdtqPatch'
responses:
'200':
  description: >
    The Individual PDTQ Policy Subscription resource is modified and a representation
    of that resource is returned.
  content:
    application/json:
      schema:
        $ref: '#/components/schemas/Pdtq'
'204':
  description: The Individual PDTQ Policy Subscription resource is 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: Delete a PDTQ policy subscription resource.
  operationId: DeleteIndPDTQSubscription
  tags:
    - Individual PDTQ Policy Subscription
  responses:
    '204':
      description: The Individual PDTQ Policy Subscription resource is 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:

```
Pdtq:
  description: Represents a PDTQ Policy Subscription.
  type: object
  properties:
    altQosParamSets:
      type: array
      items:
        $ref: 'TS29543_Npcf_PDTQPolicyControl.yaml#/components/schemas/AltQosParamSet'
      minItems: 1
      description: >
        Contains the alternative QoS requirements as a list of individual QoS parameter
        sets in a prioritized order.
    altQosRefs:
      type: array
      items:
        type: string
      minItems: 1
      description: >
        Contains the alternative QoS requirements as the list of QoS references in a
        prioritized order.
    appId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/ApplicationId'
    aspId:
      description: Contains an identity of an application service provider.
      type: string
    desTimeInts:
      type: array
      items:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
      minItems: 1
      description: Identifies the time interval(s).
    locationArea5G:
```

```

    $ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea5G'
notificationDestination:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/Link'
numberOfUEs:
    type: integer
    description: Identifies the number of UEs.
pdtqPolicies:
    type: array
    items:
        $ref: 'TS29543_Npcf_PDTQPolicyControl.yaml#/components/schemas/PdtqPolicy'
    minItems: 1
    description: Contains the PDTQ policies.
qosParamSet:
    $ref: 'TS29543_Npcf_PDTQPolicyControl.yaml#/components/schemas/QosParameterSet'
qosReference:
    type: string
    description: >
        Requested QoS requirements expressed as the QoS Reference which represents
        a pre-defined QoS information.
referenceId:
    $ref: 'TS29543_Npcf_PDTQPolicyControl.yaml#/components/schemas/PdtqReferenceId'
selectedPolicy:
    type: integer
    description: >
        Identity of the selected PDTQ policy. Shall not be present in initial message
        exchange, can be provided by NF service consumer in a subsequent message exchange.
self:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/Link'
supportedFeatures:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
warnNotifEnabled:
    type: boolean
    description: >
        Indicates whether the PDTQ warning notification is enabled (true) or not (false).
        Default value is false.
required:
    - aspId
    - desTimeInts
    - numberOfUEs
oneOf:
    - required: [qosReference]
    - required: [qosParamSet]

PdtqPatch:
description: Represents the modification of an individual PDTQ policy subscription.
type: object
properties:
    selectedPolicy:
        type: integer
        description: Identity of the selected PDTQ policy.
    warnNotifEnabled:
        type: boolean
        description: >
            Indicates whether the PDTQ warning notification is enabled (true) or not (false).
notificationDestination:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/Link'

Notification:
description: Represents a PDTQ notification.
type: object
properties:
    pdtqRefId:
        $ref: 'TS29543_Npcf_PDTQPolicyControl.yaml#/components/schemas/PdtqReferenceId'
    candPolicies:
        type: array
        items:
            $ref: 'TS29543_Npcf_PDTQPolicyControl.yaml#/components/schemas/PdtqPolicy'
        minItems: 1
        description: >
            This IE indicates a list of the candidate PDTQ policies from which the AF may select
            a new PDTQ policy due to network performance or DN performance degradation.
required:
    - pdtqRefId
    - candPolicies

```

A.30 MemberUESelectionAssistance API

openapi: 3.0.0

info:

```
title: 3gpp-musa
version: 1.0.0-alpha.3
description: |
  API for Member UE Selection Assistance.
  © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
  All rights reserved.
```

externalDocs:

```
description: >
  3GPP TS 29.522 V18.5.0; 5G System; Network Exposure Function Northbound APIs.
url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'
```

servers:

```
- url: '{apiRoot}/3gpp-musa/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
    operationId: ReadAllSubscriptions
    tags:
      - Member UE Selection Assistance Subscription
    responses:
      '200':
        description: OK.
        content:
          application/json:
            schema:
              type: array
              items:
                $ref: '#/components/schemas/MemUeSelectAssistSubsc'
      '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 Member UE Selection Assistance.
    operationId: CreateMemberUESelectionAssistanceSubscription
    tags:
```

```

- Member UE Selection Assistance Subscription
requestBody:
  required: true
  content:
    application/json:
      schema:
        $ref: '#/components/schemas/MemUeSelectAssistSubsc'
responses:
  '201':
    description: Create a new Individual Member UE Selection Assistance Subscription resource.
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/MemUeSelectAssistSubsc'
    headers:
      Location:
        description: >
          Contains the URI of the newly created resource, according to the structure
          {apiRoot}/3gpp-musa/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#/notifUri}':
      post:
        requestBody:
          required: true
          content:
            application/json:
              schema:
                type: array
                items:
                  $ref: '#/components/schemas/MemUeSeletAssistNotif'
                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.
      operationId: ReadSubscription
      tags:
        - Individual Member UE Selection Assistance Subscription
      responses:
        '200':
          description: OK (Successful get the active subscription).
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/MemUeSelectAssistSubsc'
        '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.
      operationId: UpdateSubscription
      tags:
        - Individual Member UE Selection Assistance Subscription
      requestBody:
        description: Parameters to replace the existing subscription.
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/MemUeSelectAssistSubsc'
      responses:
        '200':
          description: OK (Successful update of the subscription).
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/MemUeSelectAssistSubsc'
        '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: Modifyan existing subscription resource
operationId: ModifySubscription
tags:
  - Individual Traffic Influence Subscription
requestBody:
  required: true
  content:
    application/merge-patch+json:
      schema:
        $ref: '#/components/schemas/MemUeSelectAssistSubscPatch'

```

responses:

```

'200':
  description: OK. The subscription was modified successfully.
  content:
    application/json:
      schema:
        $ref: '#/components/schemas/MemUeSelectAssistSubsc'
'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.
operationId: DeleteSubscription
tags:

```

```

- Individual Member UE Selection Assistance 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:
    MemUeSelectAssistSubsc:
      description: Represents an Member UE Selection Assistance Subscription.
      type: object
      properties:
        afId:
          type: string
          description: The AF Identifier.
        tgtUeIds:
          type: array
          items:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
          minItems: 1
          description: >
            Identifies the GPSIs of a list of UEs for Member UE Selection Assistance Reporting.
        tgtUeIps:
          type: array
          items:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/IpAddr'
          minItems: 1
          description: >
            Identifies the IP addresses of a list of UEs for Member UE Selection Assistance Reporting.
        notifUri:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
        notifId:
          type: string
        expTime:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'
        qosFilters:
          type: array
          items:
            $ref: '#/components/schemas/QoSFilterCriteria'
          minItems: 1
          description: The QoS filtering criteria for Member UE selection.
        accRatTypeFilters:
          type: array
          items:
            $ref: '#/components/schemas/AccessRatTypeFilterCriteria'
          minItems: 1
          description: The Access types and Rat types filtering criteria for Member UE selection.
        e2eTransTimeFilters:
          type: array
          items:
            $ref: '#/components/schemas/E2ETransTimeFilterCriteria'
          minItems: 1

```

```

description: >
  The End-to-end data volume transfer time filtering criteria for Member UE selection.
ueLocFilters:
  type: array
  items:
    $ref: '#/components/schemas/UeLocFilterCriteria'
  minItems: 1
  description: The UE location filtering criteria for Member UE selection.
ueHisLocFilters:
  type: array
  items:
    $ref: '#/components/schemas/UeHisLocFilterCriteria'
  minItems: 1
  description: The UE historical location filtering criteria for Member UE selection.
ueDirFilters:
  type: array
  items:
    $ref: '#/components/schemas/UeDirectionFilterCriteria'
  minItems: 1
  description: The UE direction filtering criteria for Member UE selection.
ueDistanceFilters:
  type: array
  items:
    $ref: '#/components/schemas/UeDistanceFilterCriteria'
  minItems: 1
  description: The UE distance filtering criteria for Member UE selection.
serviceExpFilters:
  type: array
  items:
    $ref: '#/components/schemas/ServiceExpFilterCriteria'
  minItems: 1
  description: The Service Experience filtering criteria for Member UE selection.
dnnFilters:
  type: array
  items:
    $ref: '#/components/schemas/DnnFilterCriteria'
  minItems: 1
  description: The DNN filtering criteria for Member UE selection.
memUpdatePeriod:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
maxUeNum:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
timeWin:
  $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
suppFeat:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
required:
  - notifUri
  - notifId
oneOf:
  - required: [tgtUeIds]
  - required: [tgtUeIps]
anyOf:
  - required: [qosFilters]
  - required: [accRatTypeFilters]
  - required: [e2eTransTimeFilters]
  - required: [ueLocFilters]
  - required: [ueHisLocFilters]
  - required: [ueDirFilters]
  - required: [ueDistanceFilters]
  - required: [serviceExpFilters]
  - required: [dnnFilters]

QoSFilterCriteria:
description: The QoS filtering criteria for Member UE selection.
type: object
properties:
  event:
    $ref: 'TS29508_Nsmf_EventExposure.yaml#/components/schemas/SmfEvent'
  appId:
    type: string
    description: Identifies an application.
  dnn:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
  snssai:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
  ulDelay:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'

```

```

dlDelay:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
rtDelay:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'

AccessRatTypeFilterCriteria:
  description: The Access types and Rat types filtering criteria for Member UE selection.
  type: object
  properties:
    events:
      type: array
      items:
        $ref: 'TS29508_Nsmf_EventExposure.yaml#/components/schemas/SmfEvent'
      minItems: 1
      description: >
        Indicates the SMF event(s) which may be used to retrieve the Access Type and/or RAT Type
        of the selected UE.
    dnn:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
    snssai:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
    accTypes:
      type: array
      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/AccessType'
      minItems: 1
      description: Indicates the Access Types of the selected UE.
    ratTypes:
      type: array
      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/RatType'
      minItems: 1
      description: Indicate the RAT Types of the selected UE.

E2ETransTimeFilterCriteria:
  description: >
    The End-to-end data volume transfer time filtering criteria for Member UE selection.
  type: object
  properties:
    event:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/NwdafEvent'
    appId:
      type: string
      description: Identifies an application.
    dnn:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
    snssai:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
    dataVolTransTime:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/DataVolumeTransferTime'
    geoDistrInfos:
      type: array
      items:
        $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/GeoDistributionInfo'
      minItems: 1
    locationArea:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea5G'
    numDataTrans:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
    timeInterval:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/DurationSec'

UeLocFilterCriteria:
  description: The UE location filtering criteria for Member UE selection.
  type: object
  properties:
    event:
      $ref: 'TS29518_Namf_EventExposure.yaml#/components/schemas/AmfEventType'
    loc:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea5G'

UeHisLocFilterCriteria:
  description: The UE historical location filtering criteria for Member UE selection.
  type: object
  properties:
    event:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/NwdafEvent'
    loc:

```

```

    $ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea5G'

UeDirectionFilterCriteria:
  description: The UE direction filtering criteria for Member UE selection.
  type: object
  properties:
    event:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/NwdafEvent'
    directions:
      type: array
      items:
        $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/Direction'
      minItems: 1
      description: Indicates the moving directions of the UEs.

UeDistanceFilterCriteria:
  description: The UE distance filtering criteria for Member UE selection.
  type: object
  properties:
    event:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/NwdafEvent'
    distance:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'

ServiceExpFilterCriteria:
  description: The Service Experience filtering criteria for Member UE selection.
  type: object
  properties:
    event:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/NwdafEvent'
    dnn:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
    snssai:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
    appId:
      type: string
      description: Identifies an application.
    dnai:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnai'
    loc:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea5G'
    contribWeightThr:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
    expTypes:
      type: array
      items:
        $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/ServiceExperienceType'
      minItems: 1
      description: Indicates the Service Experience Types.

DnnFilterCriteria:
  description: The DNN filtering criteria for Member UE selection.
  type: object
  properties:
    event:
      $ref: 'TS29508_Nsmf_EventExposure.yaml#/components/schemas/SmfEvent'
    dnn:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'

MemUeSeletAssistNotif:
  description: Represents a Member UE Selection Assistance notification.
  type: object
  properties:
    notifId:
      type: string
    candiUeInfos:
      type: array
      items:
        $ref: '#/components/schemas/CandiUeInfo'
      minItems: 1
      description: >
        Identifies the lists of candidate UEs information for Member Selection Assistance Reporting.
    memUeSelectRpts:
      type: array
      items:
        $ref: '#/components/schemas/MemUeSeletReport'
      minItems: 1

```

```
    description: Identifies the list of UEs for Member Selection Assistance Reporting.
  required:
  - notifId
  - candiUeInfos

MemUeSeletReport:
  description: Indicates the Member UE selection report.
  type: object
  properties:
    criterionType:
      $ref: '#/components/schemas/FilterCriterionType'
    numForCriterion:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
  required:
  - criterionType
  - numForCriterion

CandiUeInfo:
  description: Identifies the list of candidate UEs information.
  type: object
  properties:
    candUeIds:
      type: array
      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
      minItems: 1
    candUeIps:
      type: array
      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/IpAddr'
      minItems: 1
    remdTimeWin:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
  oneOf:
  - required: [candUeIds]
  - required: [candUeIps]

MemUeSelectAssistSubscPatch:
  description: Represents an Member UE Selection Assistance Subscription.
  type: object
  properties:
    notifUri:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
    notifId:
      type: string
    expTime:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'
    qosFilters:
      type: array
      items:
        $ref: '#/components/schemas/QoSFilterCriteria'
      minItems: 1
      description: The QoS filtering criteria for Member UE selection.
    accRatTypeFilters:
      type: array
      items:
        $ref: '#/components/schemas/AccessRatTypeFilterCriteria'
      minItems: 1
      description: The Access types and Rat types filtering criteria for Member UE selection.
    e2eTransTimeFilters:
      type: array
      items:
        $ref: '#/components/schemas/E2ETransTimeFilterCriteria'
      minItems: 1
      description: >
        The End-to-end data volume transfer time filtering criteria for Member UE selection.
    ueLocFilters:
      type: array
      items:
        $ref: '#/components/schemas/UeLocFilterCriteria'
      minItems: 1
      description: The UE location filtering criteria for Member UE selection.
    ueHisLocFilters:
      type: array
      items:
        $ref: '#/components/schemas/UeHisLocFilterCriteria'
      minItems: 1
      description: The UE historical location filtering criteria for Member UE selection.
```

```

ueDirFilters:
  type: array
  items:
    $ref: '#/components/schemas/UeDirectionFilterCriteria'
  minItems: 1
  description: The UE direction filtering criteria for Member UE selection.
ueDistanceFilters:
  type: array
  items:
    $ref: '#/components/schemas/UeDistanceFilterCriteria'
  minItems: 1
  description: The UE distance filtering criteria for Member UE selection.
serviceExpFilters:
  type: array
  items:
    $ref: '#/components/schemas/ServiceExpFilterCriteria'
  minItems: 1
  description: The Service Experience filtering criteria for Member UE selection.
dnnFilters:
  type: array
  items:
    $ref: '#/components/schemas/DnnFilterCriteria'
  minItems: 1
  description: The DNN filtering criteria for Member UE selection.
memUpdatePeriod:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
maxUeNum:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/UIntegerRm'
timeWin:
  $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
nullable: true

FilterCriterionType:
  anyOf:
  - type: string
  - enum:
    - QOS
    - ACCESS_RAT_TYPE
    - E2E_DATA_VOLUME_TRANSFER_TIME
    - UE_LOCATION
    - UE_HISTORICAL_LOCATION
    - UE_DIRECTION
    - UE_DISTANCE
    - SERVICE_EXPERIENCE
    - DNN
  - type: string
  description: >
    This string provides forward-compatibility with future extensions to the enumeration and
    is not used to encode content defined in the present version of this API.
  description: |
    Represents the filter criterion event
    Possible values are:
    - QOS: Indicates QoS criterion.
    - ACCESS_RAT_TYPE: Indicates Access and Rat types criterion.
    - E2E_DATA_VOLUME_TRANSFER_TIME: Indicates End-to-end data volume transfer time criterion.
    - UE_LOCATION: Indicates UE location criterion.
    - UE_HISTORICAL_LOCATION: Indicates UE historical location criterion.
    - UE_DIRECTION: Indicates UE direction criterion.
    - UE_DISTANCE: Indicates UE distance criterion.
    - SERVICE_EXPERIENCE: Indicates the Service Experience criterion.
    - DNN: Indicates the DNN criterion.

```

A.31 GroupParametersProvisioning API

openapi: 3.0.0

info:

```

title: 3gpp-grp-pp
version: 1.0.0-alpha.2
description: |
  API for Group Parameters Provisioning.
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  All rights reserved.

```

```

externalDocs:
  description: >

```

3GPP TS 29.522 V18.5.0; 5G System; Network Exposure Function Northbound APIs.
url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'

```
servers:
- url: '{apiRoot}/3gpp-grp-pp/v1'
  variables:
    apiRoot:
      default: https://example.com
      description: apiRoot as defined in clause 4.4 of 3GPP TS 29.501

security:
- {}
- oAuth2ClientCredentials: []

paths:
  /pp:
    get:
      summary: Request to retrieve all the active Group Parameters Provisioning resources at the NEF.
      operationId: GetGrpParamsProvisionings
      tags:
        - Group Parameters Provisionings (Collection)
      responses:
        '200':
          description: >
            OK. All the active Group Parameters Provisioning resources managed by the NEF are
            returned.
          content:
            application/json:
              schema:
                type: array
                items:
                  $ref: '#/components/schemas/GrpPpData'
                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 Group Parameters Provisioning.
      tags:
        - Group Parameters Provisioning (Collection)
      operationId: CreateGrpParamsProvisioning
      requestBody:
        description: >
          Representation of the new Group Parameters Provisioning to be created at the NEF.
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/GrpPpData'
      responses:
        '201':
          description: >
            Created. Successful creation of a new Individual Group Parameters Provisioning resource.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/GrpPpData'
          headers:
```



```

    Location:
      description: >
        Contains the URI of the newly created resource, according to the structure
        {apiRoot}/3gpp-grp-pp/v1/pp/{ppId}
      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'

/pp/{ppId}:
  parameters:
    - name: ppId
      in: path
      description: >
        Represents the identifier of the Individual Group Parameters Provisioning resource.
      required: true
      schema:
        type: string

get:
  summary: Request to retrieve an existing Individual Group Parameters Provisioning resource.
  operationId: GetIndGrpParamsProvisioning
  tags:
    - Individual Group Parameters Provisioning (Document)
  responses:
    '200':
      description: >
        OK. Successful retrieval of the requested Individual Group Parameters Provisioning
        resource.
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/GrpPpData'
    '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 Group Parameters Provisioning resource.
tags:
  - Individual Group Parameters Provisioning (Document)
operationId: UpdateIndGrpParamsProvisioning
requestBody:
  description: >
    Represents the updated Individual Group Parameters Provisioning resource representation.
  required: true
  content:
    application/json:
      schema:
        $ref: '#/components/schemas/GrpPpData'
responses:
  '200':
    description: >
      OK. The Individual Group 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/GrpPpData'
  '204':
    description: >
      No Content. The Individual Group Parameters Provisioning 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 Group Parameters Provisioning
resource.
tags:
  - Individual Group Parameters Provisioning (Document)
operationId: ModifyIndGrpParamsProvisioning
requestBody:
  description: >
    Contains the parameters to request the modification of the Individual Group Parameters
    Provisioning resource.
  required: true
  content:
    application/merge-patch+json:
      schema:
        $ref: '#/components/schemas/GrpPpDataPatch'
responses:
  '200':
    description: >
      OK. The Individual Group 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/GrpPpData'
  '204':
    description: >

```

No Content. The Individual Group Parameters Provisioning 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: Request the deletion of an existing Individual Group Parameters Provisioning resource.

tags:

- Individual Group Parameters Provisioning (Document)

operationId: DeleteIndGrpParamsProvisioning

responses:

```
'204':
  description: >
    No Content. The Individual Group 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

#

GrpPpData:

description: Represents the Group Parameters Provisioning data.

type: object

properties:

afId:

```

    type: string
    mtcProviderId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/MtcProviderInformation'
    dnnSnssaiGrpData:
      $ref: '#/components/schemas/DnnSnssaiGrpData'
    suppFeat:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  required:
    - afId

GrpPpDataPatch:
  description: >
    Represents the requested modification to the existing Group Parameters Provisioning data
    instance.
  type: object
  properties:
    dnnSnssaiGrpData:
      $ref: '#/components/schemas/DnnSnssaiGrpData'

DnnSnssaiGrpData:
  description: Represents DNN and S-NSSAI specific Group Parameters data.
  type: object
  properties:
    extGroupId:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/ExternalGroupId'
    dnn:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
    snssai:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
    defQos:
      $ref: '#/components/schemas/AfReqDefaultQoS'
    ladnServArea:
      $ref: '#/components/schemas/LadnServArea'
  required:
    - extGroupId
    - dnn
    - snssai
  anyOf:
    - required: [ defQos ]
    - required: [ ladnServArea ]

AfReqDefaultQoS:
  description: Represents the AF requested default QoS.
  type: object
  properties:
    5qi:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/5Qi'
    arp:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Arp'
    priorityLevel:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/5QiPriorityLevelRm'
  required:
    - 5qi
    - arp

LadnServArea:
  description: Represents an LADN Service Area.
  type: object
  properties:
    geographicAreas:
      type: array
      items:
        $ref: 'TS29572_Nlmf_Location.yaml#/components/schemas/GeographicArea'
      minItems: 1
    civicAddresses:
      type: array
      items:
        $ref: 'TS29572_Nlmf_Location.yaml#/components/schemas/CivicAddress'
      minItems: 1
    tais:
      type: array
      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Tai'
      minItems: 1
  oneOf:
    - required: [ geographicAreas ]
    - required: [ civicAddresses ]
    - required: [ tais ]

```

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

A.32 SliceParamProvision API

openapi: 3.0.0

info:

```
title: Slice Parameters Provisionings
version: 1.0.0-alpha.3
description: |
  API for Slice Parameters Provisionings.
  © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
  All rights reserved.
```

externalDocs:

```
description: >
  3GPP TS 29.522 V18.5.0; 5G System; Network Exposure Function Northbound APIs.
url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'
```

security:

```
- {}
- oAuth2ClientCredentials: []
```

servers:

```
- url: '{apiRoot}/3gpp-slice-pp/v1'
  variables:
    apiRoot:
      default: https://example.com
      description: apiRoot as defined in clause 5.2.4 of 3GPP TS 29.122.
```

paths:

```
/pp:
  get:
    summary: Request to retrieve all the active Slice Parameters Provisionings
      resources at the NEF.
    operationId: GetSliceParamProvisionings
    tags:
      - Slice Parameters Provisionings (Collection)
    responses:
      '200':
        description: >
          OK. All the active Slice Parameters Provisioning resources managed by the
          NEF are returned.
        content:
          application/json:
            schema:
              type: array
              items:
                $ref: '#/components/schemas/SlicePpData'
              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: '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 Slice Parameters Provisioning.
  tags:
    - Slice Parameters Provisionings (Collection)
  operationId: CreateSliceParamProvisioning
  requestBody:
    description: >
      Representation of the new Slice Parameters Provisioning to be created at
      the NEF.
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/SlicePpData'
  responses:
    '201':
      description: >
        Created. Successful creation of a new Individual Slice Parameters
        Provisioning resource.
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/SlicePpData'
      headers:
        Location:
          description: >
            Contains the URI of the newly created resource, according to the structure
            {apiRoot}/3gpp-slice-pp/v1/pp/{ppId}
          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'

/PP/{ppId}:
  parameters:
    - name: ppId
      in: path
      description: >
        Represents the identifier of the Individual Slice Parameters
        Provisioning resource.
      required: true
      schema:
        type: string

get:
  summary: Request to retrieve an existing Individual Slice Parameters
  Provisioning resource.
  operationId: GetIndSliceParamProvisioning
  tags:
    - Individual Slice Usage Control Parameters Provisioning (Document)
  responses:

```

```

'200':
  description: >
    OK. Successful retrieval of the requested Individual Slice
    Parameters Provisioning resource.
  content:
    application/json:
      schema:
        $ref: '#/components/schemas/SlicePpData'
'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 to update an existing Individual Slice Parameters
  Provisioning resource.
  tags:
    - Individual Slice Parameters Provisioning (Document)
  operationId: UpdateIndSliceParamProvisioning
  requestBody:
    description: >
      Represents the updated Individual Slice Parameters Provisioning
      resource representation.
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/SlicePpData'
  responses:
    '200':
      description: >
        OK. The Individual Slice 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/SlicePpData'
    '204':
      description: >
        No Content. The Individual Slice Parameters Provisioning 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 Slice Parameters Provisioning resource.

tags:

- Individual Slice Parameters Provisioning (Document)

operationId: ModifyIndSliceParamProvisioning

requestBody:

```

description: >
  Contains the requested modifications to the Individual Slice Parameters
  Provisioning resource.
required: true
content:
  application/merge-patch+json:
    schema:
      $ref: '#/components/schemas/SlicePpDataPatch'

```

responses:

```

'200':
  description: >
    OK. The Individual Slice 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/SlicePpData'
'204':
  description: >
    No Content. The Individual Slice Parameters Provisioning 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: Request the deletion of an existing Individual Slice Parameters Provisioning resource.

tags:

- Individual Slice Parameters Provisioning (Document)

operationId: DeleteIndSliceParamProvisioning

responses:

```

'204':
  description: >
    No Content. The Individual Slice 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
#
  SlicePpData:
    description: Represents the Slice Parameters Provisioning data.
    type: object
    properties:
      afId:
        type: string
      mtcProviderId:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/MtcProviderInformation'
      sliceUsgCtrlData:
        type: object
        additionalProperties:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SliceUsageControlInfo'
        minProperties: 1
        description: >
          Contains the Network Slice Usage Control information to be provisioned.
          The key of the map shall be the AF dedicated S-NSSAI to which the Network Slice Usage
          Control information is related and that is provided within the snssai attribute of the
          corresponding map value encoded via the SliceUsageControlInfo data structure.
      suppFeat:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
    required:
      - afId

  SlicePpDataPatch:
    description: >
      Represents the requested modifications to an existing Slice Parameters
      Provisioning data.
    type: object
    properties:
      sliceUsgCtrlData:
        type: object
        additionalProperties:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SliceUsageControlInfo'
        minProperties: 1
        description: >
          Contains the updated Network Slice Usage Control information to be provisioned.
          The key of the map shall be the AF dedicated S-NSSAI to which the Network Slice Usage
          Control information are related and that is provided within the snssai attribute of the
          corresponding map value encoded via the SliceUsageControlInfo data structure.

#
# SIMPLE DATA TYPES
#

#
# ENUMERATIONS
#

```

A.33 UEAddress API

```
openapi: 3.0.0

info:
  title: 3gpp-ue-address
  version: 1.0.0-alpha.1
  description: |
    API for UE Address service.
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    All rights reserved.

externalDocs:
  description: 3GPP TS 29.522 V18.4.0; 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-ue-address/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 UE Address.
      operationId: RetrieveUEAddress
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/UeAddressReq'
      responses:
        '200':
          description: The requested information was returned successfully.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/UeAddressInfo'
        '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:
  UeAddressReq:
    description: Represents the parameters to request the retrieval of UE Address.
    type: object
    properties:
      afId:
        type: string
      gpsi:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
      suppFeat:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
    required:
      - afId
      - gpsi

  UeAddressInfo:
    description: Represents UE Address information.
    type: object
    properties:
      ueIpAddrs:
        type: array
        items:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/IpAddr'
        minItems: 1
    required:
      - ueIpAddrs

```

A.34 ECSAddress API

openapi: 3.0.0

```

info:
  title: 3gpp-ecs-address
  version: 1.0.0-alpha.2
  description: |
    API for AF provisioned ECS Address Configuration Information.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

```

```

externalDocs:
  description: >
    3GPP TS 29.522 V18.5.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'

```

```

security:
  - {}
  - oAuth2ClientCredentials: []

```

```

servers:
  - url: '{apiRoot}/3gpp-ecs-address/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in clause 5.2.4 of 3GPP TS 29.122.

```

```

paths:
  /{afId}/ecs-address-info:
    get:
      summary: Read all ECS Address Configuration Information for a given AF
      operationId: ReadAllEACIs
      tags:
        - ECS Address Configuration Information (Collection)
      parameters:
        - name: afId
          in: path
          description: Identifier of the AF
          required: true
          schema:
            type: string
      responses:
        '200':

```

```

description: OK (Successful retrieval of the ECS Address Configuration Information)
content:
  application/json:
    schema:
      type: array
      items:
        $ref: '#/components/schemas/EcsAddrInfo'
      minItems: 0
'307':
  $ref: 'TS29122_CommonData.yaml#/components/responses/307'
'308':
  $ref: 'TS29122_CommonData.yaml#/components/responses/308'
'400':
  $ref: 'TS29122_CommonData.yaml#/components/responses/400'
'401':
  $ref: 'TS29122_CommonData.yaml#/components/responses/401'
'403':
  $ref: 'TS29122_CommonData.yaml#/components/responses/403'
'404':
  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
'406':
  $ref: 'TS29122_CommonData.yaml#/components/responses/406'
'429':
  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'

post:
summary: Create a new Individual ECS Address Configuration Information resource.
operationId: CreateEACI
tags:
- ECS Address Configuration 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/EcsAddrInfo'
responses:
'201':
description: Created (Successful creation)
content:
  application/json:
    schema:
      $ref: '#/components/schemas/EcsAddrInfo'
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}/ecs-address-info/{ecsAddrInfoId}:
  get:
    summary: Read an active Individual ECS Address Configuration Information resource for the AF
    operationId: ReadEACI
    tags:
      - Individual ECS Address Configuration Information
    parameters:
      - name: afId
        in: path
        description: Identifier of the AF
        required: true
        schema:
          type: string
      - name: ecsAddrInfoId
        in: path
        description: Identifier of ECS Address Configuration Information.
        required: true
        schema:
          type: string
    responses:
      '200':
        description: OK (Successful retrieval of the active resource)
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/EcsAddrInfo'
      '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: UpdateEACI
    tags:
      - Individual ECS Address Configuration Information
    parameters:
      - name: afId
        in: path
        description: Identifier of the AF
        required: true
        schema:
          type: string
      - name: ecsAddrInfoId
        in: path
        description: Identifier of the ECS Address Configuration 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/EcsAddrInfo'
responses:
  '200':
    description: OK (Successful update of the existing resource)
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/EcsAddrInfo'
  '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 existing ECS Address Configuration Information resource
operationId: DeleteEACI
tags:
  - Individual ECS Address Configuration Information
parameters:
  - name: afId
    in: path
    description: Identifier of the AF
    required: true
    schema:
      type: string
  - name: ecsAddrInfoId
    in: path
    description: Identifier of the ECS Address Configuration 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-ecsaddr:
  post:
    summary: Remove ECS Address Configuration Information based on given criteria.
    operationId: DeleteEACIs
    tags:
      - ECS Address Configuration Information removal
    requestBody:
      description: Criteria to be used for deleting ECS Address Configuration Information.
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/EcsAddrDeleteCriteria'
          required: true
    responses:
      '204':
        description: >
          No Content. The entries matching the provided criteria have been 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'
      '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:
  EcsAddrInfo:
    description: Represents ECS Address Configuration Information.
    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

```

```

EcsAddrDeleteCriteria:

```

```
description: >
  Contains criteria to be used for deleting ECS Address Configuration Information.
type: object
properties:
  afIds:
    type: array
    items:
      $ref: 'TS29522_AKMA.yaml#/components/schemas/AfId'
    minItems: 1
    description: AF identifiers to be used as deletion criterion.
  dnn:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
  snssai:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
  ecsAddrInfo:
    $ref: '#/components/schemas/EcsAddrInfo'
anyOf:
  - required: [afIds]
  - required: [dnn]
  - required: [snssai]
  - required: [ecsAddrInfo]
```


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
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
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2022-06	CT#96	CP-221120	0609	1	F	Resolution of EN related to Error cases related to TMGI management.	17.6.0
2022-06	CT#96	CP-221121	0610	1	F	MBS Session API resources method update	17.6.0
2022-06	CT#96	CP-221142	0611	1	B	Definition of Data Reporting Provisioning API	17.6.0
2022-06	CT#96	CP-221142	0612	1	B	Description of Data Reporting Provisioning API	17.6.0
2022-06	CT#96	CP-221246	0613	4	F	Defining FQDN information for EAS deployment	17.6.0
2022-06	CT#96	CP-221145	0614	1	F	Time Synchronization Error Budget	17.6.0
2022-06	CT#96	CP-221134	0615		B	Update the reporting threshold for AnalyticsExposure service	17.6.0
2022-06	CT#96	CP-221120	0616		F	Updating the identifier of an Individual MBS Session resource	17.6.0
2022-06	CT#96	CP-221120	0617		F	Corrections to the OpenAPI description of the Nnef_MBSSession API	17.6.0
2022-06	CT#96	CP-221264	0618	2	B	Supporting event requirements provisioning for the TrafficInfluence API	17.6.0
2022-06	CT#96	CP-221126	0619		F	Support the update of notifUri for ServiceParameter API	17.6.0
2022-06	CT#96	CP-221144	0620		F	Support the update of notifUri for TimeSyncExposure API	17.6.0
2022-06	CT#96	CP-221147	0621	1	F	Update the definition of notifUri for TrafficInfluence API	17.6.0
2022-06	CT#96	CP-221159	0622		F	Corrections related to notifUri for DCAMP	17.6.0

2022-06	CT#96	CP-221117	0624		A	Correction to UP path notification	17.6.0
2022-06	CT#96	CP-221128	0626	1	A	value range of confidence	17.6.0
2022-06	CT#96	CP-221128	0628	1	A	NEF mapping for Analytics Exposure Subscription	17.6.0
2022-06	CT#96	CP-221157	0630	1	F	Support the update of notifUri for AnalyticsExposure API	17.6.0
2022-06	CT#96	CP-221261	0631	2	B	Defining the OpenAPI description of the Data Reporting API	17.6.0
2022-06	CT#96	CP-221262	0632	3	B	Defining the OpenAPI description of the Data Reporting Provisioning API	17.6.0
2022-06	CT#96	CP-221126	0634	1	F	Geographic area support for URSP	17.6.0
2022-06	CT#96	CP-221147	0635		F	Updates to multiple query parameters in ServiceParameter API	17.6.0
2022-06	CT#96	CP-221151	0636		F	Update of info and externalDocs fields	17.6.0
2022-09	CT#97e	CP-222110	0637	1	B	Updates to Data Reporting Provisioning API	17.7.0
2022-09	CT#97e	CP-222098	0638	1	F	Resolve EN for AF specific UE Id retrieval in MonitoringEvent API	17.7.0
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 NpConfigurator 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
2022-09	CT#97e	CP-222095	0647	1	F	Resolution of EN related to Event reports in MBS session management.	17.7.0
2022-09	CT#97e	CP-222110	0649		F	Correction for service name of DataReportingProvisioning API	17.7.0
2022-09	CT#97e	CP-222113	0650		F	Correction for StateOfDst data type of TimeSyncExposure API	17.7.0
2022-09	CT#97e	CP-222097	0651	2	F	Correction of Application Port ID for UEId API	17.7.0
2022-09	CT#97e	CP-222099	0654		F	Correction to QoS monitoring notification when direct notification is requested	17.7.0
2022-09	CT#97e	CP-222113	0655	2	F	Correction to subscription to notification of Time Synchronization Capabilities	17.7.0
2022-09	CT#97e	CP-222099	0657	1	F	Correction to notification of outcome of the UE Policy Delivery	17.7.0
2022-09	CT#97e	CP-222110	0658	1	B	API general clauses in Nnef_MSEventExposure API	17.7.0
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
2022-09	CT#97e	CP-222110	0662	1	B	Procedures descriptions in Nnef_MSEventExposure API	17.7.0
2022-09	CT#97e	CP-222110	0663	1	B	OpenAPI file of Nnef_MSEventExposure API	17.7.0
2022-09	CT#97e	CP-222110	0664	1	B	General descriptions for Nnef_MSEventExposure API	17.7.0
2022-09	CT#97e	CP-222114	0665	1	F	Wrong grouping of Time Synchronization procedures	17.7.0
2022-09	CT#97e	CP-222113	0666		F	Removal of the mapping of GPSIs and Group Identifiers to a SUPI list	17.7.0
2022-09	CT#97e	CP-222099	0667		F	Correction in EAS Deployment Information creation procedure	17.7.0
2022-09	CT#97e	CP-222099	0668	1	F	Custom deletion of EAS Deployment Information	17.7.0
2022-09	CT#97e	CP-222117	0669		F	Application errors handling for the TimeSyncExposure API	17.7.0
2022-09	CT#97e	CP-222117	0670		F	Application errors handling for the AMPolicyAuthorization API	17.7.0
2022-09	CT#97e	CP-222117	0671		F	Application errors handling for the ASTI API	17.7.0
2022-09	CT#97e	CP-222113	0672		F	ASTI API: definition of error responses	17.7.0
2022-09	CT#97e	CP-222118	0673	1	F	Body in relayed error response	17.7.0
2022-09	CT#97e	CP-222101	0674		F	Corrections related to top applications for congestion	17.7.0
2022-09	CT#97e	CP-222127	0675		F	Data type of evSubscs attribute	17.7.0
2022-09	CT#97e	CP-222127	0676		F	Removable attributes within AppAmContextExpUpdateData	17.7.0
2022-09	CT#97e	CP-222127	0677		F	Misalignment of data type definition in AMPolicyAuthorization API	17.7.0
2022-09	CT#97e	CP-222125	0681		F	Correction to QoS monitoring notification	17.7.0
2022-09	CT#97e	CP-222118	0683	1	F	he events subscribed by the NEF	17.7.0
2022-09	CT#97e	CP-222126	0684	1	F	Correction to UP Path change notification	17.7.0
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

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#98	CP-223161	0734	1	A	Correction of the minimum items in the GET response of LpiParametersProvision	17.8.0
2022-12	CT#98	CP-223172	0736		F	Analytics exposure restrictions	17.8.0
2022-12	CT#98	CP-223181	0737	1	F	Corrections of the TSCTSFS usage determination in AF session with QoS	17.8.0
2022-12	CT#98	CP-223175	0740		A	Corrections in ServiceParameter API	17.8.0
2022-12	CT#98	CP-223184	0742	1	F	Corrections in TimeSyncExposure API	17.8.0
2022-12	CT#98	CP-223197	0743		F	Corrections in AMPolicyAuthorization API	17.8.0
2022-12	CT#98	CP-223184	0745	1	F	Corrections in procedure for NEF north bound interfaces	17.8.0
2022-12	CT#98	CP-223167	0747	1	F	Data type Cardinality corrections for GET response in MBSSession API	17.8.0
2022-12	CT#98	CP-223166	0748		F	Data type Cardinality corrections for GET response in MBSUserDataIngestSession API	17.8.0
2022-12	CT#98	CP-223166	0749		F	Data type Cardinality corrections for GET response in MBSUserService Service API	17.8.0
2022-12	CT#98	CP-223179	0750		F	Data type Cardinality corrections for GET response in MSEventExposure API	17.8.0
2022-12	CT#98	CP-223166	0751		F	Corrections on MBS FSA IDs for broadcast MBS session creation	17.8.0
2022-12	CT#98	CP-223171	0753	1	F	Correction to the EASDeployment API	17.8.0
2022-12	CT#98	CP-223167	0754	1	F	Updates to NEF Northbound APIs Overview and Introduction	17.8.0
2022-12	CT#98	CP-223196	0757		F	Correction related to applicability of traffic correlation indicator	17.8.0
2022-12	CT#98	CP-223172	0758		F	Corrections to data types in AnalyticsExposure API	17.8.0
2022-12	CT#98	CP-223181	0759	1	F	Corrections on Time Synchronization Capabilities subscription procedure	17.8.0
2022-12	CT#98	CP-223168	0760	1	F	Correction for AKMA Application Key Request	17.8.0
2022-12	CT#98	CP-223167	0761	1	F	Corrections for MBSSession service	17.8.0
2022-12	CT#98	CP-223173	0762	1	F	Add clarifications for some information included in the analytics to	17.8.0

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2022-12	CT#98	CP-223197	0763	1	F	Corrections for Nnef_AMPolicyAuthorization service	17.8.0
2022-12	CT#98	CP-223240	0767		F	Update of info and externalDocs fields	17.8.0
2022-12	CT#98	CP-223176	0735	1	B	User consent corrections for analytics exposure	18.0.0
2022-12	CT#98	CP-223176	0746	1	B	Analytics exposure subscription termination request	18.0.0
2022-12	CT#98	CP-223185	0752	1	F	Enumeration definitions in the OpenAPI files	18.0.0
2022-12	CT#98	CP-223198	0755		F	Updates on Nnef_SMSService impacts	18.0.0
2022-12	CT#98	CP-223198	0756		F	Updates on service operations mapping in Nnef_MBSTMGi service	18.0.0
2022-12	CT#98	CP-223199	0764	1	F	Corrections on AF specific UE ID retrieval	18.0.0
2022-12	CT#98	CP-223241	0768		F	Update of info and externalDocs fields	18.0.0
2023-03	CT#99	CP-230131	0770	1	A	Adding MBS service area to the TmgiAllocRequest	18.1.0
2023-03	CT#99	CP-230154	0773		A	Packet delay budget attribute name correction	18.1.0
2023-03	CT#99	CP-230179	0774	1	B	Adding PER to AF Session with QoS API	18.1.0
2023-03	CT#99	CP-230179	0775	1	B	PER for Alternative QoS	18.1.0
2023-03	CT#99	CP-230179	0776	1	B	Spatial Validity Condition for Time Synchronization Exposure Configuration	18.1.0
2023-03	CT#99	CP-230179	0777	1	B	Spatial Validity Condition for ASTI	18.1.0
2023-03	CT#99	CP-230172	0778	1	B	Unavailability Period feature for Monitoring Event API	18.1.0
2023-03	CT#99	CP-230147	0779	1	B	PFD Determination Analytics for NEF	18.1.0
2023-03	CT#99	CP-230156	0780	-	F	Correction of MbsSessionCreateRsp data type for MBSSession API	18.1.0
2023-03	CT#99	CP-230156	0786	1	B	Update procedures for Flow Description Information with ToSTC	18.1.0
2023-03	CT#99	CP-230176	0788	1	F	Correct the data type of the DELETE method of Individual MBS session	18.1.0
2023-03	CT#99	CP-230176	0789	1	F	Correct the broadcast delivery status of MBS session	18.1.0
2023-03	CT#99	CP-230138	0791	1	A	Resolve editor notes on user consent during AF specific UE ID retrieval	18.1.0
2023-03	CT#99	CP-230176	0792	1	F	Correct the procedure description for the EasDeployInfo	18.1.0
2023-03	CT#99	CP-230157	0793	1	F	Missing definitions	18.1.0
2023-03	CT#99	CP-230149	0794	1	F	DNNS and SNSAIS analytics exposure in NEF	18.1.0
2023-03	CT#99	CP-230149	0795	1	F	NetworkAreaInfo exposure removal for untrusted AF	18.1.0
2023-03	CT#99	CP-230149	0796	1	F	Corrections on error handling in AnalyticsExposure API	18.1.0
2023-03	CT#99	CP-230157	0797	1	B	Updates procedure of immediate reporting	18.1.0
2023-03	CT#99	CP-230156	0798	1	F	Correction of the description fields in enumerations	18.1.0
2023-03	CT#99	CP-230145	0800		A	misspelled attribute anyUeInd	18.1.0
2023-03	CT#99	CP-230140	0802		A	incorrect attribute name	18.1.0
2023-03	CT#99	CP-230149	0806	1	F	non-existent eventId	18.1.0
2023-03	CT#99	CP-230170	0810	1	B	Support for AF influence on Service Function Chaining	18.1.0
2023-03	CT#99	CP-230137	0811	1	B	Support for AF traffic influence for common EAS, DNAI selection	18.1.0
2023-03	CT#99	CP-230173	0813	1	A	Correction on handling of Packet Delay Failure report Threshold	18.1.0
2023-03	CT#99	CP-230174	0815	-	F	Generalization of QoS monitoring control description	18.1.0
2023-03	CT#99	CP-230137	0816	1	B	Introducing selection of more granular set of UEs	18.1.0
2023-03	CT#99	CP-230182	0817	1	B	Support of Nnef_AFsessionWithQoS_Create service update for Multi-Modal service XR and Media Services	18.1.0
2023-03	CT#99	CP-230279	0819	2	B	MBS group delivery procedures	18.1.0
2023-03	CT#99	CP-230132	0820	1	B	MBS Group Message Delivery API Definitions	18.1.0
2023-03	CT#99	CP-230280	0821	2	B	OpenAPI definition for Group message delivery API	18.1.0
2023-03	CT#99	CP-230175	0822	-	B	Specification of application errors for QoS requests	18.1.0
2023-03	CT#99	CP-230175	0823	-	B	Indication of Alternative Service Requirements not supported	18.1.0
2023-03	CT#99	CP-230154	0825	1	A	Correction to TSCTSF invocation	18.1.0
2023-03	CT#99	CP-230154	0830	-	A	Removal of the remaining ENs in the definition of the Nnef_TimeSyncExposure API	18.1.0
2023-03	CT#99	CP-230179	0831	1	B	Enhancement of Time Sensitive Communication	18.1.0
2023-03	CT#99	CP-230153	0832	-	B	Support of Group Member List Change event	18.1.0
2023-03	CT#99	CP-230137	0833	1	B	Support of common DNAI selection by AF	18.1.0
2023-03	CT#99	CP-230145	0835	1	A	Clarification for historical analytics exposure	18.1.0
2023-03	CT#99	CP-230156	0838	-	F	Description about N5 session on MonitoringEvent API	18.1.0
2023-03	CT#99	CP-230155	0840	-	A	Missing features for AsSessionWithQoS API	18.1.0
2023-03	CT#99	CP-230156	0842	-	F	Description field of LpiParameterProvision API	18.1.0
2023-03	CT#99	CP-230156	0843	-	F	Description field of ServiceParameter API	18.1.0
2023-03	CT#99	CP-230156	0845	-	F	Description field of MSEventExposure API	18.1.0
2023-03	CT#99	CP-230154	0847	1	A	Correction of the procedure when the NEF reject the AF update request	18.1.0
2023-03	CT#99	CP-230161	0849	-	F	Update of info and externalDocs fields	18.1.0
2023-06	CT#100	C3-231593	0781	2	B	Updates for DN performance of Group UEs in AnalyticsExposure API	18.2.0
2023-06	CT#100	C3-231546	0782	2	B	Update for UE Mobility support FL in AnalyticsExposure API	18.2.0
2023-06	CT#100	C3-231690	0818	3	B	Procedure for multicast MBS Session MBS Assistance information provisioning	18.2.0
2023-06	CT#100	C3-231455	0836	2	B	Support NWDAF assisted URSPs in Service Experience	18.2.0
2023-06	CT#100	C3-232242	0837	1	B	Support use case context in analytics exposure	18.2.0
2023-06	CT#100	C3-231460	0850	1	B	Introduction of Nnef_PDTQPolicyNegotiation API	18.2.0
2023-06	CT#100	C3-231659	0851	1	B	Prioritization of candidate DNAs	18.2.0

2023-06	CT#100	C3-231660	0852	1	B	Adding target AF ID to the EAS deployment information	18.2.0
2023-06	CT#100	C3-231672	0853	1	B	Event muting enhancements for Analytics exposure	18.2.0
2023-06	CT#100	C3-231678	0854	1	F	Adding missing feature to the list of 5G features	18.2.0
2023-06	CT#100	C3-232613	0855	2	B	Nnef_AFsessionWithQoS service enhancements to support multi-modal services	18.2.0
2023-06	CT#100	C3-231092	0856		B	Update of the Reused APIs table	18.2.0
2023-06	CT#100	C3-231707	0857	1	B	Network determined BAT offset and periodicity adaption	18.2.0
2023-06	CT#100	C3-232681	0858	3	B	Support for network timing synchronization status and reporting	18.2.0
2023-06	CT#100	C3-231119	0859		B	Support of Associated Session Id	18.2.0
2023-06	CT#100	C3-231146	0864		F	Correction of time synchronization error budget	18.2.0
2023-06	CT#100	C3-231461	0865	1	B	Update MBSGroupMsgDelivery API	18.2.0
2023-06	CT#100	C3-232466	0866	2	B	Addition of PIN ID in TrafficDescriptorComponents	18.2.0
2023-06	CT#100	C3-231686	0867	1	B	Introduction to PDU set QoS handling in Nnef_AFsessionWithQoS Service API	18.2.0
2023-06	CT#100	C3-232656	0868	2	B	Support of ECN marking for L4S	18.2.0
2023-06	CT#100	C3-232516	0869	2	B	Definition of the service description clauses of the new ParametersProvisioning API	18.2.0
2023-06	CT#100	C3-232517	0870	2	B	Definition of the API resources clauses of the new ParametersProvisioning API	18.2.0
2023-06	CT#100	C3-232518	0871	2	B	Definition of the data model clauses of the new ParametersProvisioning API	18.2.0
2023-06	CT#100	C3-232519	0872	2	B	Definition of the other API parts of the new ParametersProvisioning API	18.2.0
2023-06	CT#100	C3-231572	0874	1	B	Updates to the Nnef_MBSUserService API to support MBS group message delivery	18.2.0
2023-06	CT#100	C3-231573	0875	1	B	Updates to the Nnef_MBSUserDataIngestSession API to support MBS group message delivery	18.2.0
2023-06	CT#100	C3-231229	0876		B	Updates to the multiple NSACFs case for network slice status reporting	18.2.0
2023-06	CT#100	C3-231529	0877	1	F	Adding missing maxItems for array data type	18.2.0
2023-06	CT#100	C3-231626	0878	1	D	Update of 4.1	18.2.0
2023-06	CT#100	C3-231513	0880	1	B	Correction to AF influence on Service Function Chaining	18.2.0
2023-06	CT#100	C3-231284	0881		B	Complete common DNAI and EAS selection	18.2.0
2023-06	CT#100	C3-231605	0883	1	B	Support of ordering criterion for UE communication	18.2.0
2023-06	CT#100	C3-231606	0884	1	B	Support of ordering criterion for user data congestion	18.2.0
2023-06	CT#100	C3-231296	0885		B	Support of preferred granularity of location for AnalyticsExposure service	18.2.0
2023-06	CT#100	C3-231607	0886	1	B	Support of ordering criterion for UE mobility	18.2.0
2023-06	CT#100	C3-232222	0888	2	B	DNAI Mapping service and procedures	18.2.0
2023-06	CT#100	C3-232223	0893	2	B	API Resource definition for DNAIMapping service	18.2.0
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2023-06	CT#100	C3-232427	0897	3	B	OpenAPI definition for Nnef_DNAIMapping service	18.2.0
2023-06	CT#100	C3-231655	0898	1	B	Support of common EAS re-discovery initiated by SMF	18.2.0
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2023-06	CT#100	C3-231415	0909		F	Corrections on the feature name	18.2.0
2023-06	CT#100	C3-231648	0910	1	B	Enhancements to Network Performance Analytics	18.2.0
2023-06	CT#100	C3-232567	0911	3	B	MemberUESelectionAssistance API, API definition	18.2.0
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2023-06	CT#100	C3-231464	0913	1	B	Service parameter provisioning for A2X communication	18.2.0
2023-06	CT#100	C3-232425	0914	1	B	OpenAPI specification for PDTQPolicyNegotiation API	18.2.0
2023-06	CT#100	C3-232070	0916		A	Wrong attribute name in EAS deployment	18.2.0
2023-06	CT#100	C3-232641	0920	1	A	Monitoring procedure corrections	18.2.0
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2023-06	CT#100	C3-232643	0923	1	F	Adding time domain to AF Session with QoS procedure	18.2.0
2023-06	CT#100	C3-232702	0924	2	F	Incomplete NEF functionality description	18.2.0
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2023-06	CT#100	C3-232662	0933	1	B	End-to-end data volume transfer time analytics subscription exposure	18.2.0
2023-06	CT#100	C3-232666	0934	1	B	Support of Protocol Description	18.2.0

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2023-06	CT#100	C3-232251	0942		B	Support Application Specific Expected UE Behaviour parameters	18.2.0
2023-06	CT#100	C3-232566	0944	1	B	Updates for UE mobility analytics in AnalyticsExposure API	18.2.0
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2023-06	CT#100	C3-232509	0947	1	F	Corrections to procedures for BDT	18.2.0
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2023-06	CT#100	C3-232678	0954	1	B	Support of Packet Delay Variation monitoring and reporting	18.2.0
2023-06	CT#100	C3-232521	0958	1	F	Addition of missing description fields	18.2.0
2023-06	CT#100	C3-232522	0959	1	D	Correct the remaining occurrences of subclause	18.2.0
2023-06	CT#100	C3-232413	0961		F	Clarifying the UNKNOWN_MBS_SERVICE_AREA application error	18.2.0
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2023-06	CT#100	C3-232626	0963	2	F	Correcting the AM Influence Subscriptions resource name	18.2.0
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2023-09	CT3#101	CP-232101	0974	1	B	Adding TNAP IDs to Service Parameter provisioning	18.3.0
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2023-09	CT3#101	CP-232256	0988	1	B	Data model for timing synchronization status and reporting	18.3.0
2023-09	CT3#101	CP-232091	0990		F	Addition of the missing clauses for the concerned APIs	18.3.0
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2023-09	CT3#101	CP-232093	1002	1	B	Network Slice Usage Control parameter provisioning resources and data model	18.3.0
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2023-09	CT3#101	CP-232091	1008	2	F	Corrections in ServiceParameter API	18.3.0
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2023-09	CT3#101	CP-232087	1010	1	B	Add the description fields for the attributes in the Notification data type	18.3.0
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2023-09	CT3#101	CP-232257	1018	1	B	Impacts in AF influence on traffic procedures due to HR-SBO scenarios	18.3.0
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2023-09	CT3#101	CP-232087	1021	1	F	Incorrect data type	18.3.0
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2023-09	CT3#101	CP-232092	1028	1	B	Common EAS/DNAI determination for a set of UEs	18.3.0
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2023-09	CT3#101	CP-232158	1033	1	B	Support of the congestion information measurement and reporting	18.3.0
2023-09	CT3#101	CP-232158	1034	1	B	Support of the Packet Delay Variation monitoring	18.3.0
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2023-09	CT3#101	CP-232085	1038	1	B	Support of the End of Data Burst Indication	18.3.0
2023-09	CT3#101	CP-232090	1040		F	Update of info and externalDocs fields	18.3.0
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2023-12	CT#102	CP-233234	1047	1	B	Support of subscription to flow level QoS monitoring	18.4.0
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2023-12	CT#102	CP-233232	1099	1	D	Updates to the service description procedures	18.4.0
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2024-03	CT#103	CP-240159	1094	7	B	QoS monitoring alignment with SA2	18.5.0
2024-03	CT#103	CP-240171	1100	2	F	Solving the issue of the missing functionalities in clause 4.3.1 and additional corrections	18.5.0
2024-03	CT#103	CP-240158	1150		F	Resolve the Editor's Notes for QoS monitoring for congestion	18.5.0
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2024-03	CT#103	CP-240187	1155	1	F	MBSGroupMsgDelivery error handling with application errors.	18.5.0
2024-03	CT#103	CP-240187	1156	1	B	Support RedCap UEs indication in the MBS Session.	18.5.0
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2024-03	CT#103	CP-240162	1159	2	B	Update WLAN performance analytics	18.5.0
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History

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