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Contents

Foreword

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1 Scope

The present specification describes the protocol for the NEF Northbound interface between the NEF and the AF. The NEF Northbound interface and the related stage 2 functional requirements are defined in 3GPP TS 23.501 [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] 3GPP TS 26.502 [65] and 3GPP TS 23.586 [76].

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".

[75]   GSMA PRD NG.135, version 3.0: "E2E Network Slicing Requirements".

[76]   3GPP TS 23.586: "Architectural Enhancements to support Ranging based services and Sidelink Positioning".

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
AAnF	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
PFD	Packet Flow Description
PFDF	Packet Flow Description Function
PIN	Personal IoT Network
REST	Representational State Transfer
RNAA	Resource owner-aware Northbound API Access
RSLPPI	Ranging and SideLink Positioning Privacy Indication
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, DNN and S-NSSAI specific Group Parameters provisioning and Ranging and SideLink Positioning Privacy Indication (RSLPPI) 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 MBS 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_UCMFProvisioning 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 the Nnef_PFDManagement service, only the Nnef_PFDManagement_Create/Update/Delete service operations are applicable for the NEF Northbound interface.

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

NOTE 3: For the 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 is set 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 together with the support of the "GMEC" 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.
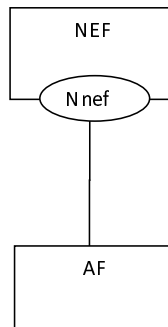
Figure 4.2-1: Reference Architecture for the Nnef Service; SBI representation

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 convery the AF's addressing information for location reporting over user plane. If the "Ranging_SL" feature as defined in clause 5.3.4 of 3GPP TS 29.122 [4] is also supported, the AF may additionally include the ranging and sidelink positioning result(s) type within the "reqRangSlRes" attribute, the list of the related UE(s) for the ranging and sidelink positioning and the corresponding information within the "relatedUEs" attribute within the MonitoringEventSubscription data structure;

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];

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.);

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 targeting 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/PATCH request targeting the NEF to the "Individual Monitoring Event Subscription" resource to update an existing subscription, as defined in clauses 5.3.3.3.3.2 and 5.3.3.3.3.3 of 3GPP TS 29.122 [4], as follows:

A) within the MonitoringEventSubscription data structure (or the requested modifications to the MonitoringEventSubscription data structure in case the HTTP PATCH method is used):

a) either the concerned network slice identified by the "snssai" attribute, in the case of a trusted AF, or the AF service identifier within the "afServiceId" attribute, in the case of an untrusted AF, shall be provided;

b) the value of the "monitoringType" attribute shall be set to 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) 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;

e) 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;

f) 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

2) if needed, 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 to the corresponding S-NSSAI prior to sending the request(s) to the concerned 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(s) 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 concerned 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) an HTTP "201 Created" status code with 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(s) within the "monitoringEventReport" attribute, if available and the "immediateRep" attribute was provided and set to "true" in the corresponding request; or

b) an HTTP "200 OK" status code with the response body containing the current network slice status information received from the NSACF(s) within the MonitoringEventReport data structure, if the corresponding request is a one-time reporting request with the "immediateRep" attribute set to "true";

B) for the HTTP PUT/PATCH request, respond to the AF with either:

- an HTTP "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(s) within the "monitoringEventReport" attribute, if available and the "immediateRep" attribute was provided and set to "true" in the request; or

- an HTTP "204 No Content" status code;

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: When the "maximumNumberOfReports" attribute is either not present or present and set to a value above 1 and/or the "immediateRep" attribute is either not present or present and set to "false", the above steps 2 and 3 may occur after step 4, i.e., the NEF may acknowledge/respond to the request and create/update the "Individual Monitoring Event Subscription" resource accordingly before interacting with the the concerned NSACF(s).

NOTE 5: 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 request message (as defined in clause 5.3.3A.2.3 of 3GPP TS 29.122 [4]) as follows:

A) within the MonitoringEventReport data structure of the MonitoringNotification data structure:

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 in the HTTP POST or PUT/PATCH request that created or updated 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 corresponding subscription request; and

      c) the current network slice status information within 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 "snssai" attribute provided during the corresponding 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 "snssai" attribute provided during the corresponding subscription creation/update;

NOTE 6: The handling of threshold-based notifications is described in clause 4.15.3.2.10 of 3GPP TS 23.502 [2].

NOTE 7: 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:

      A) the AF shall either:

          a) send an HTTP DELETE request 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]; or

          b) send an HTTP PUT/PATCH request to the NEF targeting the corresponding "Individual Monitoring Event Subscription" resource to remove the subscription to network slice status reporting related event(s) from the list of subscribed events together with the related information, as defined in clauses 5.3.3.3.3.2 and 5.3.3.3.3.3 of 3GPP TS 29.122 [4];

      and

      B) if needed, the NEF shall interact with the concerned NSACF(s) to delete the associated subscription(s) to notifications by invoking the Nnsacf_SliceEventExposure_Unsubscribe service operation as specified in 3GPP TS 29.536 [47];

- if the "enNB1_5G" feature defined in clause 5.3.4 of 3GPP TS 29.122 [4] is supported, then::

    - the AF may require immediate reporting for the subscribed event(s) by providing the "immediateRep" attribute set to "true" within the MonitoringEventSubscription data structure in the corresponding subscription creation/update request; and

    - if there are available report(s) for the subscribed event(s) at the NEF, the corresponding subscription creation/update response shall contain these available report(s) within the "monitoringEventReport" attribute, and/or if the "enNB" feature is supported, the "addnMonEventReports" attribute, of the MonitoringEventSubscription data structure;

- 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 8: 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 event 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" collection resource defined in clause 5.3.3.2.3.4 of 3GPP TS 29.122 [4] to request the creation of a subscription with the the request body including the MonitoringEventSubscription data structure that shall contain:

    - the external group identifier, to identify the targeted group (e.g. 5G VN group), within the "externalGroupId" attribute; and

    - the "monitoringType" attribute (or the "addnMonTypes" attribute) 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 and an HTTP PUT/PATCH request to the NEF targeting the corresponding "Individual Monitoring Event Subscription" resource, as defined in clause 5.3.3.3.3.2/5.3.3.3.3.3 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, 5.3.3.3.3.2 or 5.3.3.3.3.3 of 3GPP TS 29.122 [4];

- when the NEF receives group status List change event report(s) via notification(s) from the UDM as defined in 3GPP TS 29.503 [17], the NEF shall in turn 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 members list shall be provided within the "groupMembListChanges" attribute;

  and

  - in order to unsubscribe from group status change event(s) reporting:

    - if the AF subscribed to other monitoring event(s) in addition to the group status change event(s) reporting, the AF shall update/modify the corresponding subscription to remove the group status change event(s) reporting from the list of the subscribed 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 "Individual Monitoring Event Subscription" resource;

      - 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];

- if the "AppDetection_5G" feature defined in clause 5.3.4 of 3GPP TS 29.122 [4] is supported, in order to support application traffic detection (e.g., start/stop of application traffic) monitoring event(s) reporting:

  - the AF shall send either:

    - an HTTP POST request to the NEF targeting the "Monitoring Event Subscriptions" resource to request the creation of a subscription as defined in clause 5.3.3.2.3.4 of 3GPP TS 29.122 [4]; or

    - an HTTP PUT/PATCH request to the NEF targeting an existing "Individual Monitoring Event Subscription" resource to request the update of an existing subscription as defined in clause 5.3.3.3.3.2 or 5.3.3.3.3.3 of 3GPP TS 29.122 [4];

  - the MonitoringEventSubscription data structure (or the requested modifications to the MonitoringEventSubscription data structure when HTTP PATCH is used) shall include the targeted application traffic, i.e., any UE application traffic associated with the S-NSSAI, provided within the "snssai"

attribute, and the DNN provided within the "dnn" attribute, for the application(s) identified by the "appIds" attribute;

- the monitoring type (or the "addnMonTypes" attribute) of the MonitoringEventSubscription data structure shall be set to the "APPLICATION_START" or "APPLICATION_STOP";

- upon reception of the subscription request message from the AF, the NEF shall check whether the AF is authorized to perform this operation or not:

  - if the AF is not authorized, the NEF shall respond to the AF with an HTTP "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; or

  - if the AF is authorized, the NEF shall subscribe to the requested application traffic detection event(s) reporting at the concerned PCF(s) (locally configured at the NEF for the authorized DNN/S-NSSAI) using the Npcf_EventExposure_Subscribe service operation as defined in clause 4.2.2.2 of 3GPP TS 29.523 [22];

and

- when the NEF receives an event notification from the PCF(s) via the Npcf_EventExposure_Notify service operation as defined in clause 4.2.4 of 3GPP TS 29.523 [22] indicating that the subscribed event(s) has(ve) been detected, the NEF shall send a corresponding notification to the AF by sending an HTTP POST request message to the AF with each of the corresponding MonitoringEventReport data structure(s) (provided within the "monitoringEventReports" attribute of the MonitoringNotification data structure) containing:

  - the reported event (i.e., "APPLICATION_START" or "APPLICATION_STOP") within the "monitoringType" attribute;

  - the identifier of the detected application within the "appId" attribute, if the "appIds" attribute within the corresponding subscription resource contains more than one array element (i.e., more than one application identifier); and

  - the PDU session information related to the detected application within the "pduSessInfo" attribute, if available.

and

- if the "DataTransfer" feature defined in clause 5.3.4 of 3GPP TS 29.122 [4] is supported, in order to support AF request for Session inactivity time, Traffic volume and UL/DL data rate events 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 "Individual Monitoring Event Subscription" resource as defined in clause 5.3.3.3 of 3GPP TS 29.122 [4] for updating the subscription as follows:

  1) targeting list of UE(s) in the MonitoringEventSubscription data type setting the monitoring type as "SESSION_INACTIVITY_TIME", "TRAFFIC_VOLUME" and/or "UL_DL_DATA_RATE"; and

  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.

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 5.4.3.3.3.3 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. In addition, if the "ExpectedUmtTime_Add" feature defined in clause 5.10.4 of 3GPP TS 29.122 [4] is supported, the additional day(s) of the week may be provided within the "expectedUmtDaysAdd" attribute to indicate the additional day(s) if the "expectedUmtDays" attribute is also provided;

- 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 recieved 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. The NEF may include in the EventNotification data type further information as defined in clause 5.4.3.3.4. 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 within the TrafficInfluSub data type the "plmnId", "dnn" and "snssai" attributes indicating the HPLMN ID, HPLMN DNN and HPLMN S-NSSAI of the UE,, the NEF shall determine that the PDU session is working in HR-SBO mode when the PLMN of the UE (derived from the "plmnId", "dnn" and "snssai" received attributes) is not the PLMN that the NEF belongs to.

NOTE 1: The DNN can be unique for a PLMN (see 3GPP TS 23.003 [55]) and can be mapped to a HPLMN.

If the NEF did not receive any of the "plmnId", "dnn" and "snssai" attributes, the NEF shall deduce if the PDU session is working in HR-SBO mode and obtain the related information to be stored in the V-UDR 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 derives the HPLMN of the UE (and thus whether HR-SBO applies) from the received GPSI. The NEF shall contact the NEF of the HPLMN as described in 3GPP TS 23.502 [2], clause 4.3.6.5.5 in order to obtain the SUPI, and the DNN and S-NSSAI of the HPLMN.

NOTE 2: If the GPSI is in the form of External Identifier (see 3GPP TS 23.003 [55]) the NEF can determine the HPLMN of UE based on Domain Identifier in the 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 whether HR-SBO applies based on configuration, e.g., to compare whether the received private IP address is within the configured separate private IP address ranges for HR-SBO PDU Sessions or based on interaction with the UPF by invoking the Nupf_GetUEPrivateIPaddrAndIdentifiers service as described in 3GPP TS 23.502 [2], clause 4.3.6.1, according to local policies.

4. If the UE address is received as part of "ipv6Addr" or "ipv4Addr"attribute and it corresponds to a public IP address that belongs to an IP address range notowned by the VPLMN, the NEF shall determine that HR-SBO applies.

5. If the UE address is received as part of "ipv4Addr"attribute and it corresponds to a public 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 using the Nupf_GetUEPrivateIPaddrAndIdentifiers_Get request service operation as described in 3GPP TS 23.502 [2], clause 4.3.6.5.3.

NOTE 3: 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 4: 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 of Public IP address ranges with an HPLMN ID.

NOTE 5: This procedure is not supported if the AF request targets includes "externalGroupId", "externalGroupIds" or "extSubscCats" attributes within the TrafficInfluSub data type.

The NEF shall derive the information to be stored in the UDR considering the information received from the AF, the H-PLMN derivation (e.g. from GPSI, DNN) and the information obtained from the V-UPF (e.g. SUPI, IP address, DNN, S-NSSAI) or H-NEF (e.g.DNN, S-NSSAI, SUPI) when applicable according to the scenarios described above.

After having derived the information 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 respond to the AF with a 200 OK status code with the "TrafficInfluSub" data structure as response body containing the representation of the modified "Individual Traffic Influence Subscription", or an HTTP "204 No Content" response; and

- for the HTTP DELETE request, delete the corresponding active resource "Individual Traffic Influence Subscription" which represents the traffic influence subscription, and shall 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. The NEF may consolidate the outcome of the individual request for AF session with required QoS corresponding to each UE's IP address and consolidates them into a single response before forwarding it to the AF based on a locally configured consolidated outcome timer.

NOTE 1: The consolidation of the outcome of the individual requests and the locally configured timer are implementation dependant, e.g., the consolidated outcome timer is locally configured in NEF whose default value is zero.

- 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 QoS handling and QoS monitoring for the list of UEs from AF, the AF may include:

        a   the list of UE address(es) within the "listUeAddrs" attribute instead of the UE IP/MAC address; and

        b. the list of UE addresses subject for Consolidated Data Rate monitoring within the "listUeConsDtRt" attribute;

NOTE 2: If the "listUeConsDtRt" attribute is provided, it is a subset of "listUeAddrs" attribute.

    - in order to support the QoS Monitoring for UL and/or DL data rate for the list of UEs, the AF shall include the required consolidated data rate monitoring information for the list of UEs within the "qosMonDatRate" attribute. The subscribed event is "QOS_MONITORING". The AF shall include within the "qosMonDatRate" attribute:

        a) the requested consolidated data rate parameter(s) to be measured (i.e., DL and/or UL data rate) within the "reqQosMonParams" attribute;

        b) one or more report frequency(ies) within the "repFreqs" attribute;

        c) when the "repFreqs" attribute is set to the value "EVENT_TRIGGERED":

            -   the data rate threshold for downlink within the "consDataRateThrDl" attribute; and/or

            -   the data rate threshold for uplink within the "consDataRateThrUl" attribute;

        d) when the "repFreqs" attribute is set to the value "PERIODIC", the periodic time for reporting within the "repPeriod" attribute; and

        e) when the "repFreqs" attribute is set to the value "EVENT_TRIGGERED", the minimum waiting time between subsequent reports within the "waitTime" 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 NEF authorizes the AF request, the NEF subscribes to data rate QoS Monitoring for each UE in the list to the PCFs by invoking the Npcf_PolicyAuthorization service as defined in 3GPP TS 29.514 [7]. The NEF shall always set its notification URI as the Target of Reporting and set "directNotifInd" to "true" in the request to PCFs to ensure that QoS Monitoring reports can be sent by the UPF directly to the NEF regardless of whether the "directNotifInd" attribute was set to "true" in the request from the AF.

when the NEF receives the notification about data rate for the list of UEs from the UPFs, the NEF shall aggregate the QoS Monitoring reports for data rate for those UEs identified by the "listUeConsDtRt" attribute or "listUeAddrs" attribute and notify the AF with the "aggrDataRateRpts" attribute that may include:

   a) the uplink data rate within the "ulAggrDataRate" attribute; and/or

   b) the downlink data rate within the "dlAggrDataRate" attribute;

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

- 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 "repThreshDl" attribute;

         - the delay threshold for uplink with the "repThreshUl" 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:

   - 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 4: 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.

   - 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;

   - 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 5: 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 "repThreshDatRateDl" attribute; and/or

        - the data rate threshold for uplink within the "repThreshDatRateUl" attribute;

        b. for QoS monitoring for congestion information

        - the congestion threshold for downlink with the "conThreshDl" attribute; and/or

        - the congestion threshold for uplink with the "conThreshUl" 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.

- if the 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];

- 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";

- 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 "qosMonConInfoReps" 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 6: 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).

    - for congestion information measurements, within the "qosMonConInfoReps":

        a. the uplink congestion information measurement within the "ulConInfo" attribute; and/or

        b. the downlink congestion information measurement within the "dlConInfo" attribute;

- for data rate measurements, within "qosMonDatRateReps":

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, the packet delay measurement failure indicator within the "pdmf" attribute;

- 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 7: 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 "tscaiInputUl" attribute and/or "tscaiInputDl"attribute, and the (g)PTP domain that the AF is located in within the "tscaiTimeDom" attribute;

NOTE 8: For the adjustment of burst sending time and adjustment of periodicity within the "periodicityRange" attribute in the UL direction within the "tscaiInputUl" 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 "tscaiInputUl" attribute and/or "tscaiInputDl" 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 "reqGbrDl" attribute and/or "reqGbrUl" attribute;

- requested MBR within the "reqMbrDl" attribute and/or "reqMbrUl" 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 "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 "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 9: 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 10: 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 defined in clause 5.14.4 of 3GPP TS 29.122 [4] is supported:

    - the AF may additionally subscribe to the "ACCESS_TYPE_CHANGE" and/or "PLMN_CHG" event(s); and

    - if the NEF authorizes the AF request, the NEF shall subscribe to the corresponding event(s) at the PCF by invoking the Npcf_PolicyAuthorization service API as defined in 3GPP TS 29.514 [7];

- 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 "EnQoSMon" feature is supported and QoS Monitoring control is 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 "repThreshDl" attribute;

        - the Packet Delay Variation threshold for uplink with the "repThreshUl" 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 within the "repPeriod" attribute; and

    e) when the "repFreqs" attribute is set to the value "EVENT_TRIGGERED", the minimum waiting time between subsequent reports within the "waitTime" attribute;

NOTE 11: 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;

NOTE 12: QoS Monitoring for the round-trip delay over two QoS flows requires the support of the "MultiMedia" feature and is subscribed at single-modal data flow(s) level. The "RT_DELAY_TWO_QOS_FLOWS" event cannot be provided within the "events" attribute.

- 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 corresponding attributes;

            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. if the "RTLatency" feature is supported:

                - an indication that the a service data flow needs to meet the Round-Trip (RT) latency requirement within the "rTLatencyInd" attribute, or the indication that two service data flows together with the identification of the two service data flows need to meet the RT latency requirement within the "rTLatencyIndCorreId" attribute;

                - the RT latency requirement (i.e., PDB) of the service data flow(s) either explicitly within the "pdb" attribute or implicitly (to be derived by the PCF) in the "qosReference" attribute;

            f. if the "PDUSetHandling" feature is supported, PDU Set QoS related information for the single-modal data flow within the "pduSetQosDl" and/or "pduSetQosUl" attribute(s), if applicable, and the Protocol Description related information within the "protoDescDl" and/or "protoDescUl" attribute(s), if applicable;

NOTE 13: 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.

g. if the "EnQoSMon" feature is supported, the subscription information which is applicable to the QoS monitoring events within the "evSubsc" attribute as specified in 3GPP TS 29.514 [7];

h. 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

i. if the "PowerSaving" feature is supported, the time period between the start of the two data bursts in Uplink and/or Downlink direction within the "periodUl" and "periodDl" attributes respectively, and the Downlink Protocol Description related information within the "protoDescDl" attribute;

NOTE 14: 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 identifer together with the received event(s) parameters by invoking the Npcf_PolicyAuthorization service as defined in 3GPP TS 29.514 [7]; and

- 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";

- 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 15: 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.

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.

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

- 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; and

  - the RT latency requirement of the service data flow either explicitly within the "pdb" attribute or implicitly (to be derived by the PCF) in the "qosReference" attribute;

NOTE 16: The single direction latency requirement between the UE and the PSA UPF can be either explicitly included within the "pdb" 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 RT latency requirement 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 17: 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 "protoDescDl" and/or "protoDescUl" 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) 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 "protoDescDl" and/or "protoDescUl" attribute(s);

- the PDU Set QoS parameters, "pduSetQosDl" and/or "pduSetQosUl" attribute(s);

- if the NEF receives the AF request with PDU Set QoS parameters within the "pduSetQosDl" and/or "pduSetQosUl" attribute(s) and protocol description information within the "protoDescDl" and/or "protoDescUl" 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 "PowerSaving" feature as defined in clause 5.14.4 of 3GPP TS 29.122 [4] 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 "periodUl" and "periodDl" attributes respectively;

- the protocol description within the "protoDescDl" 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 "protoDescDl" attribute; and

- if the NEF receives the AF request with the "periodUl", "periodDl" and/or "protoDescDl" attributes, the NEF shall forward the attributes to the PCF to support the UE Power Saving management;

- 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 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"; or

     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" feature is supported and the AF requested QoS is targeting 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 perform 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 defined 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 (in case the NEF decided to invoke the TSCTSF at the reception of the corresponding AF required QoS requests) or from the PCF (in case 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_SMService.

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 NiddConfiguarationTrigger data type with:

-   the NEF identifier,

-   the AF identifier, and

-   GPSI as UE identity.

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

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 targetingthe 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 responsefrom 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 body of the HTTP PATCH message shall include the 5GLanParametersProvisionPatch data as defined in clause 5.7.2.3.5. The External Group Identifier, DNN, S-NSSAI and PDU session type(s) within the "5gLanParams" attribute shall not be updated/modified.

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) within the "5gLanParams" attribute.

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

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

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

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

4.4.15.5 5G LAN parameter provisioning event notification

If the "GMEC" feature is supported and a previously subscribed AF shall be notified on 5G LAN parameters provisioning event(s) (e.g., when Network Parameters Configuration information is 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 shall acknowledge the successful 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 responsefrom 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 converage restriction, the NEF shall interact with the UDM by using the Nudm_ParameterProvision service as specified in 3GPP TS 29.503 [17].

- if the ECR_WB_5G feature is supported, in order to configure the enhanced coverage restriction for WB UE, the HTTP POST request message shall include the WB mode related enhanced coverage restriction information via the "ecrDataWbs" attribute for the WB UE.

4.4.18 Procedures for IPTV Configuration

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

In order to configure IPTV information, the AF shall send an HTTP POST message to the NEF to the resource "IPTV Configurations", the HTTP POST 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 responsefrom 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; and/or

3. 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 "spatialValidityAreas" and/or "spatialValidityTais" 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", "spatialValidityAreas" and "spatialValidityTais" 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 "spatialValidityAreas" 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.

b) when the feature "VPLMNSpecificURSP" is supported, the "vpsUrspGuidance" attribute, where each URSP rule may contain the parameters of bullet a) above, and in addition, the description of the VPLMN(s) where the URSP rule applies within the "visitedNetDescs" attribute;

NOTE 4: The "visitedNetDescs" attribute within "vpsUrspGuidance" should be present, otherwise the provided guidance will never be applied.

4) if the "A2X" feature is supported, A2X service parameters via:

a) configuration parameters for A2X communications over PC5 within the "a2xParamsPc5" attribute;

b) configuration parameters for A2X communications over Uu within the "a2xParamsUu" 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 5: 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, the Ranging and sidelink positioning service parameters including:

a) configuration parameters for ranging and sidelink positioning within the "paramForRangingSlPos" 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 "policDelivNotifCorreId" attributes in 3GPP TS 29.519 [23]) in UDR data creation if the NEF supports the DeliveryOutcome feature (as described in 3GPP TS 29.504 [4]).

If the NEF receives an error response from the UDR or UDM, 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 shall include the AkmaAfKeyRequest data structure that

shall contain the identification of AF and an A-KID, and if the "RoamingRestriction" feature is supported, may contain a notification URI for the AF to receive notifications on the AKMA service disablement information.

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 an HTTP "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" or "ROAMING_AKMA_SERVICE_DENIED" application error, then the NEF shall relay this response to the AF.

4.4.23.3 AKMA Service Disablement Notification

This procedure is used by the NEF to notify a previously subscribed AF of AKMA service disablement information (see also clause 6.8 of 3GPP TS 33.535 [37]).

When AKMA related sessions have already been started (before roaming was detected), and as soon as the PLMN change is detected at the AAnF, the AAnF may execute AKMA service disablement procedure via the NEF based on the roaming policy to indicate to the AF that the AKMA service is disabled.

In order to notify an AF of AKMA service disablement, the NEF shall send an HTTP POST request message to the AF with the request body including the ServiceDisableNotif data structure.

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

On failure, the AF shall take proper error handling actions, as specified in clause 5.14.7, and respond to the NEF with an appropriate error status code.

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 Capabilites

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 rmessage 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.

If the "SupportReport" feature is supported, and the Time Synchronization Exposure Subscription creation or update is rejected by the TSCTSF because the AF is not authorized or the AF requested parameters are not allowed based on UE's Time Synchronization Subscription Data as specified in 3GPP TS 29.565 [50], the NEF shall relay the received error and include in the HTTP "403 Forbidden" error response the "cause" attribute set to the "UE_SERVICE_NOT_AUTHORIZED" application error.

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.

If the feature "SupportReport" feature is supported, and the time synchronization service configuration creation or update is rejected by the TSCTSF because either the AF request is not authorized or the AF requested parameter(s) are not allowed based on UE's Time Synchronization Subscription Data as specified in 3GPP TS 29.565 [50], the NEF shall relay the received error and include in the HTTP "403 Forbidden" error response the "cause" attribute set to the "UE_SERVICE_NOT_AUTHORIZED" application error.

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. If the "CoverageArea" feature is supported and the NEF received the AF requested time synchronization coverage area as part of the configuration request, the NEF shall relay the report of the changes in the state of time synchronization service when the UE/DS-TT

moves in and out of the authorized time synchronization coverage area as defined in 3GPP TS 29.565 [50]. 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.

When the "NetTimeSyncStatus" feature is supported, the NF service consumer may provide the clock quality reporting control information to manage the timing synchronization status reporting in 5GS within the clock quality detail level in the "clkQltDetLvl" attribute, and if applicable, the clock quality acceptance criteria in the "clkQltAcptCri" attribute. When the NF service consumer includes the clock quality acceptance criteria, the NF service consumer is also indicating 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.

If the "SupportReport" feature is supported, and the ASTI time synchronization service creation or update is rejected by the TSCTSF because the AF request or the AF requested parameter(s) are not authorized based on UE's Time Synchronization subscription data as specified in 3GPP TS 29.565 [50], the NEF shall relay the received error and include in the HTTP "403 Forbidden" error response the "cause" attribute set to the "UE_SERVICE_NOT_AUTHORIZED" application error.

When the "ASTIConfigReport" feature is supported and the NEF receives the notification for the 5G access stratum time distribution status change from the TSCSF 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. If the "CoverageArea" feature is supported and the NEF received the AF requested time synchronization coverage area, the NEF shall relay the report of the enable/disable state of ASTI time synchronization service when the UE moves in and out of the authorized time synchronization coverage area as defined in 3GPP TS 29.565 [50]. If the "NetTimeSyncStatus" feature is supported and the NEF received the AF requested clock quality acceptance criteria, the NEF shall relay the acceptable/not acceptable status of the ASTI time synchronization service to the NF service consumer. 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" attirbute, if the "HR-SBO" feature is supported, the PLMN ID in which the provided information applies via the "plmnId" attribute, if the "ECSAuthMethods" feature is supported, may include the supported authentication methods via the "ecsAuthMethods" attribute and, if the "ECSSuppPlmns" feature is supported, may include the list of PLMNs and associated ECSPs for which EDN configuration information can be provided by the ECS, via the "supportedPlmns" attribute.

> NOTE: The NEF can derive DNN and S-NSSAI information from the AF identifier.

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 responsefrom 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 responsefrom 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 responsefrom 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 responsefrom 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 responsefrom 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 Modifiy 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 responsefrom 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 responsefrom 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 "externalGroupId" 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 "EasDnaiConsistency" feature is supported and there are existing EAS-DNAI mappings configured via OAM in the UDR (see 3GPP TS 29.519 [23] clause 6.2.23), the NEF also ensures that the EAS Deployment Information received from the AF is not in conflict with the OAM-configured information. In case of conflict 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 "CONFLICT_CONFIG_DATA" error in the "cause" attribute of the "ProblemDetails" structure. 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 theresponse body and a Location header field containing the URI of the created individual EAS Deployment Information resource. If the NEF receives an error responsefrom 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 "EasDnaiConsistency" feature is supported and there are existing EAS-DNAI mappings configured via OAM in the UDR (see 3GPP TS 29.519 [23] clause 6.2.23), the NEF also ensures that the EAS Deployment Information received from the AF is not in conflict with the OAM-configured information. In case of conflict 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 "CONFLICT_CONFIG_DATA" error in the "cause" attribute of the "ProblemDetails" structure.

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 responsefrom 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 responsefrom 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 Deplyoment 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 "dnnSnssai" 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;

- 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 Nmbsmf_TMGI service API as defined in 3GPP TS 29.532 [52].

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

On failure or if the NEF receives an error responsefrom 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 "nrRedCapUeInfo" attribute, the NR RedCap UE Information.

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;

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 theAF 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;

  - 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 MB-SMF within either the "redMbsServArea" attribute or the "extRedMbsServArea" 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 responsefrom 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 responsefrom 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) reportingfor 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 responsefrom 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) reportingfor 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_StatusUnsubcribe response with an HTTP "204 No Content" status code.

On failure or if the NEF receives an error responsefrom 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 negociation 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 and/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/update/deletion 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 Nmbsf_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 Nmbsf_MBSUserService service API of the MBSF to request the creation of the corresponding MBS User Service at the MBSF, as specified in 3GPP TS 29.580 [66].

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

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

4.4.29.5.3   Procedure for MBS User Service retrieval

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

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

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

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

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

4.4.29.5.4   Procedure for MBS User Service update/modification

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

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

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

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

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

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

4.4.29.5.5 Procedure for MBS User Service deletion

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

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

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

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

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

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

4.4.29.6 Procedures for MBS User Data Ingest Session management

4.4.29.6.1 General

The procedures described in the clauses below are used by an external/untrusted AF (e.g. MBS Application Provider
that lies outside the trusted DN) to manage an MBS User Data Ingest Session along with its subordinate MBS
Distribution Session(s) via the NEF, i.e. create, retrieve, update/modify and delete an MBS User Data Ingest Session,
create, retrieve, update/modify and delete an MBS User Data Ingest Session Status subscription, and manage the related
MBS User Data Ingest Session Status 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
> Nmbsf_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 Nmbsf_MBSUserDataIngestSession API of the MBSF to request the creation of the corresponding MBS User Data Ingest Session at the MBSF, as specified in 3GPP TS 29.580 [66].

Upon reception of a successful response from the MBSF, as defined in 3GPP TS 29.580 [66], the NEF shall return a Nnef_MBSUserDataIngestSession_Create response message with an HTTP "201 Created" status code including a "Location" header field that shall contain the URI of the created resource, and the response body containing a representation of the created "Individual MBS User Data Ingest Session" resource within the 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 Nmbsf_MBSUserDataIngestSession service API of the MBSF to request the retrieval of the corresponding MBS User Data Ingest Session at the MBSF, as specified in 3GPP TS 29.580 [66].

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

MBSUserDataIngSession 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 Nmbsf_MBSUserDataIngestSession service API of the MBSF to request the deletion of the corresponding MBS User Data Ingest Session Status Subscription at the MBSF, as specified in 3GPP TS 29.580 [66].

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

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

4.4.29.6.9 Procedure for MBS User Data Ingest Session Status Notification

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

Upon reception of an MBS User Data Ingest Session Status Notification from the MBSF, as specified in 3GPP TS 29.580 [66], the NEF shall relay this notification to the AF by sending a Nnef_MBSUserDataIngestSession_StatusNotify request message to the AF using the HTTP POST method and targeting the notification URI provided by the AF during the creation of the corresponding MBS User Data Ingest Session Status Subscription, with the request body including the MBSUserDataIngStatNotif data structure, as specified in clause 5.27.4.2.3.1.

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

On failure, the AF shall take proper error handling actions, as specified in 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]).

NOTE: When the Nnef_MBSGroupMsgDelivery_Delete request is received before the corresponding MBS Group Message is delivered or before the status of the corresponding MBS Group Message Delivery is received, then this indicates the revocation of the previously submitted MBS Group Message.

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 defind 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/delection 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 UE ID retrieval

4.4.32.1   General

The procedures described in the clauses below are used by an AF in order to carry out the following procedures:

- request the NEF to provide a UE ID as described in clause 4.15.10 and 4.15.10A of 3GPP TS 23.502 [2]. The UE ID retrieval procedures are used by an AF to request the NEF to retrieve either:

  - the AF specific UE ID (i.e. GPSI in the form of an External Identifier); or

  - the GPSI in the form of MSISDN;

  and

- perform UE ID Mapping provisioning as defined in 3GPP TS 23.502 [2] for:

  - Ranging/SL positioning as specified in 3GPP TS 23.586 [76].

NOTE: In this release of the specification, only the Ranging/Sidelink UE ID Mapping Information between the Application Layer ID and the GPSI with 1:1 mapping is supported.

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 custom operation 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 the 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 that the IP address received 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_NFDiscovery 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 for SUPI retrieval. 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 from either 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.

4.4.32.3 Retrieve UE ID in the form of MSISDN

If the operator policy and local regulation allows the UE ID exposure in the GPSI format of MSISDN to an authenticated and authorized AF, in order to retrieve the UE ID in the form of MSISDN, the AF shall send an HTTP POST request message to the NEF targeting the custom operation URI "{apiRoot}/3gpp-ueid/v1/get-msisdn", with the request body including the MsisdnReq 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 the AF's request for MSISDN 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 authorization failure; or

- if the AF's request for MSISDN 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 that the IP address received 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_NFDiscovery 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 for SUPI retrieval. 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 either the BSF or UPF, the NEF shall proceed as follows:

- If local regulation and operator policy requires user consent for the retrieval of a UE ID in the form of MSISDN, the user consent for the targeted UE shall be checked via one of the following methods depending on whether CAPIF is used (i.e., using RNAA use case) or not:

  - If CAPIF is not used, then the user consent is checked by the UDM at the reception of the Nudm_SDM_Get request from the NEF as specified in clause 6.1.3.12 of 3GPP TS 29.503 [17] to check for user consent by setting the "uc-purpose" query parameter to "MSISDN_EXPOSURE".

  - If CAPIF is used, then the RNAA procedure defined in clause 5.6.2.3.2 of 3GPP TS 29.222 [12] shall be used.

- The NEF shall interact with the UDM to retrieve the UE ID in the format of MSISDN using the received SUPI and MTC Provider Information or AF Identifier information by invoking the Nudm_SDM_Get service operation, as defined in clause 5.2.2.2 of 3GPP TS 29.503 [17]. Upon success (with user consent granted in place, unless user consent is not required), the UDM responds to the NEF with the requested MSISDN associated with the SUPI. The NEF shall then respond to the AF with the MSISDN that was received from the UDM.

If the user consent is required and not granted for the SUPI received from either the BSF or UPF, 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.

NOTE: In the case of RNAA-based consent check this error will occur before the invocation of the Nudm_SDM_Get service operation, which means that the interaction with the UDM will not take place at all.

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.

4.4.32.4   UE ID Mapping Information Provisioning

This procedure is used by an AF to request the creation/update/deletion of UE ID Mapping Information provisioning.

In order to request the creation of a UE ID Mapping Information Provisioning, an AF shall trigger the UEId API by sending an HTTP POST request to the NEF targeting the UE ID Mapping Information Provisionings" collection resource, with the request body including the UeIdMappingInfo data structure.

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 Nudr_DataRepository service API of the UDR (for Application Data) to store the received UE ID Mapping Information as specified in 3GPP TS 29.519 [23].

Upon success and reception of a successful response from the UDR as defined in 3GPP TS 29.519 [23], 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 UeIdMappingInfo data structure containing a representation of the created "Individual UE ID Mapping Information Provisioning" resource.

On failure or if the NEF receives an error response from the UDR, the NEF shall take proper error handling actions, as specified in clause 5.25.7, and respond to the AF with an appropriate error status code.

In order to request the update of an existing "Individual UE ID Mapping Information Provisioning" resource, an AF shall trigger the UEId API by sending to the NEF either:

- an HTTP PUT request targeting the concerned "Individual UE ID Mapping Information Provisioning" resource with the request body including the UeIdMappingInfo data structure; or

- an HTTP PATCH request targeting the concerned "Individual UE ID Mapping Information Provisioning" resource with the request body including the UeIdMappingInfoPatch data structure.

After authorizing the request, the NEF shall interact with the UDR via the Nudr_DataRepository service API of the UDR (for Application Data) to store the received updated UE ID Mapping Information as specified in 3GPP TS 29.519 [23].

Upon success and reception of a successful response from the UDR as defined in 3GPP TS 29.519 [23], 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 UE ID Mapping Information Provisioning" resource within the UeIdMappingInfo data structure; or

- an HTTP "204 No Content" status code.

On failure or if the NEF receives an error response from the UDR, the NEF shall take proper error handling actions, as specified in clause 5.25.7, and respond to the AF with an appropriate error status code.

In order to request the deletion of an existing "Individual UE ID Mapping Information Provisioning" resource, an AF shall trigger the UEId API by sending an HTTP DELETE request targeting the corresponding "Individual UE ID Mapping Information Provisioning" resource to the NEF. After authorizing the request, the NEF shall interact with the UDR via the Nudr_DataRepository service API of the UDR (for Application Data) to to request to update accordingly the UE ID Mapping Information as specified in 3GPP TS 29.519 [23].

Upon success and reception of a successful response from the UDR as defined in 3GPP TS 29.519 [23], 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 UDR, the NEF shall take proper error handling actions, as specified in clause 5.25.7, and respond to the AF with an appropriate error status code.

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 "easIpAddrs" 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 correponding "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 "Individual PDTQ Policy Subscription" resource 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 Policy 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 Policy 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. The NEF shall request to disable the PDTQ warning notification by including the "warnNotifEnabled" attribute in the HTTP PATCH message towards PCF as described in 3GPP TS 29.543 [68].

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 via the NEF, also for the NEF to notify the AF about the member UE selection assistance 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, 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/<apiVersion>/{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 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 specific 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 specific Group Parameters Provisioning

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

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

- the AF shall trigger the 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 "dnnSnssaiGrpData" attribute, the DNN and S-NSSAI specific Group parameters data that is to be provisioned; and

  - within the "suppFeat" attribute, the features supported by the AF, if applicable (i.e., feature negociation 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 "dnnSnssaiGrpData" 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 specific parameters 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 "201 Created" 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 Group Parameters Provisioning" resource within the GrpPpData data structure.

In order to request the update of an existing DNN and S-NSSAI specific Group Parameters Provisioning:

- the AF shall trigger the GroupParametersProvisioning API by sending to the NEF either:

  - an HTTP PUT request targeting the corresponding "Individual Group Parameters Provisioning" resource with the request body including the GrpPpData data structure; or

  - an HTTP PATCH request targeting the corresponding "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 specific Group parameters 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 DNN and S-NSSAI specific Group Parameters Provisioning:

- the AF shall trigger the GroupParametersProvisioning API by sending an HTTP DELETE request targeting the corresponding "Individual Group Parameters Provisioning" resource to the NEF;

- after authorizing the request, the NEF shall interact with the UDM via the the Nudm_ParameterProvision service API as defined in 3GPP TS 29.503 [17] to request the deletion of the correponding DNN and S-NSSAI specific Group parameters 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 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 5.33.7, 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:

- the AF shall trigger the 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 negociation 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 "201 Created" 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 Slice Parameters Provisioning" resource within the SlicePpData data structure.

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

- the AF shall trigger the SliceParamProvision API by sending to the NEF either:

  - an HTTP PUT request targeting the corresponding "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 corresponding "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:

- the AF shall trigger the SliceParamProvision API by sending an HTTP DELETE request targeting the corresponding "Individual Slice Parameters Provisioning" resource to the NEF;

- after authorizing the request, the NEF shall interact with the UDM via the the Nudm_ParameterProvision service API as defined in 3GPP TS 29.503 [17] to request the deletion of the correponding 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 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 5.34.7, 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 is to be provisioned;

and

- during the modification of the Network Slice Parameters Provisioning using HTTP PATCH, the SlicePpDataPatch data structure shall include:

  - within the "sliceUsgCtrlData" attribute, the requested modifications 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 Set

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

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

and may include:

- the spatial validity condition within the "spatialValidityCond" attribute;

- the DNN within the "dnn" attribute;

- the S-NSSAI within the "snssai" attribute;

- the supported ECS authentication methods within the "ecsAuthMethods" attribute; and

- the list of PLMNs and associated ECSPs for which EDN configuration information can be provided by the ECS, within the "supportedPlmns" attribute.

  NOTE 1: The V-NEF can derive HPLMN DNN and S-NSSAI information from the AF identifier, if the "dnn" and "snssai" attributes are not included in the EcsAddrInfo data structure.

  NOTE 2: The provided information applies to any UE.

Upon receipt of the corresponding HTTP POST message, the V-NEF authorizes the request and 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 Set" resource and send an HTTP "201 Created" response with the EcsAddrInfo data structure including the contents of the created "Individual ECS Address Configuration Information Set" resource in the response body and a Location header field containing the URI of the created "Individual ECS Address Configuration Information Set" 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 Set

In order to modify an existing "Individual ECS Address Configuration Information Set" resource, the AF shall initiate an HTTP PUT or PATCH request to the "Individual ECS Address Configuration Information Set" resource. In the case of HTTP PUT, the request body shall include the EcsAddrInfo data structure, which shall include the same contents as described in clause 4.4.30.2. In the case of HTTP PATCH, the request body shall include the EcsAddrInfo data structure with the contents as defined in clause 5.36.5.3.4.

Upon receipt of the corresponding HTTP PUT (or PATCH) request message, the V-NEF authorizes the request and 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 Set" resource and send an HTTP "200 OK" response with the EcsAddrInfo data structure including the contents of the modified "Individual ECS Address Configuration Information Set" 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 Set

In order to delete an existing "Individual ECS Address Configuration Information Set" resource, the AF shall send an HTTP DELETE request message to the V-NEF targeting the URI of this "Individual ECS Address Configuration Information Set" 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 Set" 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 "Individual ECS Address Configuration Information Set" 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 "Individual ECS Address Configuration Information Set" 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 or if the V-NEF can succesfully 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.

4.4.41   Procedures for RSLPPI Parameters Provisioning

4.4.41.1   General

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

-   RSLPPI parameters provisioning procedures (see clause 4.15.6.2 of 3GPP TS 23.502 [2]).

4.4.41.2   Procedures for RSLPPI Parameters Provisioning

This procedure is used by an AF to request the creation/update/deletion of a RSLPPI parameters provisioning.

In order to request the creation of a RSLPPI Parameters Provisioning:

-    an AF shall trigger the RSLPPIParametersProvisioning API by sending an HTTP POST request to the NEF
     targeting the "RSLPPI Parameters Provisionings" collection resource, with the request body including the
     RslppiPpData data structure;

-    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 Nudm_ParameterProvision service API of the UDM to request the
          provisioning of the received RSLPPI 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 "201 Created" 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 RSLPPI Parameters Provisioning" resource within the RslppiPpData
     data structure.

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

-    the AF shall trigger the RSLPPIParametersProvisioning API by sending to the NEF either:

     -    an HTTP PUT request targeting the corresponding "Individual RSLPPI Parameters Provisioning" resource
          with the request body including the RslppiPpData data structure; or

     -    an HTTP PATCH request targeting the corresponding "Individual RSLPPI Parameters Provisioning"
          resource with the request body including the RslppiPpDataPatch data structure;

-    after authorizing the request, the NEF shall interact with the UDM via the the Nudm_ParameterProvision service
     API as defined in 3GPP TS 29.503 [17] to request the provisioning of the received updated RSLPPI 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
          RSLPPI Parameters Provisioning" resource within the RslppiPpData data structure; or

     -    an HTTP "204 No Content" status code.

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

-    the AF shall trigger the RSLPPIParametersProvisioning API by sending an HTTP DELETE request targeting the
     corresponding "Individual RSLPPI Parameters Provisioning" resource to the NEF;

-    after authorizing the request, the NEF shall interact with the UDM via the the Nudm_ParameterProvision service
     API as defined in 3GPP TS 29.503 [17] to request the deletion of the correponding RSLPPI 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 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 5.37.7, and respond to the AF with an appropriate error status code.

5   NEF Northbound APIs

5.1   Introduction

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

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

Table 5.1-1: API Descriptions

Service Name	Clause defined	Description	OpenAPI Specification File	API Name	Annex
TrafficInfluence	5.4	Traffic Influence API	TS29522_TrafficInfluence.yaml	3gpp-traffic-influence	A.2
NiddConfigurationTrigger	5.5	NIDD (Non-IP Data Delivery) Configuration Trigger API	TS29522_NiddConfigurationTrigger.yaml	3gpp-nidd-configuration-trigger	A.3
AnalyticsExposure	5.6	Analytics Exposure API	TS29522_AnalyticsExposure.yaml	3gpp-analyticsexposure	A.4
5GLANParameterProvision	5.7	5G LAN Parameter Provision API	TS29522_5GLANParameterProvision.yaml	3gpp-5glan-pp	A.5
ApplyingBdtPolicy	5.8	Applying BDT Policy API	TS29522_ApplyingBdtPolicy.yaml	3gpp-applying-bdt-policy	A.6
IPTVConfiguration	5.9	IPTV Configuration API	TS29522_IPTVConfiguration.yaml	3gpp-iptvconfiguration	A.7
LpiParameterProvision	5.10	LPI (Location Privacy Indicator) Parameter Provision API	TS29522_LpiParameterProvision.yaml	3gpp-lpi-pp	A.8
ServiceParameter	5.11	Service Parameter API	TS29522_ServiceParameter.yaml	3gpp-service-parameter	A.9
ACSParameterProvision	5.12	ACS Parameter Provision API	TS29522_ACSParameterProvision.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_SliceParamProvision.yaml	3gpp-slice-pp	A.32
UEAddress	5.35	UE Address API	TS29522_UEAddress.yaml	3gpp-ue-address	A.33
ECSAddress	5.36	ECS Address Configuration Information API	TS29522_ECSAddress.yaml	3gpp-ecs-address	A.34
RSLPPIParametersProvisioning	5.37	RSLPPI Parameters Provisioning API	TS29522_RSLPPIParametersProvisioning.yaml	3gpp-rslppi-pp	A.35

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", "AspId_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", "Ranging_SL" and "DataTransfer". - 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", "ExpectedUmtTime_Add", "AppExpUeBehaviour" and "ConfAccuLevels".

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", "QoSTiming_5G", "ListUE_5G" and "GMEC".
	-	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_TrafficInfuence 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.

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

/{afId}

/subscriptions

/{subscriptionId}
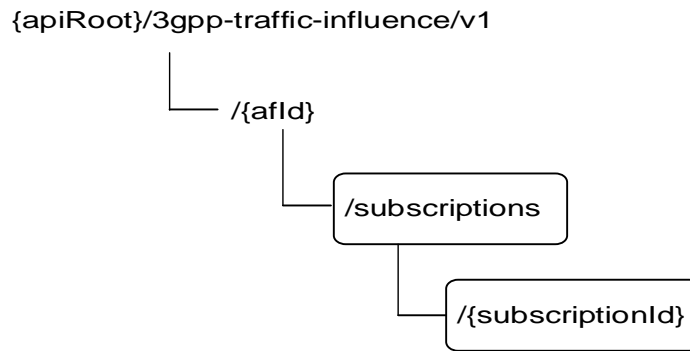
Figure 5.4.1.1-1: Resource URI structure of the TrafficInfluence API

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 subscribtions for the given AF.

5.4.1.2.2 Resource Definition

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

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

Table 5.4.1.2.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	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 theNEF shall respond to the message.

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

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

Name	Data type	P	Cardinality	Description
N/A				

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

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

Data type	P	Cardinality	Description
N/A			

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

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

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

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

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

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

5.4.1.3.3.3   PUT

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

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

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

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

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

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

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

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

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

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

5.4.1.3.3.4   PATCH

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

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

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

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

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

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

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

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

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

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

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

5.4.1.3.3.5   DELETE

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

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

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

Name	Data type	P	Cardinality	Description
N/A				

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

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

Data type	P	Cardinality	Description
N/A			

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

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

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

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

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

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

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

5.4.1A   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.	
TrafficDataSet	5.4.3.3.7	Represents a set of traffic filters and the corresponding N6 traffic routing requirements.	MultiTrafficInflu
TrafficDataSetRm	5.4.3.3.8	Represents a set of traffic filters and the corresponding N6 traffic routing requirements. This data type is defined in the same way as the TrafficDataSet data type, but with the OpenAPI "nullable: true" property.	MultiTrafficInflu

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.
Snssai	3GPP TS 29.571 [8]	Identifies the S-NSSAI.
SupportedFeatures	3GPP TS 29.571 [8]	Used to negotiate the applicability of the optional features defined in table 5.4.4-1.
TemporalValidity	3GPP TS 29.514 [7]	Indicates the time interval(s) during which the AF request is to be applied
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.
WebsockNotifConfig	3GPP TS 29.122 [4]	Contains the configuration parameters to set up notification delivery over Websocket protocol.
NOTE: In order to support a set of MAC addresses with a specific range in the traffic filter, feature MacAddressRange as specified in clause 5.4.4 shall be supported.		

5.4.3.3   Structured data types

5.4.3.3.1   Introduction

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

5.4.3.3.2   Type: TrafficInfluSub

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

Table 5.4.3.3.2-1: Definition of type TrafficInfluSub

Attribute name	Data type	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.	
snssai	Snssai	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). - 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. - 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
websockNotifConfig	WebsockNotifConfig	O	0..1	Configuration parameters to set up notification delivery over Websocket protocol.	Notification_websocket

self	Link	C	0..1	Link to the created resource. This parameter shall be supplied by the NEF in HTTP responses that include an object of TrafficInfluSub type	
trafficDataSets	map(TrafficDataSet)	O	2..N	Contains multiple sets of traffic filters with the corresponding N6 traffic routing requirements. The key of the map shall be the value of the "setId" attribute of the TrafficDataSet data type. (NOTE 3, NOTE 11, NOTE 12, NOTE 13)	MultiTrafficInflu
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, NOTE 11)	
sfcIdDl	string	O	0..1	Reference to a pre-configured steering of user traffic to service function chain in downlink. (NOTE 5)	SFC
sfcIdUl	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 "sfcIdDl" and/or "sfcIdUl" are provided.	SFC
tfcCorrInd	boolean	O	0..1	Indication of traffic correlation. May only be included when "externalGroupId" attribute was included within the TrafficInfluSub data type previously. It is used to indicate that for the group of UEs, the targeted PDU sessions should be correlated by a common DNAI. Set to "true" if it should be correlated; otherwise set to "false". Default value is "false" if omitted. (NOTE 4) (NOTE 10)	
tfcCorreInfo	TrafficCorrelationInfo	O	0..1	Contains the information for traffic correlation. The "notifUri" and "notifCorrId" attributes are not applicable for "tfcCorreInfo" attribute. (NOTE 10)	CommonEASDNAI

tempValidities	array(TemporalValidity)	O	1..N	Indicates the time interval(s) during which the AF request is to be applied.	
validGeoZoneIds	array(string)	O	1..N	Identifies a geographic zone that the AF request applies only to the traffic of UE(s) located in this specific zone. 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 validGeoZoneIds 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 preserved. - Defalult 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_lantency

easIpReplaceInfos	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. - "false" indicates that the EAS rediscovery is not required for the application. - Defalult value is "false" if omitted. The indication shall be invalid after it was applied unless it is provided again.	EASDiscovery
eventReq	ReportingInformation	O	0..1	Indicates the event reporting requirements. This attribute may be provided if the "EDGEAPP" feature is supported and the "subscribedEvents" attribute is present.	EDGEAPP
eventReports	array(EventNotification)	C	1..N	Represents user plane path management event report(s). This attribute shall be present in an HTTP POST response if the immediate reporting indication in the "immRep" attribute within the "eventReq" attribute is set to true and the "subscribedEvents" was present in the corresponding HTTP POST request and the report(s) are available. This attribute may also be present in an HTTP PUT or PATCH response when the report(s) are available.	EDGEAPP
candDnaiInd	boolean	O	0..1	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.	CommonEASDNAI
plmnId	PlmnId	O	0..1	Identifies the H-PLMN of the UE.	HR-SBO
portNumber	Port	O	0..1	Indicates the UDP or TCP port number associated with the UE IP address as provided in the "ipv4Addr" or "ipv6Addr" property.	HR-SBO
suppFeat	SupportedFeatures	C	0..1	Indicates the list of Supported features used as described in clause 5.4.4. This attribute shall be provided in the POST request and in the response of successful resource creation.	
NOTE 1: Properties marked with a feature as defined in clause 5.4.4 are applicable as described in clause 5.2.7 of 3GPP TS 29.122 [4]. If no feature is indicated, the related property applies for all the features.					

NOTE 2:	If "HR-SBO" feature is not supported, only 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. If "HR-SBO" feature is supported and the AF requests to influence traffic routing is working in HR-SBO mode in the VPLMN, only one of individual UE identifier (i.e. "gpsi", "ipv4Addr" or "ipv6Addr") or any UE indication "anyUeInd" shall be included.
NOTE 3:	One of "afAppId", "trafficFilters", "ethTrafficFilters" or "trafficDataSets" 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 "externalGroupId" and "externalGroupIds" 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 "externalGroupIds", 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 "externalGroupIds" attribute is included or "externalGroupId" is included or "anyUeInd" attribute is included. If "HR-SBO" feature is supported and the AF requests to influence is working in HR-SBO mode, the "extSubscCats" attribute shall not be provided.
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.
NOTE 11:	These attributes are mutually exclusive. Either one of them may be present.
NOTE 12:	This attribute may be present only if one of the "macAddr" attribute, the "ipv4Addr" attribute or the "ipv6Addr" attribute is provided.
NOTE 13:	If this attribute is present, then the "candDnaiInd", "tfcCorrInd" and "tfcCorreInfo" attributes shall not be present, and the other attributes of this data type shall apply to all the traffic data sets provided within this attribute.

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)	
trafficDataSets	map(TrafficDataSetRm)	O	1..N	Contains one or several set(s) of traffic filters with the corresponding N6 traffic routing requirements. The key of the map shall be the value of the "setId" attribute of the TrafficDataSet data type.	MultiTrafficInflu
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)	
sfcIdDl	string	O	0..1	Reference to a pre-configured steering of user traffic to service function chain in downlink.	SFC
sfcIdUl	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 "externalGroupId" 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)	CommonEASD NAI
tfcCorreInfo	TrafficCorrelationInfo	O	0..1	Contains the information for traffic correlation. The "notifUri" and "notifCorrId" attributes are not applicable for "tfcCorreInfo" 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)	
validGeoZoneIds	array(string)	O	1..N	Identifies a geographic zone that the AF request applies only to the traffic of UE(s) located in this specific zone. (NOTE 1) This attribute is deprecated; the attribute "geoAreas" should be used instead.	
geoAreas	array(Geograph icalArea)	O	1..N	Identifies geographical areas within which the AF request applies. (NOTE 1) This attribute deprecates validGeoZoneIds 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
easIpReplaceInfos	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. - "false" indicates that the EAS rediscovery is not required for the application. The indication shall be invalid after it was applied unless it is provided again.	EASDiscovery
notificationDestination	Link	O	0..1	Contains the Callback URL to receive the notification from the NEF.	
eventReq	ReportingInformation	O	0..1	Indicates the event reporting requirements. This attribute may be provided if the "EDGEAPP" feature is supported.	EDGEAPP
NOTE 1: The value of the property shall be set to NULL for removal.					
NOTE 2: The "tfcCorrInd" attribute and the "tfcCorreInfo" attribute are mutually exclusive.					
NOTE 3: The value of the property shall be set to NULL for removal, and in that case, the default value "false" applies.					

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
candDnaisPrioInd	boolean	O	0..1	If provided and set to "true", it indicates that the candidate DNAIs 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". It may only be provided if the "candidateDnais" attribute is provided and the "dnaiChgType" attribute is set to the value "EARLY".	CommonEASD NAI
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".	CommonEASD NAI
gpsi	Gpsi	O	0..1	Identifies a user.	
srcUeIpv4Addr	Ipv4Addr	O	0..1	The IPv4 Address of the served UE for the source DNAI.	
srcUeIpv6Prefix	Ipv6Prefix	O	0..1	The Ipv6 Address Prefix of the served UE for the source DNAI.	
tgtUeIpv4Addr	Ipv4Addr	O	0..1	The IPv4 Address of the served UE for the target DNAI.	
tgtUeIpv6Prefix	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
offloadPlmnId	PlmnId	O	0..1	If the event is "UP_PATH_CHANGE" and the UE has moved to a serving PLMN where local traffic offloading is allowed, this attribute contains the identifier of the serving PLMN.	HR-SBO
hDnn	Dnn	O	0..1	If the event is "UP_PATH_CHANGE" and the UE has moved to a serving PLMN where local traffic offloading is allowed, this attribute contains the DNN at the Home PLMN.	HR-SBO
hSnssai	Snssai	O	0..1	If the the event is "UP_PATH_CHANGE" and UE has moved to a serving PLMN where local traffic offloading is allowed, this	HR-SBO

Attribute name	Data type	P	Cardinality	Description	Applicability
				attribute contains the S-NSSAI at the Home PLMN.	
suppFeatures	SupportedFeatures	C	0..1	List of Traffic Influence negotiated features as described in clause 5.4.4. This parameter shall be supplied by the NEF when it determines that it needs to update the supported features that were negotiated during the resource creation due to a notification received by the SMF which contained updated supported features on the SMF side.	HR-SBO
NOTE 1: Properties marked with a feature as defined in clause 5.4.4 are applicable as described in clause 5.2.7 of 3GPP TS 29.122 [4]. If no feature is indicated, the related property applies for all the features.					
NOTE 2: If the DNAI is not changed while the N6 traffic routing information is changed, the "sourceDnai" attribute and "targetDnai" attribute shall not be provided.					
NOTE 3: The change from the UP path status where no DNAI applies to a status where a DNAI applies indicates the activation of the related AF request and therefore only the target DNAI and N6 traffic routing information is provided in the event notification; the change from the UP path status where a DNAI applies to a status where no DNAI applies indicates the de-activation of the related AF request and therefore only the source DNAI and N6 traffic routing information is provided in the event notification.					

5.4.3.3.5 Type: AfResultInfo

Table 5.4.3.3.5-1: Definition of type AfResultInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
afStatus	AfResultStatus	M	1	Identifies the result of the application relocation.	
trafficRoute	RouteToLocation	O	0..1	Identifies the N6 traffic routing information associated to the target DNAI. May only be present if the "afStatus" sets to "SUCCESS".	
upBuffInd	boolean	O	0..1	Indicates whether buffering of uplink traffic to the target DNAI is needed. - "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

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.	

5.4.3.3.7 Type TrafficDataSet

Table 5.4.3.3.7-1: Definition of type TrafficDataSet

Attribute name	Data type	P	Cardinality	Description	Applicability
setId	string	M	1	Identifies the traffic data set.	
trafficFilters	array(FlowInfo)	C	1..N	Contains IP packet filters. (NOTE)	
ethTrafficFilters	array(EthFlowDescription)	C	1..N	Contains Ethernet packet filters. (NOTE)	
trafficRoutes	array(RouteToLocation)	M	1..N	Contains the N6 traffic routing requirements.	
NOTE: These attributes are mutually exclusive. Either one of them shall be present.					

5.4.3.3.8 Type TrafficDataSetRm

This data type is defined in the same way as the "TrafficDataSet" data type, but:

- with the OpenAPI "nullable: true" property.

- the removable attributes "trafficFilters" and "ethTrafficFilters" and "trafficRoutes" are defined as nullable in the OpenAPI.

Table 5.4.3.3.8-1: Definition of type TrafficDataSetRm

Attribute name	Data type	P	Cardinality	Description	Applicability
setId	string	M	1	Identifies the traffic data set.	
trafficFilters	array(FlowInfo)	O	1..N	Contains IP packet filters.	
ethTrafficFilters	array(EthFlowDescription)	O	1..N	Contains Ethernet packet filters.	
trafficRoutes	array(RouteToLocation)	O	1..N	Contains the N6 traffic routing requirements.	

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.

16	MultiTrafficInflu	This feature indicates the support for providing more than one set of traffic filters and the corresponding N6 traffic routing requirements for traffic influence.
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
NiddConfiguration Trigger	M	1	The NIDD Configuration Trigger is provided by the NEF to the AF.

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

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

Tabl 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.	
suppFeat	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)
suppFeat	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

5.6.0 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 Resources

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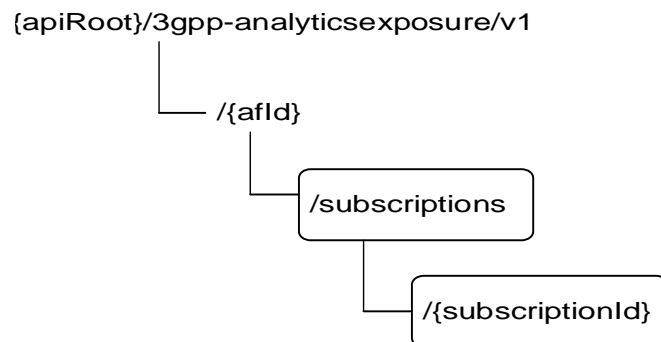
Figure 5.6.1.1-1: Resource URI structure of the AnalyticsExposure API

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 subscribtions for the given AF, or allows a AF to create a new subscription to retrieve analytics information.

5.6.1.2.2 Resource Definition

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

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

Table 5.6.1.2.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	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

Data type	P	Cardinality	Response codes	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/{afId}/subscriptions/{subscriptionId}

5.6.1.3   Resource: Individual Analytics Exposure Subscription

5.6.1.3.1   Introduction

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

5.6.1.3.2   Resource Definition

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

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

Table 5.6.1.3.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	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 theNEF shall respond to the message.

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

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

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

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

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

Data type	P	Cardinality	Description
N/A			

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

Data type	P	Cardinality	Response codes	Description
AnalyticsExposureSubsc	M	1	200 OK	The subscription information for the AF in the request URI are returned.
N/A			307 Temporary Redirect	Temporary redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in 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/{afId}/fetch	POST	Request to fetch analytics information

5.6.1A.2 Operation: fetch

5.6.1A.2.1 Description

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

5.6.1A.2.2 Operation Definition

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

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

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

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

Data type	P	Cardinality	Response codes	Description
AnalyticsData	M	1	200 OK	The requested analytics information was returned successfully.
n/a			204 No Content	If the request Analytics data does not exist, the NEF shall respond with "204 No Content".
N/A			307 Temporary Redirect	Temporary redirection, during analytics information retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [4].
N/A			308 Permanent Redirect	Permanent redirection, during analytics information retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [4].
ProblemDetails	O	0..1	400 Bad Request	(NOTE 2)
ProblemDetails	O	0..1	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 manadatory 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
TargetUeId	5.6.3.3.7	Represents the target UE(s) information.	
UeLocationInfo	5.6.3.3.10	Represents a UE location information.	
UeMobilityExposure	5.6.3.3.9	Represents a UE mobility information.	Ue_Mobility
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.	AnalyticsAccuracy
AccuracyReq	3GPP TS 29.520 [27]	Represents the analytics accuracy requirement information.	AnalyticsAccuracy
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 E2eDataVolTransTime 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 E2eDataVolTransTime
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.	
ExternalGroupId	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
NsiIdInfo	3GPP TS 29.520 [27]	Represents the S-NSSAI and the optionally associated Network Slice Instance Identifier(s).	ServiceExperience DnPerformance 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
Snssai	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.	
WlanPerUeIdPerformanceInfo	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

websockNotifConfig	WebsockNotifConfig	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. It shall only be included if the event notification is failed or the analytics information is not ready. (NOTE 1)	EneNA
rvWaitTime	DurationSec	O	0..1	Indicates a recommended time interval (in seconds) which is used to determine the time when analytics information is needed in similar future event subscriptions. It may only be included if the "failNotifyCode" attribute sets to "UNSATISFIED_REQUESTED_ANALYTICS_TIME".	EneNA
ueMobilityInfos	array(UeMobilityExposure)	C	1..N	Contains the UE mobility information. Shall be present if the "analyEvent" attribute sets to "UE_MOBILITY". (NOTE 5, NOTE 7)	Ue_Mobility
ueCommInfos	array(UeCommunication)	C	1..N	Contains the application communication information. Shall be present if the "analyEvent" attribute sets to "UE_COMM".	Ue_Communication

				(NOTE 7)	
abnormalInfos	array(AbnormalExposure)	C	1..N	Contains the user's abnormal behavior information. Shall be present if the "analyEvent" attribute sets to "ABNORMAL_BEHAVIOR". (NOTE 7)	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". (NOTE 7)	Congestion
nwPerfInfos	array(NetworkPerfExposure)	C	1..N	Contains the network performance information. Shall be present if the "analyEvent" attribute is set to "NETWORK_PERFORMANCE". (NOTE 7)	Network_Performance
qosSustainInfos	array(QosSustainabilityExposure)	C	1..N	Contains the QoS sustainability information. Shall be present if the "analyEvent" attribute is set to "QOS_SUSTAINABILITY". (NOTE 7)	QoS_Sustainability
disperInfos	array(DispersionInfo)	C	1..N	Contains the Dispersion information. Shall be present if the "analyEvent" attribute is set to "DISPERSION". (NOTE 7)	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) (NOTE 7)	DnPerformance
svcExps	array(ServiceExperienceInfo)	C	1..N	Contains the service experience information. Shall be present if the "analyEvent" attribute is set to "SERVICE_EXPERIENCE". (NOTE 7) (NOTE 8)	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

dataVlTrnsTmIfs	array(E2eDataVolTransTimeInfo)	C	1..N	E2E data volume transfer time information. Shall be present if the subscribed event is "E2E_DATA_VOL_TRANS_TIME". (NOTE 7)	E2eDataVolTransTime
acculnfo	AccuracyInfo	C	0..1	The analytics accuracy information. It shall be provided when "accuReq" attribute was provided in the subscription request and the "cancelAccuInd" attribute is set to "false" or omitted.	AnalyticsAccuracy
cancelAccuInd	boolean	O	0..1	Indicates cancelled subscription of the analytics accuracy information. Set to "true" indicates the NWDAF cancelled subscription of analytics accuracy information as the NWDAF does not support the accuracy checking capability. Otherwise set to "false". Default value is "false" if omitted.	AnalyticsAccuracy
movBehavInfos	array(MovBehavInfo)	C	1..N	The Movement Behaviour information. Shall be present if the "analyEvent" attribute is set to "MOVEMENT_BEHAVIOUR". (NOTE 7)	MovementBehaviour
relProxInfos	array(RelProxInfo)	C	1..N	The Relative Proximity information. Shall be present if the "analyEvent" attribute is set to "RELATIVE_PROXIMITY". The "supis" attribute inside the RelProxInfo data type is not applicable in this API and only the "gpsis" attribute can be used. (NOTE 7)	RelativeProximity
wlanInfos	array(WlanPerformInfo)	C	1..N	The WLAN performance related information. Shall be present if the "analyEvent" attribute is set to "WLAN_PERFORMANCE". (NOTE 7)	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(NsiLoadLev elInfo) | C | 1..N | Contains the network slice load level analytics information for each S-NSSAI.

This attribute shall be present if the subscribed event is "NS_LOAD_LEVEL".

(NOTE 6) (NOTE 7) | 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", "trafRateUeIds", "avePacketDelay", "maxPacketDelay", "varPacketDelay", "packDelayUeIds", "maxPacketLossRate", "varPacketLossRate" and "packetLossUeIds" attribute(s) within the DnPerfInfo data type is applicable only if the "DnPerformanceExt_AIML" feature is supported.
NOTE 5:	If the "Ue_MobilityExt_eNA" feature is supported and the "locGranularity" attribute value "LON_AND_LAT_LEVEL" is subscribed, the "geoLoc" attribute within the "locInfo" attribute contained in the UeMobilityExposure data type may be provided to report the geographical location (longitude and latitude level).
NOTE 6:	When the "NSLoad" feature is supported, the "nsiId" attribute and NSI related analytics information within the NsiLoadLevelInfo data structure is not applicable for the "NS_LOAD_LEVEL" event within each array element of this attribute.
NOTE 7:	If the "AnalyticsAccuracy" feature is supported and the notification is only for notifying about the accuracy information of subscribed events, this attribute is not required to be included even if the respective event was subscribed.
NOTE 8:	The "geoLoc" attribute within the ServiceExperienceInfo data type is applicable only if the "ServiceExperienceExt_eNA" feature is supported.

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	AnalyticsEventFilt erSubsc	O	0..1	Represents analytics event filter.	
tgtUe	TargetUeId	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_Performanc e Dispersion DnPerformance ServiceExperience E2eDataVolTransTi me

					MovementBehaviour RelativeProximity
fineGranAreas	array(Geographic alArea)	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)	ServiceExperienceE xt_eNA Ue_MobilityExt_eNA QoS_SustainabilityE xt_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)	UeCommunicationEx t_eNA Abnormal_BehaviorE xt_eNA ServiceExperienceE xt_eNA DnPerformanceExt_ eNA E2eDataVolTransTi me
dnais	array(Dnai)	O	1..N	Identification(s) of user plane access to DN(s) which the subscription applies.	DnPerformance ServiceExperience E2eDataVolTransTi me
appIds	array(ApplicationI d)	O	1..N	Each element identifies an application. (NOTE 7) (NOTE 13)	Abnormal_Behavior Ue_Communication Dispersion DnPerformance ServiceExperience E2eDataVolTransTi me NSLoad
dataVlTrnsTmRqs	array(E2eDataVo lTransTimeReq)	O	1..N	Represents the E2E data volume transfer time requirements	E2eDataVolTransTi me
excepRequs	array(Exception)	O	1..N	Represents a list of Exception Ids with associated thresholds. (NOTE 2, NOTE 3)	Abnormal_Behavior
exptAnaType	ExpectedAnalytic sType	O	0..1	Represents expected UE analytics type. (NOTE 3)	Abnormal_Behavior
exptUeBehav	ExpectedUeBeha viourData	O	0..1	Represents expected UE behaviour.	Abnormal_Behavior
matchingDir	MatchingDirectio n	O	0..1	A matching direction may be provided alongside a threshold. If omitted, the default value is CROSSED.	QoS_Sustainability Congestion, Network_Performanc e NSLoad
reptThlds	array(ThresholdL evel)	O	1..N	Represents the levels to be reached in order to be notified by the NEF. (NOTE 4)	Congestion
nwPerfReqs	array(NetworkPer fRequirement)	C	1..N	Represents the network performance requirements. This attribute shall be included when subscribed event is "NETWORK_PERFORMANCE".	Network_Performanc e
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_CommunicationE xt_eNA

					QoS_SustainabilityExt_eNA Abnormal_BehaviorExt_eNA CongestionExt_eNA DispersionExt_eNA ServiceExperienceExt_eNA DnPerformanceExt_eNA E2eDataVolTransTime RelativeProximity
nsiIdInfos	array(NsiIdInfo)	O	1..N	Each element identifies the S-NSSAI and the optionally associated network slice instance(s). May be included when subscribed event is "SERVICE_EXPERIENCE", "DN_PERFORMANCE" or "NS_LOAD_LEVEL". (NOTE 15)	ServiceExperience DnPerformance NSLoad
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(DispersionRequirement)	O	1..N	Represents the dispersion analytics requirements.	Dispersion
dnPerfReqs	array(DnPerformanceReq)	O	1..N	Represents the DN performance analytics requirements.	DnPerformance
bwRequs	array(BwRequirement)	O	1..N	Represents the bandwidth requirement for each application.	ServiceExperience
ratFreqs	array(RatFreqInformation)	O	1..N	Identification(s) of the RAT type and/or frequencies of UE's serving cell(s) which the subscriptiont applies. (NOTE 8)	ServiceExperience
appServerAddrs	array(AddrFqdn)	C	1..N	Each of the element represents the Application Server Instance (IP address/FQDN of the Application Server) (NOTE 9)	ServiceExperience DnPerformance
wlanReqs	array(WlanPerformanceReq)	O	1..N	Represents WLAN performance analytics requirements.	WlanPerformance_AIML
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)	
maxNumOfTopAppUl	Uinteger	O	0..1	Indicates the requested maximum number of top applications that contribute the most to the traffic in Uplink direction. Minimum = 1. May be included when one of the element in the "listOfAnaSubsets"	CongestionExt

				attribute is set to LIST_OF_TOP_APP_UL.	
maxNumOfTopApp Dl	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(LocationAr ea5G)	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(UeCommR eq)	O	1..N	Represents the UE communication requirements. This attribute may be included when the subscribed event is "UE_COMM".	UeCommunicationEx t_eNA
userDataConOrder Cri	UserDataConOrd erCrit	O	0..1	The ordering criterion for the list of User Data Congestion analytics. (NOTE 11)	CongestionExt_eNA
locGranularity	LocInfoGranularit y	O	0..1	The preferred granularity of UE location information.	ServiceExperienceE xt_eNA Ue_MobilityExt_eNA DispersionExt_eNA
locOrientation	LocationOrientati on	O	0..1	Indicates the preferred orientation of location information.	Ue_MobilityExt_eNA MovementBehaviour
ueMobilityReqs	array(UeMobility Req)	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(MovBehav Req)	O	1..N	Represents the Movement Behaviour analytics requirements.	MovementBehaviour
relProxReqs	array(RelProxRe q)	O	1..N	Represents the Relative Proximity analytics requirements.	RelativeProximity
pduSesInfos	array(PduSessio nInfo)	O	1..N	Represents combination of PDU Session parameters information. (NOTE 13)	ServiceExperienceE xt_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	AnalyticsAccuracy

				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.	
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
spatialGranSizeTa	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 "locArea" attribute is provided.	NetworkPerfExt_eNA Ue_MobilityExt_eNA UeCommunicationExt_eNA QoS_SustainabilityExt_eNA DispersionExt_eNA DnPerformanceExt_eNA
spatialGranSizeCell	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 "locArea" attribute 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 "excepId" and "excepLevel" within the Exception data type apply to the "excepRequs" attribute.

NOTE 3: Either "excepRequs" or "exptAnaType" shall be provided if the subscribed event is "ABNORMAL_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 "excepRequs" attribute is mobility related;
- at least one of the "locArea", "appIds", "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 "excepRequs" attribute is communication related;
- the expected analytics type via the "exptAnaType" attribute or the list of Exception Ids via "excepRequs" 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 "appIds" 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 NsiIdInfo data structure is applicable for the "NS_LOAD_LEVEL" event within each array element of this attribute.

5.6.3.3.7 Type TargetUeId

Table 5.6.3.3.7-1: Definition of type TargetUeId

Attribute name	Data type	P	Cardinality	Description	Applicability
anyUeInd	boolean	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_AIML MovementBehaviour
gpsi	Gpsi	C	0..1	Identifies a GPSI for an UE.	Abnormal_Behavior Congestion Ue_Mobility Ue_Communication Network_Performance Dispersion DnPerformance ServiceExperience WlanPerformance_AIML RelativeProximity
exterGroupId	ExternalGroupId	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_AIML 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
NOTE 1: Either ts or recurringTime shall be provided.					
NOTE 2: If this attribute is present, it indicates the UE movement is periodic. This attribute is suitable to be present for a recurring mobility in a long observation time.					
NOTE 3: If the "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.					
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.					

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	C	0..1	This attribute contains the geographical location in a fine granularity (e.g. smaller than a cell). Shall be present if one of the elements in the "listOfAnaSubsets" attribute in the request was set to "USER_LOCATION". (NOTE 2) (NOTE 3)	Ue_MobilityExt_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
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.				
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.				
NOTE 3:	When the "geoLoc" attribute is present, the "loc" attribute shall be ignored.				

5.6.3.3.11   Void

5.6.3.3.12   Type: AnalyticsRequest

Table 5.6.3.3.12-1: Definition of type AnalyticsRequest

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

5.6.3.3.13   Type AnalyticsEventFilter

Table 5.6.3.3.13-1: Definition of type AnalyticsEventFilter

Attribute name	Data type	P	Cardinality	Description	Applicability
locArea	LocationArea5G	C	0..1	This IE represents the network area where the NF service consumer wants to know the analytics result. (NOTE 2, NOTE 3, NOTE 10)	Ue_Mobility Ue_Communication Network_Performance QoS_Sustainability Abnormal_Behavior Congestion Dispersion DnPerformance ServiceExperience E2eDataVolTransTime MovementBehaviour RelativeProximity
fineGranAreas	array(Geographical Area)	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
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
spatialGranSizeTa	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 "locArea" attribute is provided.	NetworkPerfExt_eNA Ue_MobilityExt_eNA UeCommunicationExt_eNA QoS_SustainabilityExt_eNA DispersionExt_eNA DnPerformanceExt_eNA
spatialGranSizeCell	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 "locArea" attribute is provided.	NetworkPerfExt_eNA Ue_MobilityExt_eNA UeCommunicationExt_eNA QoS_SustainabilityExt_eNA DispersionExt_eNA DnPerformanceExt_eNA
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 E2eDataVolTransTime RelativeProximity
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
dataVlTrnsTmReqs	array(E2eDataVolTransTimeReq)	O	1..N	Represents the E2E data volume transfer time requirements	E2eDataVolTransTime
appIds	array(ApplicationId)	O	1..N	Each element identifies an application. The absence of appIds means all applications. (NOTE 3) (NOTE 9)	Ue_Communication Abnormal_Behavior DnPerformance ServiceExperience Dispersion E2eDataVolTransTime NSLoad
excepIds	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 E2eDataVolTransTime RelativeProximity
nsiIdInfos	array(NsiIdInfo)	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". (NOTE 12)	ServiceExperience DnPerformance NSLoad
qosReq	QosRequirement	C	0..1	Represents the QoS requirements. This attribute shall be included when requested event is "QOS_SUSTAINABILITY".	QoS_Sustainability E2eDataVolTransTime
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
bwRequs	array(BwRequirement)	O	1..N	Represents the media/application bandwidth requirement for each application. It may only be present if "appIds" 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 subscriptiont applies. (NOTE 4)	ServiceExperience
appServerAddrs	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_AIML
disperReqs	array(DispersionRequirement)	O	1..N	Represents the requirements of dispersion analytics.	Dispersion
maxNumOfTopAppUl	Uinteger	O	0..1	Indicates the requested maximum number of top applications that contribute the most to the traffic in Uplink direction. Minimum = 1. May be included when one of the 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
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 9)	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. (NOTE 11)	AnalyticsAccuracy

NOTE 1: Either "excepIds" 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 "excepIds" attribute is mobility related;
- at least one of the "locArea", "appIds", "dnn" and "snssai" attribute should be included, if the expected analytics type via the"exptAnaType" attribute or the list of Exception Ids via the "excepIds" attribute is communication related;
- the expected analytics type via the"exptAnaType" attribute or the list of Exception Ids via "excepIds" 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 4: If both the "allFreq" attribute and the "allRat" attribute within the "ratFreqs" attribute are present, then the cardinality shall be 1 as the "all" indication for all the RAT type and Frequency value the NWDAF has received for the application.
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 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 "appIds" 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 NsiIdInfo 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". (NOTE 4)	Ue_Mobility
ueCommInfos	array(UeCommunication)	C	1..N	Contains the application communication information. Shall be present if the "analyEvent" attribute sets to "UE_COMM"	Ue_Communication
nwPerfInfos	array(NetworkPerfExposure)	C	1..N	Contains the network performance information. Shall be present if the "analyEvent" attribute is set to "NETWORK_PERFORMANCE".	Network_Performance
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
dataVlTrnsTmInfos	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(QosSustainabilityExposure)	C	1..N	Contains the QoS sustainability information. Shall be present if the "analyEvent" attribute is set to "QOS_SUSTAINABILITY".	QoS_Sustainability E2eDataVolTransTime

				(NOTE 2)	
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 when "accuReq" attribute was provided in the request and the "cancelAccuInd" attribute is set to "false" or omitted.	AnalyticsAccuracy
cancelAccuInd	boolean	O	0..1	Indicates cancelled request of the analytics accuracy information. Set to "true" indicates the NWDAF cancelled request of analytics accuracy information as the NWDAF does not support the accuracy checking capability. Otherwise set to "false". Default value is "false" if omitted.	AnalyticsAccuracy
suppFeat	SupportedFeatures	M	1	Represents the features supported by both the AF and the NEF.	
NOTE 1: If the "start" attribute and the "expiry" attribute are both provided, the DateTime of the "expiry" attribute shall not be earlier than the DateTime of the "start" attribute.					
NOTE 2: The "qosFlowRetThd" and "ranUeThrouThd" attributes in QosSustainabilityExposure data type are not applicable.					
NOTE 3: The "minTrafficRate", "aggTrafficRate", "varTrafficRate", "trafRateUeIds", "avePacketDelay", "maxPacketDelay", "varPacketDelay", "packDelayUeIds", "maxPacketLossRate", "varPacketLossRate" and "packetLossUeIds" attribute(s) within the DnPerfInfo data type is applicable only if the "DnPerformanceExt_AIML" feature is supported.					
NOTE 4: If the "Ue_MobilityExt_eNA" feature is supported and the "locGranularity" attribute value "LON_AND_LAT_LEVEL" is requested, the "geoLoc" attribute within the "locInfo" attribute contained in the UeMobilityExposure data type may be provided to report the geographical location (longitude and latitude level).					

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.	
appId	ApplicationId	O	0..1	Identifies an application. May only be present if the "appIds" 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_Beh avior_Ext
snssai	Snssai	O	0..1	Identifies the network slice information.	Abnormal_Beh avior_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	AdditionalMeasureme nt	O	0..1	Additional measurement.	
NOTE:	If the requested period identified by the "startTs" and "endTs" attributes in the "EventReportingRequirement" type is a future time period, which means the analytics result is a prediction. If no sufficient data is collected to provide the confidence of the prediction before the time deadline, a zero confidence shall be returned.				

5.6.3.3.16   Type CongestInfo

Table 5.6.3.3.16-1: Definition of type CongestInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
locArea	LocationArea5G	M	1	Network area of interest. (NOTE)	
cngAnas	array(CongestionAnaly tics)	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 QosSustainabilityExposure

Table 5.6.3.3.18-1: Definition of type QosSustainabilityExposure

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.	
NOTE 1: Either qosFlowRetThd or ranUeThrouThd shall be provided.					
NOTE 2: If the requested period identified by the "startTs" and "endTs" attributes in the "EventReportingRequirement" type is a future time period, which means the analytics result is a prediction. If no sufficient data is collected to provide the confidence of the prediction before the time deadline, a zero confidence shall be returned.					
NOTE 3: The NetworkAreaInfo data within the LocationArea5G data is not applicable.					
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.					
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.					

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	ResourceUsageRequir ement	O	0..1	Indicates more information when providing resource usage information for the network performance type indicated by the "nwPerfType" attribute. (NOTE 4)	NetworkPerfor manceExt_AIM L
confidence	Uinteger	C	0..1	Indicates the confidence of the prediction. (NOTE 2) Shall be present if the analytics result is a prediction. Minimum = 0. Maximum = 100.	
NOTE 1: Either relativeRatio or absoluteNum shall be provided.					
NOTE 2: If the requested period identified by the "startTs" and "endTs" attributes in the "EventReportingRequirement" type is a future time period, which means the analytics result is a prediction. If no sufficient data is collected to provide the confidence of the prediction before the time deadline, a zero confidence shall be returned.					
NOTE 3: The NetworkAreaInfo data within the LocationArea5G data is not applicable.					
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".					
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.					
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.					

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 location area to which the notification applies within the subscribed location area. This attribute shall be present if the "locArea" attribute is included	

				in the event subscription or analytics request.	
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. (NOTE)	
NOTE: The "supi" attribute within the WlanPerUeIdPerformanceInfo data type is not applicable to the current specification.					

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_VOL_TRANS_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_PERFOR MANCE	Indicates that the event subscribed is WLAN performance.	WlanPerformance_AIM L
NS_LOAD_LEVE L	Indicates that the event subscribed is Network Slice load level information.	NSLoad
RELATIVE_PROX IMITY	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
NO_ROAMING_SUPPORT	Indicates that the request is rejected because roaming analytics or data are required and they could not be collected because the NWDAF(s) that were invoked by the NEF do not support the roaming exchange capability.	RoamingAnalytics
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 enhacements 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	ENAExt	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 enhacements 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.
36	StatisticsFailure	This feature indicates support for partial failure report for statistics during event notification. This feature requires the support of the "EneNA" feature.
37	RoamingAnalytics	This feature indicates support for forwarding errors related to roaming analytics.

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.
NO_ROAMING_SUPPORT	403 Forbidden	Indicates that the request is rejected because roaming analytics or data are required and they could not be collected because the NWDAF(s) that were invoked by the NEF do not support the roaming exchange capability.
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.
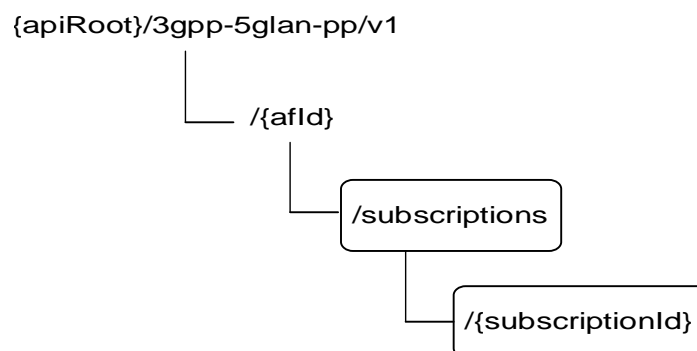
Figure 5.7.1.1-1: Resource URI structure of the 5GLANParameterProvision API

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	/{afId}/subscriptions	GET	Read all subscriptions for a given AF.
		POST	Create a new subscription to provision parameters.
Individual 5GLAN Parameters Provision Subscription	/{afId}/subscriptions/{subscriptionId}	GET	Read an existing subscription identified by {subscriptionId}.
		PUT	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 subscribtions for the given AF, or create an new individual 5GLAN parameters provision subscription to provision parameters to the NEF.

5.7.1.2.2 Resource Definition

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

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

Table 5.7.1.2.2-1: Resource URI variables for this resource

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

5.7.1.2.3 Resource Methods

5.7.1.2.3.1 General

The following clauses specify the resource methods supported by the resource as described in clause 5.7.1.2.2.

5.7.1.2.3.2 GET

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

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

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

Name	Data type	P	Cardinality	Description
N/A				

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

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

Data type	P	Cardinality	Description

N/A			

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

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

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

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

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

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

5.7.1.2.3.3   POST

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

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

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

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

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

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

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

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

5GLanParameter sProvision	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
5GLanParameter sProvision	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
5GLanParameter sProvision	M	1	200 OK	The subscription was updated successfully.
n/a			204 No Content	The subscription was updated successfully.
N/A			307 Temporary Redirect	Temporary redirection, during subscription modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [4].
N/A			308 Permanent Redirect	Permanent redirection, during subscription modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF.

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

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

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

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

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

5.7.1.3.3.4 DELETE

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

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

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

Name	Data type	P	Cardinality	Description
N/A				

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

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

Data type	P	Cardinality	Description
N/A			

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

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

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

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

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

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

5.7.1.3.3.5 PATCH

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

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

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

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

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

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

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

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

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

Name	Data type	P	Cardinality	Description

Location	string	M	1	An alternative URI of the resource located in an alternative NEF.

5.7.1A   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
5GLanParamProvNotif	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   Void

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 Parameters 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
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	Applicability
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.	
EcsAuthMethod	3GPP TS 29.503 [17]	Represents the ECS Authentication Methods.	ECSAuthMethods
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.	
SupportedPlmn	3GPP TS 29.503 [17]	Represents the ID of the PLMN supported by the ECS along with the list of ECSPs associated with the PLMN.	ECSSuppPlmns
5GVnGroupCommunicationType	3GPP TS 29.503 [17]	Represents the 5G VN group communication type.	

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
exterGroupId	ExternalGroupId	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.	
aaaIpv4Addr	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.	
aaaIpv6Addr	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)	
mtcProviderId	MtcProviderInformation	O	0..1	Indicates MTC provider information for 5G VN Group Configuration authorization. (NOTE 1)	
snssai	Snssai	M	1	S-NSSAI for the 5G VN group.	
sessionType	PduSessionType	M	1	PDU Session Type allowed for 5G VN group.	
sessionTypes	array(PduSessionType)	O	1..N	If further PDU Session Types (in addition to the PDU Session Type indicated in the "sessionType" attribute) are allowed for the 5G VN group, they are provided in this attribute. (NOTE 2)	multipleSessionTypes
appDesps	map(AppDescriptor)	M	1..N	Describes the operation systems and the corresponding applications for each operation systems. The key of map is osId.	
vnGroupCommInd	boolean	O	0..1	Indicates whether the 5G VN group is associated with 5G VN group communication. - "true" indicates that the 5G VN group is associated with 5G VN group communication. - "false" indicates that the 5G VN group is not associated with 5G VN group communication. - The default value when omitted is "false".	GMEC
vnGroupCommType	5GVnGroupCommunicationType	O	0..1	Contains the 5G VN group communication type. This attribute shall be present only when the "vnGroupCommInd" is present and set to "true".	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	AcsParams	O	0..1	Contains ACS configuration parameters for the 5G VN group.	GMEC
ecsAddrParams	ECSAddrParams	O	0..1	Contains ECS address configuration parameters for the 5G VN group.	GMEC
dnnSnssaiParams	DnnSnssaiParams	O	0..1	Contains DNN and S-NSSAI specific group 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 present only when 5G LAN Parameters Provisioning Event notifications (e.g., Network Parameters Configuration related notifications) need to be delivered.	GMEC

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.	
appIds	map(ApplicationId)	M	1..N	Identifies applications that is running on the UE's operating system. Any string value can be used as a key of the map.	

5.7.2.3.5   Type: 5GLanParametersProvisionPatch

Table 5.7.2.3.5-1: Definition of type 5GLanParametersProvisionPatch

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

5.7.2.3.6   Type: 5GLanParametersPatch

This data type is deprecated.

Table 5.7.2.3.6-1: Definition of type 5GLanParametersPatch

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

				applications for each operation system. The key of map is osId.	
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
appIds	map(ApplicationIdRm)	O	1..N	Identifies application(s) on the UE's operating system. Any string value can be used as a key of the map.	

5.7.2.3.8   Void

5.7.2.3.9   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). The key of the map is a string representing the failure identifier.	

| | | | | This attribute may only be present in responses from the NEF to the AF.

(NOTE). | |
| 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.	
suggestedNumberOfDlPackets	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.	
ecsAuthMethods	array(EcsAuthMethod)	O	1..N	Contains the supported ECS Authentication Method(s).	ECSAuthMethods

supportedPlmns	array(SupportedPlmn)	O	1..N	Contains the List of PLMNs and associated ECSPs for which EDN configuration information can be provided by the ECS.	ECSSuppPlmns

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
maxGrpDataRateUl	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.	
maxGrpDataRateDl	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: - 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	Void	
4	Void	
5	ECSAuthMethods	This feature indicates the support of ECS authentication methods for 5G VN group.
6	ECSSuppPlmns	This feature indicates the support of ECS supported PLMNs.

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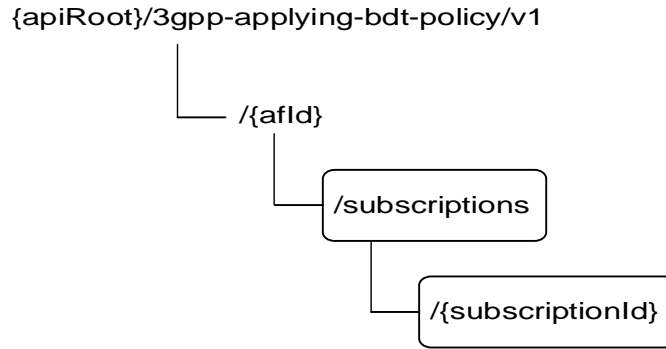
Figure 5.8.1.1-1: Resource URI structure of the ApplyingBdtPolicy API

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	/{afId}/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	/{afId}/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/{afId}/subscriptions**

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

Table 5.8.1.2.2-1: Resource URI variables for this resource

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

5.8.1.2.3   Resource Methods

5.8.1.2.3.1   General

The following clauses specify the resource methods supported by the resource as described in clause 5.8.1.2.2.

5.8.1.2.3.2   GET

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

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

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

Name	Data type	P	Cardinality	Description
N/A				

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

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

Data type	P	Cardinality	Description
N/A			

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

Data type	P	Cardinality	Response codes	Description
array(AppliedBdtPolicy)	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 subscritpion.

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

Data type	P	Cardinality	Response codes	Description
AppliedBdtPolicy	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
BdtReferenceId	3GPP TS 29.122 [4]	Identifier of a selected BDT policy.
Gpsi	3GPP TS 29.571 [8]	Identifies a GPSI.
ExternalGroupId	3GPP TS 29.122 [4]	External Group Identifier for a user group.
SupportedFeatures	3GPP TS 29.571 [8]	Used to negotiate the applicability of the optional features defined in table 5.8.4-1.

5.8.3.3 Structured data types

5.8.3.3.1 Introduction

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

5.8.3.3.2 Type: AppliedBdtPolicy

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

Table 5.8.3.3.2-1: Definition of type AppliedBdtPolicy

Attribute name	Data type	P	Cardinality	Description	Applicability
bdtRefId	BdtReferenceId	M	1	Identifies a selected policy of background data transfer.	
gpsi	Gpsi	C	0..1	Identifies a user. (NOTE)	
externalGroupId	ExternalGroupId	C	0..1	Identifies a user group. (NOTE)	
suppFeat	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 "externalGroupId" shall be included.					

5.8.3.3.3 Type: AppliedBdtPolicyPatch

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

Table 5.8.3.3.2-1: Definition of type AppliedBdtPolicyPatch

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

5.8.3.4 Simple data types and enumerations

5.8.3.4.1 Introduction

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

5.8.3.4.2 Simple data types

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

Table 5.8.3.4.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

5.8.4 Used Features

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

Table 5.8.4-1: Features used by ApplyingBdtPolicy API

Feature number	Feature Name	Description

5.8.5 Error handling

5.8.5.1 General

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

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

5.8.5.2 Protocol Errors

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

5.8.5.3 Application Errors

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

Table 5.8.5.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

5.9 IPTVConfiguration API

5.9.0 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.
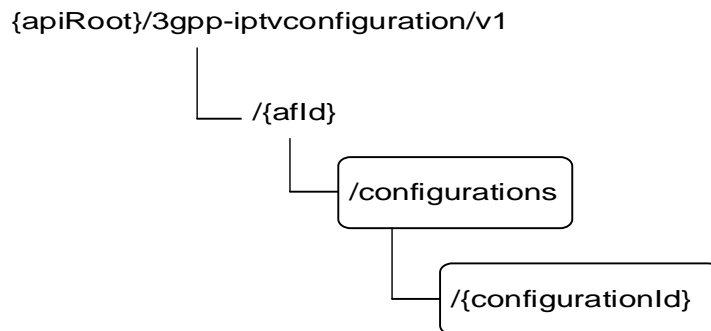
Figure 5.9.1.1-1: Resource URI structure of the IPTVConfiguration API

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

Location	string	M	1	An alternative URI of the resource located in an alternative NEF.

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

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

5.9.1.2.3.3   POST

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

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

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

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

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

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

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

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

5.9.1.3   Resource: Individual IPTV Configuration

5.9.1.3.1   Introduction

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

5.9.1.3.2   Resource Definition

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

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

Table 5.9.1.3.2-1: Resource URI variables for this resource

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

afId	string	Identifier of the AF.
configurationId	string	Identifier of the configuration resource.

5.9.1.3.3   Resource Methods

5.9.1.3.3.1   General

The following clauses specify the resource methods supported by the resource as described in clause 5.9.1.3.2.

5.9.1.3.3.2   GET

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

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

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

Name	Data type	P	Cardinality	Description
N/A				

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

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

Data type	P	Cardinality	Description
N/A			

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

Data type	P	Cardinality	Response codes	Description
IptvConfigData	M	1	200 OK	The information for the configuration in the request URI are returned.
N/A			307 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.

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5.9.1.3.3.3   PUT

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

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

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

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

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

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

Table 5.9.1.3.3.3-3: Headers supported by the 307 Response Code on this resource

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

Table 5.9.1.3.3.3-4: Headers supported by the 308 Response Code on this resource

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

5.9.1.3.3.4   DELETE

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

This method shall support the URI query parameters specified in table 5.9.1.3.3.4-1.

Table 5.9.1.3.3.4-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description

N/A			

This method shall support the request data structures specified in table 5.9.1.3.3.4-2 and the response data structures and response codes specified in table 5.9.1.3.3.4-3.

Table 5.9.1.3.3.4-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.9.1.3.3.4-3: Data structures supported by the DELETE Response Body on this resource

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

Table 5.9.1.3.3.4-4: Headers supported by the 307 Response Code on this resource

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

Table 5.9.1.3.3.4-5: Headers supported by the 308 Response Code on this resource

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

5.9.1.3.3.5   PATCH

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

This method shall support the request data structures specified in table 5.9.1.3.3.5-1 and the response data structures and response codes specified in table 5.9.1.3.3.5-2.

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

Data type	P	Cardinality	Description
IptvConfigDataPatch	M	1	Partial update an existing configuration.

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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.	

5.9.2.2 Reused data types

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

Table 5.9.2.2-1: Re-used Data Types

Data type	Reference	Comments
Dnn	3GPP TS 29.571 [8]	Identifies a DNN.
ExternalGroupId	3GPP TS 29.122 [4]	External Group Identifier for a user group.
Gpsi	3GPP TS 29.571 [8]	Identifies a GPSI.
Ipv4Addr	3GPP TS 29.571 [8]	Identifies an IPv4 address.
Ipv6Addr	3GPP TS 29.571 [8]	Identifies an IPv6 address.
Link	3GPP TS 29.122 [4]	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)	
exterGroupId	ExternalGroupId	C	0..1	Represents a group of users. (NOTE)	
afAppId	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.	
mtcProviderId	MtcProviderInformation	O	0..1	Indicates MTC provider information.	
suppFeat	SupportedFeatures	M	1	Indicates the negotiated supported features.	
NOTE: Only one of the "gpsi" or "exterGroupId" 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.
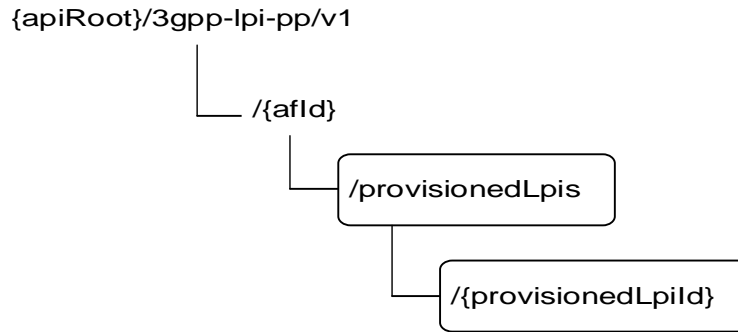
Figure 5.10.1.1-1: Resource URI structure of the LpiParameterProvision API

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

This resource shall support the resource URI variables defined in table 5.10.1.2.2-1.

Table 5.10.1.2.2-1: Resource URI variables for this resource

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

afId	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
LpiParametersPro vision	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
LpiParametersPro vision	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))	
suppFeat	SupportedFeatures	M	1	Indicates the negotiated supported features.	
NOTE 1: Only one of the "gpsi" or "exterGroupId" attribute shall be provided.					
NOTE 2: The NEF should check received MTC Provider information and then the NEF may:					
- 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:
   - 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.
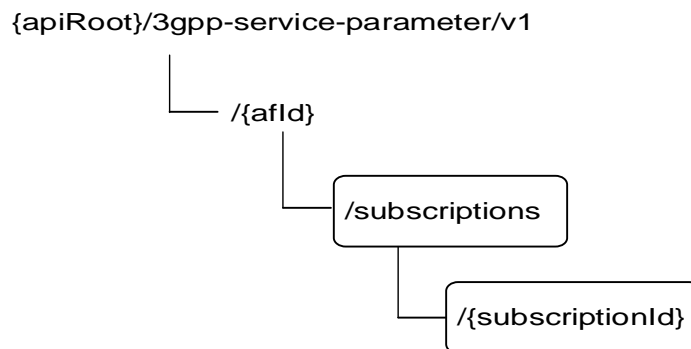
Figure 5.11.1.1-1: Resource URI structure of the ServiceParameter API

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 Subscripions	/{afId}/subscriptions	GET	Read all subscriptions for a given AF.

		POST	Create a new service parameter subscription.
Individual Service Parameter Subscripion	/{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 an new individual service parameter subscription in the NEF.

5.11.1.2.2 Resource Definition

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

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

Table 5.11.1.2.2-1: Resource URI variables for this resource

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

5.11.1.2.3 Resource Methods

5.11.1.2.3.1 General

The following clauses specify the resource methods supported by the resource as described in clause 5.11.1.2.3.

5.11.1.2.3.2 GET

The HTTP GET method allows to read all the active subscriptions for a given AF.

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	Contains the GPSI(s) of the requested UE(s). (NOTE 1, NOTE 2)	enNB
ip-addrs	array(IpAddr)	O	1..N	Contains the IP address(es) of the requested UE(s). (NOTE 1, NOTE 2)	enNB
ip-domain	string	O	1	Contains the IPv4 address domain identifier. This query parameter may be present only if the "ip-addrs" query parameter is also present and contains at least one array element including an IPv4 address.	enNB

mac-addrs	array(MacAddr48)	O	1..N	Contains the MAC address(es) of the requested UE(s). (NOTE 1, NOTE 2)	enNB
NOTE 1: These query parameters are mutually exclusive. Either one of them may be present.					
NOTE 2: If multiple array elements are provided within this query parameter, then each array 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 HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall 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	Contains 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	Contains an alternative URI of the resource located in an alternative NEF.

5.11.1.2.3.3   POST

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

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

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

Data type	P	Cardinality	Description

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

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

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

Table 5.11.1.2.3.3-3: Headers supported by the 201 Response Code on this resource

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

5.11.1.3   Resource: Individual Service Parameter Subscription

5.11.1.3.1   Introduction

This resource allows a AF to read, update or delete an existing service parameter subscription.

5.11.1.3.2   Resource Definition

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

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

Table 5.11.1.3.2-1: Resource URI variables for this resource

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

5.11.1.3.3   Resource Methods

5.11.1.3.3.1   General

The following clauses specify the resource methods supported by the resource as described in clause 5.11.1.3.3.

5.11.1.3.3.2   GET

The GET method allows to read the active subscription for a given AF and subscription Id. The AF shall initiate the HTTP GET request message and 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 5.11.1.3.3.3-4: Headers supported by the 308 Response Code on this resource

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

5.11.1.3.3.4   DELETE

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

This method shall support the URI query parameters specified in table 5.11.1.3.3.4-1.

Table 5.11.1.3.3.4-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description
N/A				

This method shall support the request data structures specified in table 5.11.1.3.3.4-2 and the response data structures and response codes specified in table 5.11.1.3.3.4-3.

Table 5.11.1.3.3.4-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.11.1.3.3.4-3: Data structures supported by the DELETE Response Body on this resource

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

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

Table 5.11.1.3.3.4-4: Headers supported by the 307 Response Code on this resource

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

Table 5.11.1.3.3.4-5: Headers supported by the 308 Response Code on this resource

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

5.11.1.3.3.5   PATCH

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

This method shall support the request data structures specified in table 5.11.1.3.3.5-1 and the response data structures and response codes specified in table 5.11.1.3.3.5-2.

Table 5.11.1.3.3.5-1: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
ServiceParameterDataPatch	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
ServiceParameterData	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(AfNotificatio n)	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 reference point.	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
A2xParamsUu	5.11.2.4.2	Represents the service parameters for A2X communication over Uu reference point.	A2X
A2xParamsUuRm	5.11.2.4.2	This data type is defined in the same way as the A2xParamsUu 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
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
ParamForRangingSlPos	5.11.2.4.2	Represents the service parameters for ranging and sidelink positioning.	Ranging_SL
ParamForRangingSlPosRm	5.11.2.4.2	This data type is defined in the same way as the ParamForRangingSlPos 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.	
Bytes	3GPP TS 29.571 [8]	Represents a string with format "byte".	ExtConnCapability
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.	
Snssai	3GPP TS 29.571 [8]	Identifies the S-NSSAI.	
SupportedFeatures	3GPP TS 29.571 [8]	Used to negotiate the applicability of the optional features defined in table 5.11.3-1.	
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)	
appId	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. - "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.	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	Notification_test_event

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				3GPP TS 29.122 [4]. The default value is "false" if omitted.	
websockNotifConfig	WebsockNotifConfig	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
paramForRangingSlPos	ParamForRangingSlPos	O	0..1	Contains the service parameters for ranging and sidelink positioning.	Ranging_SL
urspGuidance	array(UrspRuleRequest)	O	1..N	Contains the service parameters used to guide the URSP rule(s). (NOTE 1)	AfGuideURSP
vpsUrspGuidance	array(UrspRuleRequest)	O	1..N	Contains the service parameters provided by an AF to guide the VPLMN-specific URSP rule(s).	VPLMNSpecificURSP
a2xParamsPc5	A2xParamsPc5	O	0..1	Contains the A2X service parameters used over PC5 reference point.	A2X
a2xParamsUu	A2xParamsUu	O	0..1	Contains the A2X service parameters used over Uu reference point.	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.	

NOTE 1: One of individual UE identifier (i.e. "gpsi", "ueIpv4", "ueIpv6" 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 for the HPLMN (i.e. via the "urspGuidance" attribute, see also clause 4.4.20), only "anyUeInd", "gpsi" and "externalGroupId" attributes are applicable. For VPLMN-specific URSP service parameter provisioning (i.e. via the "vpsUrspGuidance" attribute, see also clause 4.4.20), when the "VPLMNSpecificURSP" feature is supported, only "gpsi" and "roamUeNetDescs" attributes are applicable. The "roamUeNetDescs" attribute only applies to URSP service parameter provisioning and may be included only when the "vpsUrspGuidance" attribute is provided. When the "AfGuideTNAPs" feature is supported, when TNAP ID(s) is provisioned within the "tnaps" attribute, only "gpsi" shall be provided.

NOTE 2: Either the "afServiceId" attribute, "appId" 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.

NOTE 3: When "anyUeInd" attribute is present, "appId" 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.

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
paramForRangingSlPos	ParamForRangingSlPosRm	O	0..1	Contains the service parameters for ranging and sidelink positioning.	Ranging_SL
urspGuidance	array(UrspRuleRequest)	O	1..N	Contains the service parameters used to guide the URSP rule(s).	AfGuideURSP
vpsUrspGuidance	array(UrspRuleRequest)	O	1..N	Contains the service parameters provided by an AF to guide the VPLMN-specific URSP rule(s).	VPLMNSpecificURSP
a2xParamsPc5	A2xParamsPc5Rm	O	0..1	Contains the A2X service parameters used over PC5 reference point.	A2X
a2xParamsUu	A2xParamsUuRm	O	0..1	Contains the A2X service parameters used over Uu reference point.	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)	
NOTE 1: If the "trafficDesc" attribute is not present, the NEF may derive the traffic descriptor components from the AF Service Identifier.					
NOTE 2: If the "routeSelSelParamSets" attribute is not present, the NEF may derive S-NSSAI/DNN and/or other related parameters from the AF Service Identifer according to SLA.					
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.					

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
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.					

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 "exterGroupId" attribute or "anyUeInd" 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.	
opSpecConnCaps	array(Bytes)	C	1..N	Operator specific connection capabilities. Its encoding shall comply with the encoding defined in clause 5.2 of 3GPP TS 24.526 [48].	ExtConnCapability
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 5.2 of 3GPP TS 24.526 [48]. (NOTE 5)	PIN
NOTE 1: At least one attribute of the above Traffic descriptor components shall be present.					
NOTE 2: The information is used to identify the Application(s) that is(are) running on the UE's OS. The included "osId" attribute does not include an OS version number. The included "appIds" attribute does not include a version number for the application.					
NOTE 3: "flowDescs" attribute and "ethFlowDescs" attribute are mutually exclusive.					
NOTE 4: The match of this traffic descriptor component does not require successful DNS resolution of the FQDN provided by the UE Application.					
NOTE 5: The "pinId" attribute and other attributes are mutually exclusive.					

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 Void

5.11.2.3.11 Void

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 reference point 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
A2xParamsUu	string	Configuration parameters for A2X communication over Uu reference point. Its encoding shall comply with the UE policies for A2X communication over Uu reference point as defined in 3GPP TS 24.578 [69].	A2X
A2xParamsUuRm	string	This data type is defined in the same way as the "A2xParamsUu" 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
ParamForProSeU2NRelUeRm	string	This data type is defined in the same way as the "ParamForProSeU2NRelUe" data type, but with the OpenAPI "nullable: true" property.	ProSe
ParamForProSeRemUe	string	Configuration parameters for 5G ProSe remote UE. Its encoding shall comply with the UE policies for 5G ProSe remote UE defined in clause 5.6 of 3GPP TS 24.555 [49].	ProSe
ParamForProSeRemUeRm	string	This data type is defined in the same way as the "ParamForProSeRemUe" data type, but with the OpenAPI "nullable: true" property.	ProSe
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
ParamForRangingSlPos	string	Configuration parameters for ranging and sidelink positioning. Its encoding shall comply with the UE policies for ranging and sidelink positioning defined in clause 5.2.3 of 3GPP TS 24.514 [72]	Ranging_SL
ParamForRangingSlPosRm	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
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	Applicability
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.	
IOT_DELAY_TOLERANT	Indicates the connection capability to support IoT delay-tolerant services. (NOTE)	ExtConnCapability
IOT_NON_DELAY_TOLERANT	Indicates the connection capability to support IoT non-delay-tolerant services. (NOTE)	ExtConnCapability
DL_STREAMING	Indicates the connection capability to support downlink streaming services. (NOTE)	ExtConnCapability
UL_STREAMING	Indicates the connection capability to support uplink streaming services.	ExtConnCapability

	(NOTE)	
VEHIC_COMM	Indicates the connection capability to support vehicular communication services. (NOTE)	ExtConnCapability
REAL_TIME_INTERACTIVE	Indicates the connection capability to support real time interactive services. (NOTE)	ExtConnCapability
UNIFIED_COMM	Indicates the connection capability to support unified communication services. (NOTE)	ExtConnCapability
BACKGROUND	Indicates the connection capability to support background services. (NOTE)	ExtConnCapability
MISS_CRITICAL	Indicates the connection capability to support mission critical services. (NOTE)	ExtConnCapability
TIME_CRITICAL	Indicates the connection capability to support time critical services. (NOTE)	ExtConnCapability
LOW_LAT_LOSS_TOL_UNACK	Indicates the connection capability to support low latency loss tolerant communications in un-acknowledged mode. (NOTE)	ExtConnCapability
NOTE: These connection capabilities are traffic categories specified in GSMA PRD NG.135 [75].		

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: -　Support the provisioning/update/deletion of ranging and sidelink positioning service parameters.
13	PduSessTypeChange	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. The following functionalities are supported: -　Support the provisioning/update of the requested PDU Session type as part of the information provided by the AF for guiding URSP determination. This feature requires the support of the "AfGuideURSP" feature.
14	ExtConnCapability	This feature indicates the support of: -　The connection capabilities defined as traffic categories in GSMA PRD NG.135 [75]. -　Operator Specific traffic categories.

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　ACSParameterProvision API

5.12.0　Introduction

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

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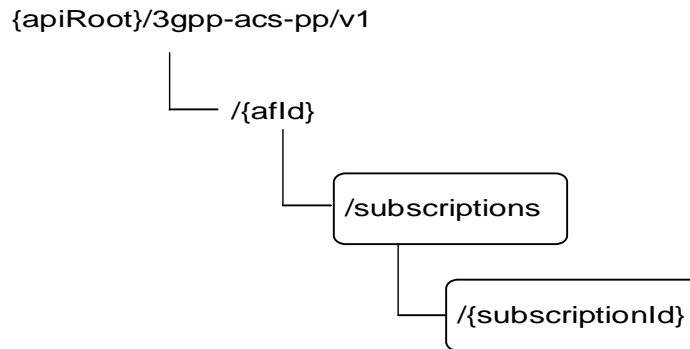
Figure 5.12.1.1-1: Resource URI structure of the ACSParameterProvision API

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

Table 5.12.1.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method	Description
ACS Configuration Subscripions	/{afId}/subscriptions	GET	Read all subscriptions for a given AF.
		POST	Create a new ACS configuration subscription.
Individual ACS Configuration Subscripion	/{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-acs-pp/v1/{afId}/subscriptions**

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

Table 5.12.1.2.2-1: Resource URI variables for this resource

Name	Definition
apiRoot	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 theNEF shall respond to the message.

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

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

Name	Data type	P	Cardinality	Description
N/A				

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

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

Data type	P	Cardinality	Description
N/A			

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

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

Table 5.12.1.3.3.2-4: Headers supported by the 307 Response Code on this resource

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

Table 5.12.1.3.3.2-5: Headers supported by the 308 Response Code on this resource

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

5.12.1.3.3.3 PUT

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

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

Table 5.12.1.3.3.3-1: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
AcsConfiguration Data	M	1	Modify an existing subscription.

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

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

Table 5.12.1.3.3.3-3: Headers supported by the 307 Response Code on this resource

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

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

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

5.12.1.3.3.3A PATCH

The PATCH method modifies an existing resource to update an existing ACS Configuration Subscripion. The AF shall initiate the HTTP PATCH request message and the NEF shall respond to the message.

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

Table 5.12.1.3.3.3A-1: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
AcsConfiguration DataPatch	M	1	Modify an existing subscription.

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

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

Table 5.12.1.3.3.3A-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 ACSParameterProvision API.

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

Table 5.12.2.1-1: ACSParameterProvision API specific Data Types

Data type	Clause defined	Description	Applicability
AcsConfigurationData	5.12.2.3.2	Represents an individual ACS Configuration subscription resource.	
AcsConfigurationDataPatch	5.12.2.3.3	Represents the parameters to request to modify an existing ACS Configuration subscription.	PatchUpdate

5.12.2.2 Reused data types

The data types reused by the ACSParameterProvision API from other specifications are listed in table 5.12.2.2-1.

Table 5.12.2.2-1: Re-used Data Types

Data type	Reference	Comments
AcsInfo	3GPP TS 29.571 [8]	Contains the information of ACS
ExternalGroupId	3GPP TS 29.122 [4]	External Group Identifier for a user group.
Gpsi	3GPP TS 29.571 [8]	Identifies a GPSI.
Link	3GPP TS 29.122 [4]	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)	
exterGroupId	ExternalGroupId	O	0..1	Represents a group of users. (NOTE)	
acsInfo	AcsInfo	M	1	Contains the information of ACS.	
mtcProviderId	MtcProviderInformation	O	0..1	Indicates MTC provider information.	
suppFeat	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 "exterGroupId" 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.	
mtcProviderId	MtcProviderInformation	O	0..1	Indicates MTC provider information.	

ETSI

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.	
svcId	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 additionaly 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.

{apiRoot}/3gpp-akma/v1
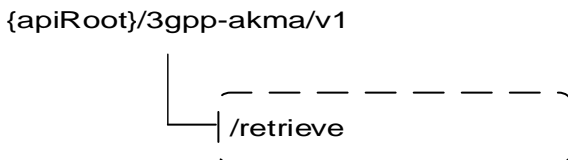
Figure 5.14.3.1-1: Custom operation URI structure of the AKMA API

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

5.14.4.1   General

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

Table 5.14.4.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
AKMA Service Disablement Notification	{notifUri}	POST	Enable the NEF to notify a previously subscribed AF of the disablement of the AKMA service for the UE.

5.14.4.2   AKMA Service Disablement Notification

5.14.4.2.1   Description

The AKMA Service Disablement Notification is used by the NEF to notify the AF of AKMA service disablement for the UE.

5.14.4.2.2   Target URI

The Callback URI **"{notifUri}"** shall be used with the callback URI variables defined in table 5.14.4.2.2-1.

Table 5.14.4.2.2-1: Callback URI variables

Name	Definition
notifUri	Callback URI provided by the AF during retrievel of AKMA application key as defined in table 5.14.3.2.2-1.

5.14.4.2.3   Operation Definition

This method shall support the request data structures specified in table 5.14.4.2.3.1-1 and the response data structures and response codes specified in table 5.14.4.2.3-2.

Table 5.14.4.2.3-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
ServiceDiableNotif	M	1	Represents the AKMA Service Disablement Notification.

Table 5.14.4.2.3-2: 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 received successfully and processed.
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 5.14.4.2.3-3: 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 5.19.4.2.3-4: 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.

5.14.5 Data Model

5.14.5.1 General

This clause specifies the application data model supported by the AKMA API. Table 5.14.5.1-1 specifies the data types defined for the AKMA API.

Table 5.14.5.1-1: AKMA API specific Data Types

Data type	Clause defined	Description	Applicability
AkmaAfKeyRequest	5.14.5.3.2	Represents AKMA application key retrieval request information.	
AkmaAfKeyData	5.14.5.3.3	Represents AKMA application key information.	
ServiceDisableNotif	5.15.5.3.4	Represents a AKMA service disable information.	

5.14.5.2 Reused data types

The data types reused by the AKMA API from other specifications are listed in table 514.5.2-1.

Table 5.14.5.2-1: Re-used Data Types

Data type	Reference	Comments
DateTime	3GPP TS 29.122 [4]	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.
Uri	3GPP TS 29.122 [4]	Represents a URI.

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.	
notifiUri	Uri	O	0..1	Contains the notification URI via which the AF desires to receive notifications on AKMA service disablement.	RoamingRestriction
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 3)	
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.

5.14.5.3.4 Type: ServiceDisableNotif

Table 5.14.5.3.4-1: Definition of type ServiceDisableNotif

Attribute name	Data type	P	Cardinality	Description	Applicability
aKId	AKId	M	1	Contains the A-KID.	RoamingRestriction

5.14.5.4 Simple data types and enumerations

5.14.5.4.1 Introduction

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

5.14.5.4.2 Simple data types

The simple data types defined in table 5.14.5.4.2-1 shall be supported.

Table 5.14.5.4.2-1: Simple data types

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

5.14.6 Used Features

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

Table 5.14.6-1: Features used by AKMA API

Feature number	Feature Name	Description
1	RoamingRestriction	This feature indicates the support of roaming UE detection by the network and the denial of the AKMA services to roaming UEs.

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	Applicability
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.	
ROAMING_AKMA_SERVICE_DENIED	403 Forbidden	Indicates that the Network identifies the request is for a Roaming UE and denies the AKMA service.	RoamingRestriction

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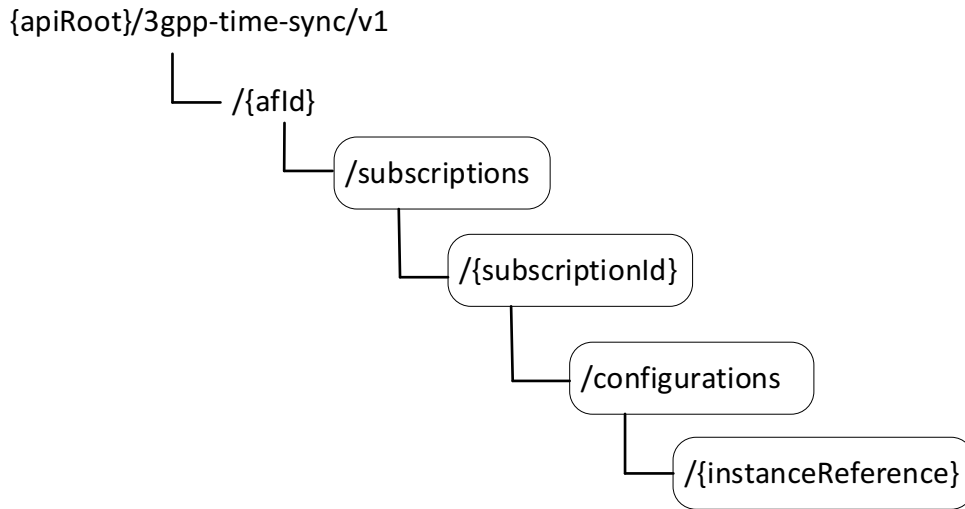
Figure 5.15.1.1-1: Resource URI structure of the TimeSyncExposure API

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	/{afId}/subscriptions	GET	Read all subscriptions for a given AF.
		POST	Create a new subscription to time synchronization exposure.
Individual Time Synchronization Exposure Subscription	/{afId}/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	/{afId}/subscriptions/{subscriptionId}/configurations	GET	Read all configurations for a given AF and subscription.
		POST	Create a new configuration to time synchronization exposure
Individual Time Synchronization Exposure Configuration	/{afId}/subscriptions/{subscriptionId}/configurations/{instanceReference}	GET	Read a configuration to time synchronization exposure.
		PUT	Modify all of the properties of an existing configuration to time synchronization exposure.
		DELETE	Delete a configuration to time synchronization exposure.
		DELETE	DELETE a new configuration of 5G access stratum time distribution.

5.15.1.2 Resource: Time Synchronization Exposure Subscriptions

5.15.1.2.1 Introduction

This resource allows an AF to read all active time synchronization exposure subscribtions 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/{afId}/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].
afId	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. The response shall include a Location header field containing an alternative 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 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	Contains 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	Contains 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.
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 causes are described in clause 5.15.6.				

Table 5.15.1.2.3.3-3: Headers supported by the 201 Response Code on this resource

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

5.15.1.3   Resource: Individual Time Synchronization Exposure Subscription

5.15.1.3.1   Introduction

This resource allows an AF to read, update or delete an existing Individual Time Synchronization Exposure Subscription.

5.15.1.3.2   Resource Definition

Resource URI: **{apiRoot}/3gpp-time-sync/v1/{afId}/subscriptions/{subscriptionId}**

This resource shall support the resource URI variables defined in table 5.15.1.3.2-1.

Table 5.15.1.3.2-1: Resource URI variables for this resource

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

5.15.1.3.3   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 theNEF 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. The response shall include a Location header field containing an alternative 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 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	Contains 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	Contains 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. The response shall include a Location header field containing an alternative 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 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 5.15.6.				

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	Contains 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	Contains 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. The response shall include a Location header field containing an alternative 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 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	Contains 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	Contains 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. The response shall include a Location header field containing an alternative 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 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	Contains 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	Contains 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 5.15.1.4.3.3-2: 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.
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 causes are described in clause 5.15.6.				

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. The response shall include a Location header field containing an alternative 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 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	Contains 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	Contains 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

Data type	P	Cardinality	Response codes	Description
TimeSyncExposur eConfig	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
TimeSyncExposu reConfig	M	1	200 OK	The time synchronization configuration was updated successfully.
N/A			204 No Content	The time synchronization configuration was updated 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].
ProblemDetails	O	0..1	403 Forbidden	(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 5.15.6.				

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	Contains 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	Contains 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. The response shall include a Location header field containing an alternative 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 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	Contains 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	Contains 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 synchroniziation 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. 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 5.15.3.2.3.1-3: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description

Location	string	M	1	Contains 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	Contains 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 synchroniziation service configuration by the NEF to the AF.

Table 5.15.5.3.3.1-2: Data structures supported by the POST Response Body on this resource

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

N/A			308 Permanent Redirect	Permanent redirection, during event notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative AF where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [4].
NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.				

Table 5.15.3.3.3.1-3: Headers supported by the 307 Response Code on this resource

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

Table 5.15.2.2.3.1-4: Headers supported by the 308 Response Code on this resource

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

5.15.3.3.3.2   Void

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
AvailReport	5.15.4.3.22	Contains the availability status for a UE/DS-TT.	SupportReport
AvailStatus	5.15.4.4.10	Defines the availability status.	SupportReport
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.	
ReportedCapability	5.15.4.5.1	Extends the EventFilter data type with the AvailReport data type to allows to indicate the availability status of the UE/DS-TT.	SupportReport
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.	
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.	
ProblemDetails	3GPP TS 29.122 [4]	Represents error related information.	
Snssai	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.	
TemporalValidity	3GPP TS 29.514 [7]	Indicates the time interval(s) during which the AF request is to be applied.	
Uinteger	3GPP TS 29.571 [8]	Unsigned integer.	
Uri	3GPP TS 29.122 [4]	Identifies a referenced resource.	
WebsockNotifConfig	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

exterGroupId	ExternalGroupId	C	0..1	Identifies a group of UE(s) for which the time synchronization capabilities is requested. (NOTE 1)	
gpsis	array(Gpsi)	C	1..N	Contains a list of UE for which the time synchronization capabilities is requested. (NOTE 1)	
anyUeInd	boolean	C	0..1	Identifies whether the AF request applies to any UE (i.e. all UEs). - "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)	
snssai	Snssai	C	0..1	Identifies an S-NSSAI. (NOTE 2)	
afServiceId	string	O	0..1	Identifies a service on behalf of which the AF is issuing the request.	
subscribedEvents	array(SubscribedEvent)	O	1..N	Identifies the requirement to be notified of the event(s).	
eventFilters	array(EventFilter)	O	1..N	Contains the filter conditions to match for notifying the event(s) of time synchronization capabilities for a list of UE(s).	
subsNotifUri	Uri	M	1	Notification URI for time sensitive capability reporting.	
subsNotifId	string	M	1	Notification Correlation ID assigned by the NF service consumer.	
maxReportNbr	Uinteger	O	0..1	If omitted, there is no limit.	
expiry	DateTime	C	0..1	This attribute indicates the expiry time of the subscription, after which the NEF shall not send any event notifications and the subscription becomes invalid. It may be included in an event subscription request and may be included in an event subscription response based on operator policies. If an expiry time was included in the request, then the expiry time returned in the response should be less than or equal to that value. If the expiry time is not included in the response, the NF service consumer shall not associate an expiry time for the subscription.	
repPeriod	DurationSec	C	0..1	Is supplied for notification Method "periodic".	

requestTestNotif ication	boolean	O	0..1	Indicates whether the AF requests the NEF to send a test notification. - 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
websockNotifConfig	WebsockNotifConfig	O	0..1	Configuration parameters to set up notification delivery over Websocket protocol.	Notification_websocket
suppFeat	SupportedFeatures	C	0..1	Represents the features supported by the NF service consumer. This parameter shall be supplied by the NF service consumer in the POST request and the response that requested the creation of an Individual Time Synchronization Subscription resource.	
NOTE 1: Only one of the properties "gpsis", "anyUeInd" or "exterGroupId" 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 1)	
asTimeRes	AsTimeResource	C	0..1	Indicates the supported 5G clock quality (i.e. the source of time used by the 5GS). (NOTE 1)	
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 2)	
NOTE 1: At least one of the "gmCapables" attribute and "asTimeRes" attribute shall be included.					
NOTE 2: The "ptpCapForUes" attribute shall contain the PTP capabilities for previously target UE(s) for which the PTP capabilities changed and/or the PTP capabilities for new UE(s).					

5.15.4.3.4   Void

5.15.4.3.5   Void

5.15.4.3.6   Type: TimeSyncExposureConfig

Table 5.15.4.3.6-1: Definition of type TimeSyncExposureConfig

Attribute name	Data type	P	Cardinality	Description	Applicability
upNodeId	Uint64	M	1	Identifies the applicable NW-TT. Contains a TSC user plane node Id. If integrated with TSN, the user plane node Id is a bridge Id defined in IEEE 802.1Q [41] clause 14.2.5.	
reqPtpIns	PtpInstance	M	1	Identifies the PtP instance configuration and activation requested by the AF.	
gmEnable	boolean	C	0..1	Indicates whether the AF requests 5GS to act as a grandmaster for PTP or gPTP. - "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.	
timeSyncErrBdgt	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	NetTimeSyncStatus

| | | | | time synchronization status for the (g)PTP service is acceptable / not acceptable.

This attribute shall be present when the "clkQltDetLvl" attribute is present. | |
| 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 synchroniztion 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(ReportedCapability)	M	1..N	Contains the reported PTP capabilities for the UE. (NOTE)	
NOTE:	When the "SupportReport" feature is supported, it also indicates the PTP capabilities of the UE changed because of the termination of the PDU session. In this case, the "ptpCaps" attribute shall contain a ReportedCapability entry with the "avStatus" attribute set to "PDU_SESSION_TERMINATION".				

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",	NetTimeSyncStatus

				"NOT_ACCEPTABLE") for any of the PTP port(s) in NW-TT of the PTP instance.	
stateOfDstts	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 provided configuration parameters apply. (NOTE)	
n6Ind	boolean	C	0..1	Indicates whether the provided configuration parameters apply to the N6 interface. - "true" indicates that the provided configuration parameters apply to the N6 interface. The presence of this attribute with the value "false" shall be prohibited. (NOTE)	
ptpEnable	boolean	O	0..1	This attribute is used to indicate how to set the portDS.portEnable. - 'true' indicates to set the portDS.portEnable to TRUE. - "false" indicates to set the portDS.portEnable to 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 "logAnnouInter" attribute is to be used. - When set to "false", the value of "logSyncInter" attribute is used to set the initialLogSyncInterval as described in IEEE Std 802.1AS [46].	

				- When set to "true", the value of "logSyncInter" attribute is used to set the mgtSettableLogSyncInterval as described in IEEE Std 802.1AS [46]. - If omitted, the default value as described in the IEEE Std 802.1AS [46] is used.	
logAnnouInter	integer	O	0..1	Specifies the mean time interval between successive Announce messages. This is applicable for IEEE Std 1588 [45] Boundary Clock or IEEE Std 802.1AS [46] operation. If omitted, the default value as described in the PTP Profile is used.	
logAnnouInterInd	boolean	O	0..1	Indicates how the value of the "logSyncInter" attribute is to be used. - 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 the "gpsi" attribute or the "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.	
clkQltIndOfDstt	AcceptanceCriteriaResultIndication	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

5.15.4.3.22   Type: AvailReport

Table 5.15.4.3.22-1: Definition of type AvailReport

Attribute name	Data type	P	Cardinality	Description	Applicability
avStatus	AvailStatus	O	0..1	Indicates the availability status.	

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 availablility 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.	

5.15.4.4.10   Enumeration: AvailStatus

Table 5.15.4.4.10-1: Definition of type AvailStatus

Enumeration value	Description	Applicability
PDU_SESSION_TERMINATION	The UE is not available for (g)PTP services because the PDU session is terminated.	

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

5.15.4.5.1   Type: ReportedCabability

The ReportedCapability data type extends the EventFilter data type with the attribute(s) defined in the AvailReport data type, to enable to indicate the availability status of the UE/DS-TT.

Table 5.15.4.5.1-1: Definition of type ReportedCabability as a list of non-exclusive alternatives

Data type	Cardinality	Description	Applicability
EventFilter	1	It represents the conditions to match for notifying the event(s) of time synchronization capabilities for a list of UE(s).	
AvailReport	1	It represents the availability status report of the UE.	SupportReport

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	SupportReport	This feature indicates the support of the report of whether the requested Time Synchronization is available and, based on the UE's Time Synchronization Subscription Data in UDM, authorized for the requested UEs.

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	Applicability
UE_SERVICE_NOT_AUTHORIZED	403 Forbidden	The AF request is not authorized or the AF requested parameter(s) are not allowed by UE's Time Synchronization Subscription Data in UDM.	SupportReport

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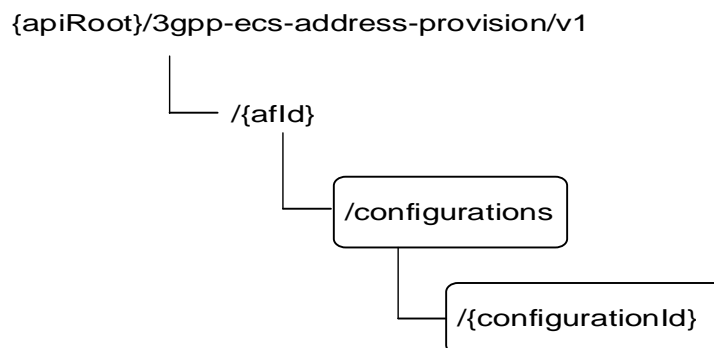
Figure 5.16.1.1-1: Resource URI structure of the EcsAddressProvision API

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/{configuratio nId}	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 an 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
EcsAddressProvis ion	M	1	Parameters to create a confirguation 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
EcsAddressProvi sion	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

EcsAddressProvi sion	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
EcsAddressProvis ion	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
EcsAddressProvi sion	M	1	200 OK	The configuration was updated successfully.
N/A			204 No Content	The configuration was updated successfully.
N/A			307 Temporary Redirect	Temporary redirection, during configuration modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [4].
N/A			308 Permanent Redirect	Permanent redirection, during configuration modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF.

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

Table 5.16.1.3.3.3-3: Headers supported by the 307 Response Code on this resource

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

Table 5.16.1.3.3.3-4: Headers supported by the 308 Response Code on this resource

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

5.16.1.3.3.4   DELETE

The DELETE method deletes an existing Individual ECS Address Provision Configuration. The AF shall initiate the HTTP DELETE request message and the NEF shall respond to the message.

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

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

Name	Data type	P	Cardinality	Description
N/A				

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

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

Data type	P	Cardinality	Description
N/A			

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

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

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

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

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

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

5.16.1A 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
EcsAuthMethod	3GPP TS 29.503 [17]	Represents the ECS Authentication Methods.	ECSAuthMethods
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.	
SupportedPlmn	3GPP TS 29.503 [17]	ID of the PLMN supported by the ECS along with the list of ECSPs associated with the PLMN.	ECSSuppPlmns
TargetUeId	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	TargetUeId	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
ecsAuthMethods	array(EcsAuthMethod)	O	1..N	Indicates the Supported ECS Authentication Method(s).	ECSAuthMethods
supportedPlmns	array(SupportedPlmn)	O	1..N	Indicates the List of PLMNs and associated ECSPs for which EDN configuration information can be provided by the ECS.	ECSSuppPlmns
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.
3	ECSAuthMethods	This feature indicates the support of ECS authentication methods provided to the NEF.
4	ECSSuppPlmns	This feature indicates the support of ECS supported PLMNs.

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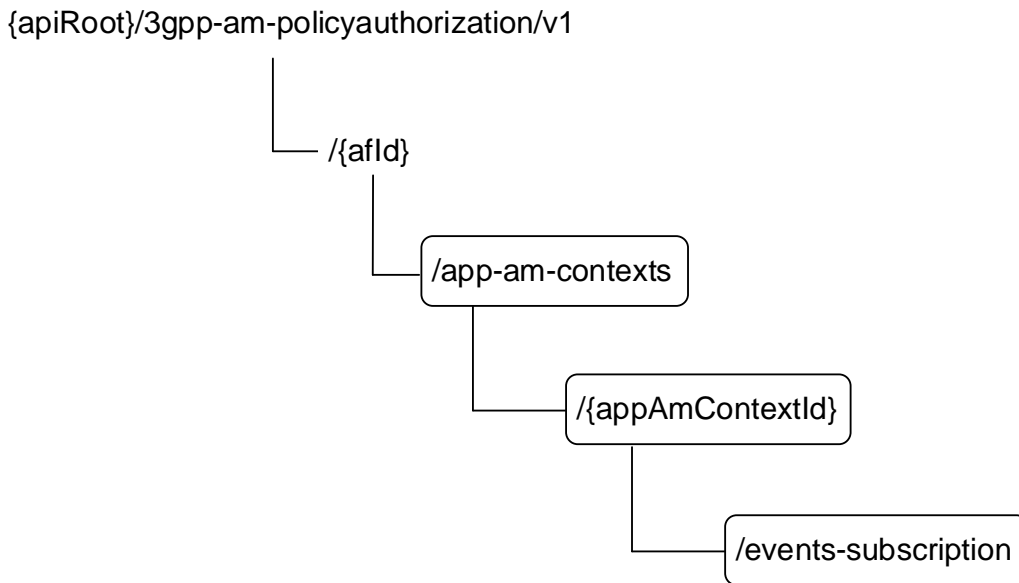
Figure 5.17.1.1-1: Resource URI structure of the AMPolicyAuthorization API

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	/{afId}/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	/{afId}/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	/{afId}/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.

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		DELETE	Deletes an AM Policy Events Subscription sub-resource.

5.17.1.2 Resource: Application AM Contexts

5.17.1.2.1 Introduction

This resource allows an AF to request the creation of a new Individual application AM context resource.

5.17.1.2.2 Resource Definition

Resource URI: **{apiRoot}/3gpp-am-policyauthorization/v1/{afId}/app-am-contexts**

This resource shall support the resource URI variables defined in table 5.17.1.2.2-1.

Table 5.17.1.2.2-1: Resource URI variables for this resource

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

5.17.1.2.3 Resource Methods

5.17.1.2.3.1 General

The following clauses specify the resource methods supported by the resource as described in clause 5.17.1.2.2.

5.17.1.2.3.2 POST

The POST method creates a new resource to Individual application AM context for a given AF. The AF shall initiate the HTTP POST request message and the NEF shall respond to the message. The NEF shall construct the URI of the created resource.

This method shall support the request data structures specified in table 5.17.1.2.3.2-1 and shall support the response data structures and response codes specified in table 5.17.1.2.3.2-2.

Table 5.17.1.2.3.2-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
AppAmContextExpData	M	1	Contains the exposure information for the creation of a new Individual application AM context resource.

Table 5.17.1.2.3.2-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
AppAmContextExpRespData	M	1	201 Created	Successful case. The Individual application AM context resource was created successfully. The URI of the created resource shall be returned in the "Location" HTTP header.
ProblemDetails	O	0..1	500 Internal Server Error	(NOTE 2)
NOTE 1: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.				
NOTE 2: Failure causes are described in clause 5.17.5.				

Table 5.17.1.2.3.2-3: Headers supported by the 201 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains the URI of the newly created resource, according to the structure: {apiRoot}/3gpp-am-policyauthorization/v1/{afId}/ app-am-contexts/{appAmContextId}

5.17.1.3 Resource: Individual Application AM Context

5.17.1.3.1 Introduction

This resource allows an AF to read, update or delete an existing Individual application AM context.

5.17.1.3.2 Resource Definition

Resource URI: **{apiRoot}/3gpp-am-policyauthorization/v1/{afId}/app-am-contexts/{appAmContextId}**

This resource shall support the resource URI variables defined in table 5.17.1.3.2-1.

Table 5.17.1.3.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	Clause 5.2.4 of 3GPP TS 29.122 [4].
afId	string	Identifier of the AF.
appAmContextId	string	Identifier of the application AM context formatted according to IETF RFC 3986 [44].

5.17.1.3.3 Resource Methods

5.17.1.3.3.1 General

The following clauses specify the resource methods supported by the resource as described in clause 5.17.1.3.2.

5.17.1.3.3.2 GET

The GET method allows to read the existing application AM context for a given AF and a given application AM context Id. The AF shall initiate the HTTP GET request message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.17.1.3.3.2-1.

Table 5.17.1.3.3.2-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description
N/A				

This method shall support the request data structures specified in table 5.17.1.3.3.2-2, the response data structures and response codes specified in table 5.17.1.3.3.2-3 and the Location Headers specified in table 5.17.1.3.3.2-4 and table 5.17.1.3.3.2-5.

Table 5.17.1.3.3.2-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.17.1.3.3.2-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
AppAmContextEx pData	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
AppAmContextEx pUpdateData	M	1	Contains the modification(s) to be applied to the Individual application AM context resource.

Table 5.17.1.3.3.3-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
AppAmContextExpRespData	M	1	200 OK	Successful case. The exposure information of the updated application AM context.
N/A			204 No Content	The application AM context was updated successfully.
N/A			307 Temporary Redirect	Temporary redirection, during the AM context modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [4].
N/A			308 Permanent Redirect	Permanent redirection, during the AM context modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [4].
ProblemDetails	O	0..1	400 Bad Request	(NOTE 2)
ProblemDetails	O	0..1	404 Not Found	(NOTE 2)
NOTE 1: The mandatory HTTP error status codes for the PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.				
NOTE 2: Failure causes are described in clause 5.17.5.				

Table 5.17.1.3.3.3-4: Headers supported by the 307 Response Code on this resource

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

Table 5.17.1.3.3.3-5: Headers supported by the 308 Response Code on this resource

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

5.17.1.3.3.4   DELETE

The DELETE method deletes an existing Individual application AM context. The AF shall initiate the HTTP DELETE request message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.17.1.3.3.4-1.

Table 5.17.1.3.3.4-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description
N/A				

This method shall support the request data structures specified in table 5.17.1.3.3.4-2 and the response data structures and response codes specified in table 5.17.1.3.3.4-3, and the Location Headers specified in table 5.17.1.3.3.4-4 and table 5.17.1.3.3.4-5.

Table 5.17.1.3.3.4-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description

N/A			

Table 5.17.1.3.3.4-3: Data structures supported by the DELETE Response Body on this resource

Data type	P	Cardinality	Response codes	Description
N/A			204 No Content	Successful case. The application AM context was terminated successfully.
N/A			307 Temporary Redirect	Temporary redirection, during the AM context termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [4].
N/A			308 Permanent Redirect	Permanent redirection, during the AM context termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [4].
ProblemDetails	O	0..1	404 Not Found	(NOTE 2)
NOTE 1: The mandatory HTTP error status codes for the DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.				
NOTE 2: Failure causes are described in clause 5.17.5.				

Table 5.17.1.3.3.4-4: Headers supported by the 307 Response Code on this resource

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

Table 5.17.1.3.3.4-5: Headers supported by the 308 Response Code on this resource

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

5.17.1.4 Resource: AM Policy Events Subscription

5.17.1.4.1 Introduction

This resource allows an AF to create a new AM policy events subscription sub-resource or modifies an existing AM policy events subscription sub-resource.

5.17.1.4.2 Resource Definition

Resource URI: **{apiRoot}/3gpp-am-policyauthorization/v1/{afId}/app-am-contexts/{appAmContextId}/events-subscription**

This sub-resource shall support the resource URI variables defined in table 5.17.1.4.2-1.

Table 5.17.1.4.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	Clause 5.2.4 of 3GPP TS 29.122 [4].
afId	string	Identifier of the AF.
appAmContextId	string	Identifier of the application AM context formatted according to IETF RFC 3986 [44].

5.17.1.4.3 Resource Methods

5.17.1.4.3.1 General

The following clauses specify the resource methods supported by the sub-resource as described in clause 5.17.1.4.2.

5.17.1.4.3.2 PUT

The PUT method allows to create a new AM policy events subscription sub-resource in an existing application AM context or modifies an existing AM policy events subscription sub-resource. The AF shall initiate the HTTP PUT request message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.17.1.4.3.2-1.

Table 5.17.1.4.3.2-1: URI query parameters supported by the PUT method on this resource

Name	Data type	P	Cardinality	Description
N/A				

This method shall support the request data structures specified in table 5.17.1.4.3.2-2, the response data structures and response codes specified in table 5.17.1.4.3.2-3 and the Location Headers specified in table 5.17.1.4.3.2-4, table 5.17.1.4.3.2-5 and table 5.17.1.4.3.2-6.

Table 5.17.1.4.3.2-2: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
AmEventsSubscData	M	1	Contains the information for the creation and/or modification of the AM Policy Events Subscription.

Table 5.17.1.4.3.2-3: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description
AmEventsSubscRespData	M	1	201 Created	Successful case. The AM policy events subscription sub-resource was created. The representation of the AM Policy Events Subscription sub-resource is included within the properties of the AmEventsSubscData data type. The one or more matched events, if available, are included within the properties of the AmEventsNotification data type.
AmEventsSubscRespData	M	1	200 OK	Successful case. The AM policy events subscription sub-resource was modified and a representation of the sub-resource is returned. The representation of the AM Policy Events Subscription sub-resource is included within the properties of the AmEventsSubscData data type. The one or more matched events, if available, are included within the properties of the AmEventsNotification data type.
N/A			204 No Content	Successful case. The AM policy events subscription sub-resource was modified successfully, with no content to be sent in the response message body.
N/A			307 Temporary Redirect	Temporary redirection, during the AM policy events subscription or modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [4].
N/A			308 Permanent Redirect	Permanent redirection, during the AM policy events subscription or modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF.

Name				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
AmEventsNotifica tion	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 geographic 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
websockNotifConfig	WebsockNotifConfig	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.
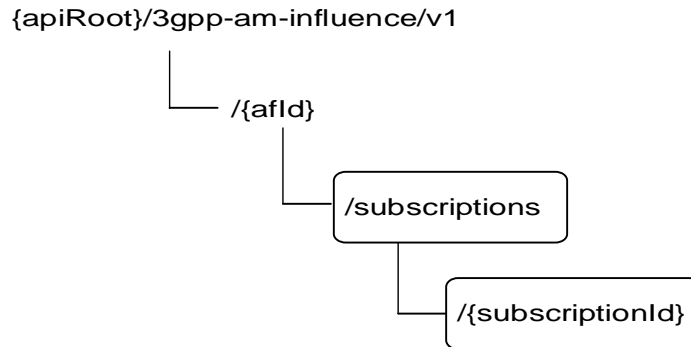
Figure 5.18.1.1-1: Resource URI structure of the AMInfluence API

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 subscribtions 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/{afId}/subscriptions/{subscriptionId}

5.18.1.3 Resource: Individual AM Influence Subscription

5.18.1.3.1 Introduction

This resource allows an AF to read, update or delete an existing AM Influence subscription.

5.18.1.3.2 Resource Definition

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

This resource shall support the resource URI variables defined in table 5.18.1.3.2-1.

Table 5.18.1.3.2-1: Resource URI variables for this resource

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

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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

Data type	P	Cardinality		Description
AmInfluSubPatch	M		1	Partial update of a subscription to AM influence and/or notifications about service area coverage outcome events with the NEF.

Table 5.18.1.3.3.4-2: Data structures supported by the PATCH Response Body on this resource

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

Table 5.18.1.3.3.4-3: Headers supported by the 307 Response Code on this resource

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

Table 5.18.1.3.3.4-4: Headers supported by the 308 Response Code on this resource

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

5.18.1.3.3.5   DELETE

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

This method shall support the URI query parameters specified in table 5.18.1.3.3.5-1.

Table 5.18.1.3.3.5-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description
N/A				

This method shall support the request data structures specified in table 5.18.1.3.3.5-2 and the response data structures and response codes specified in table 5.18.1.3.3.5-3.

Table 5.18.1.3.3.5-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.18.1.3.3.5-3: Data structures supported by the DELETE Response Body on this resource

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

Table 5.18.1.3.3.5-4: Headers supported by the 307 Response Code on this resource

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

Table 5.18.1.3.3.5-5: Headers supported by the 308 Response Code on this resource

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

5.18.1A   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). - 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
websockNotifConfig	WebsockNotifConfig	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 "dnnSnssaiInfos" attribute or "afAppIds" 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 "afAppIds" attribute or "dnnSnssaiInfos" 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(GeographicalArea)	O	1..N	Identifies geographical areas of the user where the UE is located. (NOTE 1)	
policyDuration	DurationSecRm	O	0..1	Indicates the time duration that the policy shall last. (NOTE 1)	
dnnSnssaiInfos	array(DnnSnssaiInformation)	O	1..N	Each of the element identifies a combination of (DNN, S-NSSAI). (NOTE 1)	
subscribedEvents	array(AmInfluEvent)	O	1..N	Identifies the requirement to be notified of the event(s). (NOTE 1)	

notificationDestinatio n	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(Geographic alArea)	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_COVRG_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
TmgiAllocRespon se	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]
ProblemDetailsT mgiAlloc	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
TmgiDeallocRequ est	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 URIprovided 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.	

WebsockNotifConfig	3GPP TS 29.122 [4]	Contains the configuration parameters to set up notification delivery over Websocket protocol.	

5.19.5.2 Structured data types

5.19.5.2.1 Introduction

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

5.19.5.2.2 Type: TmgiAllocRequest

Table 5.19.5.2.2-1: Definition of type TmgiAllocRequest

Attribute name	Data type	P	Cardinality	Description	Applicability
afId	string	M	1	Contains the identifier of the AF that is sending the request.	
tmgiParams	TmgiAllocate	M	1	Contains the parameters to request the allocation of TMGI(s) for new MBS session(s) or the refresh of the expiry time of already allocated MBS TMGI(s).	
notificationUri	Uri	O	0..1	The notification URI via which the AF desires to receive notifications on timer expiry for MBS TMGI(s).	
mbsServiceArea	MbsServiceArea	O	0..1	Indicates the MBS service area for the TMGI(s) to be allocated. This attribute may be provided by the AF for a local MBS service. (NOTE)	
extMbsServiceArea	ExternalMbsServiceArea	O	0..1	Indicates the external MBS service area for the TMGI(s) to be allocated. This attribute may be provided by the AF for a local MBS service. (NOTE)	
requestTestNotification	boolean	O	0..1	Indicates whether sending a test notification shall be performed. Set to "true" by the AF to request the NEF to send a test notification as defined in clause 5.2.5.3 of 3GPP TS 29.122 [4]. Set to "false" or omitted otherwise.	Notification_test_event
websockNotifConfig	WebsockNotifConfig	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.	

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				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 a single MB-SMF. (NOTE 1) (NOTE 3)	
reducedExtMbsServArea	ExternalMbsServiceArea	C	0..1	Represents the reduced external MBS Service Area information that can be supported by a single MB-SMF. (NOTE 1) (NOTE 4)	

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reducedMbsServ Areas	array(MbsServiceAre a)	C	1..N	Represents the additional reduced MBS Service Areas. Each reduced MBS Service Area provided within each array element of this attribute can be supported by a single MB-SMF. (NOTE 2) (NOTE 4)	
reducedExtMbsS ervAreas	array(ExternalMbsSe rviceArea)	C	1..N	Represents the additional reduced external MBS Service Areas. Each reduced MBS Service Area provided within each array element of this attribute can be supported by a single MB-SMF. (NOTE 2) (NOTE 3)	
NOTE 1: These attributes are mutually exclusive. Either one of them shall be present.					
NOTE 2: These attributes are mutually exclusive. Either one of them may be present.					
NOTE 3: If the "reducedMbsServArea" attribute is present, then the "reducedExtMbsServAreas" attribute shall not be present.					
NOTE 4: If the "reducedExtMbsServArea" attribute is present, then the "reducedMbsServAreas" attribute shall not 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_websoc ket	The delivery of notifications over Websocket is supported as described in 3GPP TS 29.122 [4]. This feature requires that the Notification_test_event feature is also supported.
2	Notification_test_ev ent	The testing of notification connection is supported as described in 3GPP TS 29.122 [4].

5.19.7   Error handling

5.19.7.1   General

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

In addition, the requirements in the following 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.
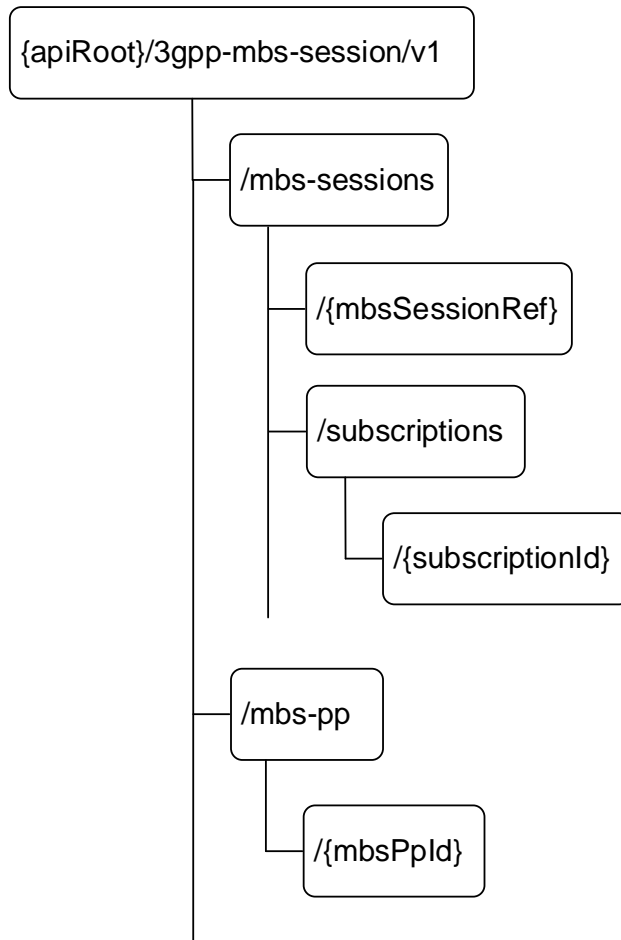
Figure 5.20.2.1-1: Resource URI structure of the MBSSession API

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

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		POST	Create an MBS Session Subscription.
Individual MBS Session Subscription	/mbs-sessions/subscriptions/{subscriptionId}	GET	Retrieve an existing Individual MBS Session Subscription resource.
		DELETE	Delete an existing Individual MBS Session Subscription resource.
MBS Parameters Provisionings	/mbs-pp	GET	Retrieve all the MBS Parameters Provisioning resources.
		POST	Request the creation of a new MBS Parameters Provisioning.
Individual MBS Parameters Provisioning	/mbs-pp/{mbsPpId}	GET	Retrieve an existing individual MBS Parameters Provisioning resource.
		PUT	Request the update of an existing Individual MBS Parameters Provisioning resource.
		PATCH	Request the modification of an existing Individual MBS Parameters Provisioning resource.
		DELETE	Request the deletion of an existing Individual MBS Parameters Provisioning resource.

5.20.2.2   Resource: MBS sessions

5.20.2.2.1   Introduction

This resource represents the collection of MBS sessions managed by the NEF.

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

5.20.2.2.2   Resource Definition

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

This resource shall support the resource URI variables defined in table 5.20.2.2.2-1.

Table 5.20.2.2.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 5.20.1.

5.20.2.2.3   Resource Methods

5.20.2.2.3.1   POST

This method enables an AF to request the creation of an MBS session resource at the NEF.

This method shall support the URI query parameters specified in table 5.20.2.2.3.1-1.

Table 5.20.2.2.3.1-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description	Applicability
N/A					

This method shall support the request data structures specified in table 5.20.2.2.3.1-2 and the response data structures and response codes specified in table 5.20.2.2.3.1-3.

Table 5.20.2.2.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
MbsSessionCreateReq	M	1	Representation of the MBS session to be created at the NEF.

Table 5.20.2.2.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MbsSessionCreateRsp	M	1	201 Created	Successful case. A representation of the created Individual MBS Session resource is returned. The URI of the created resource shall be returned in an HTTP "Location" header.
ProblemDetails	O	0..1	400 Bad Request	(NOTE 2)
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
Location	string	M	1	An alternative target URI of the resource located in an alternative NEF.

Table 5.20.2.4.3.1-5: Headers supported by the 308 Response Code on this resource

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

5.20.2.4.3.2   POST

This method enables an AF to request the creation of an MBS Session Subscription resource at the NEF.

This method shall support the URI query parameters specified in table 5.20.2.4.3.2-1.

Table 5.20.2.4.3.2-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 5.20.2.4.3.2-2 and the response data structures and response codes specified in table 5.20.2.4.3.2-3.

Table 5.20.2.4.3.2-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
MbsSessionSubsc	M	1	Representation of the MBS session to be created at the NEF.

Table 5.20.2.4.3.2-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MbsSessionSubsc	M	1	201 Created	Successful case. A representation of the created Individual MBS Session Subscription resource is returned. The URI of the created resource is returned in an HTTP "Location" header.
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
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 URIprovided 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.

5.20.5   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 data set(s).	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.	

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 data set(s) that the AF requests to provision. This attribute shall be present when the AF requests to provision one or several MBS Session Assistance information data set(s).	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. | |

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 data set(s) 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
reducedMbsServArea	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)	
reducedExtMbsServArea	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	This feature indicates the support of the Rel-18 enhancements to the 5G Multicast/Broadcast services. The following functionalities are supported: - 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 Core Networks). - NR RedCap UE Information provisioning during MBS Session creation/update.
2	ReducedMbsServArea	This feature indicates the support of the MBS Service Area reduction functionality. The following sub-functionalities are supported: - Support to return the reduced MBS Service Area in an MBS Session creation/update response.
3	enNB1	This feature indicates the support of Rel-18 enhancements to this northbound API. The following sub-functionalities are supported: - Support the provisioning of the MTC provider ID.

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.
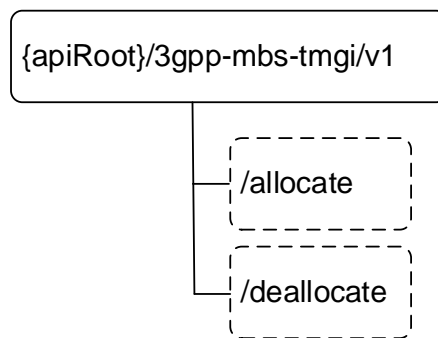
5.21.1 Resources

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.

{apiRoot}/3gpp-eas-deployment/v1

└── /{afId}

└── /eas-deployment-info

└── /{easDeployInfoId}
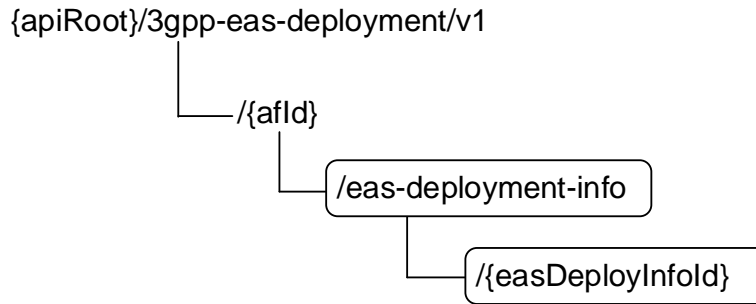
Figure 5.21.1.1-1: Resource URI structure of the northbound EASDeployment API

Table 5.21.1.1-1 provides an overview of the resources and HTTP methods applicable for the northbound EASDeployment API.

Table 5.21.1.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method	Description
EAS Deployment Information	/{afId}/eas-deployment-info	GET	Read all EAS Deployment information for a given AF.
		POST	Create a new Individual EAS Deployment information resource.
Individual EAS Deployment Information	/{afId}/eas-deployment-info/{easDeployInfoId}	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/{afId}/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].

afId	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(EasDeployInfo)	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.

{apiRoot}/3gpp-eas-deployment/v1

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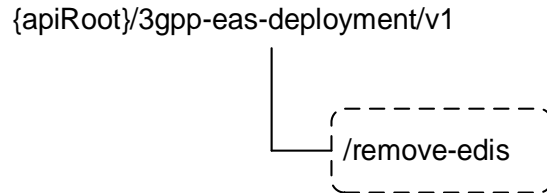
Figure 5.21.2.1-1: Custom operation URI structure of the Nnef_EASDeployment API

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.	
DnaiInformation	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
AfId	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	Contains the 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.	
appId	string	O	0..1	Identifies the application for which the EAS Deployment Information corresponds to.	
dnn	Dnn	O	0..1	Contains the DNN for the EAS Deployment Information.	
snssai	Snssai	O	0..1	Contains the S-NSSAI for the EAS Deployment Information.	
externalGroupId	ExternalGroupId	O	0..1	Contains the external Group ID for the EAS Deployment Information.	
dnaiInfos	map(DnaiInformati on)	O	1..N	Contains the 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	string	O	0..1	Identifier of the AF that is responsible for the EAS associated with this EAS deployment information.	EasRelocation Enh
suppFeat	SupportedFeatures	C	0..1	Indicates the list of Supported features used as described in clause 5.21.5.	

5.21.4.3.3   Type: DnaiInformation

Table 5.21.4.3.3-1: Definition of type DnaiInformation

Attribute name	Data type	P	Cardinality	Description	Applicability
dnai	Dnai	M	1	Identifer the DNAI.	
dnsServIds	array(DnsServerId entifier)	C	1..N	list of DNS server identifier (consisting of IP address and port) for each DNAI.	
easIpAddrs	array(IpAddr)	C	1..N	IP address(s) of the EASs in the local DN for each DNAI.	
NOTE: At least one of the "dnsServIds" or "easIpAddrs" attribute shall be provided.					

5.21.4.3.4   Type: DnsServerIdentifier

Table 5.21.4.3.4-1: Definition of type DnsServerIdentifier

Attribute name	Data type	P	Cardinality	Description	Applicability
dnsServIpAddr	IpAddr	M	1	DNS server IP address.	
portNumber	Uinteger	M	1	DNS port number.	

5.21.4.3.5   Type: EdiDeleteCriteria

Table 5.21.4.3.5-1: Definition of type EdiDeleteCriteria

Attribute name	Data type	P	Cardinality	Description	Applicability
afId	AfId	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.
2	EasDnaiConsistency	This feature indicates support of consistency checking between AF-provisioned and operator-configured data related to EAS Deployment.

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

CONFLICT_CONFIG_DATA	403 Forbidden	The provided EAS Deployment Information is in conflict with the OAM-configured information.	EasDnaiConsistency

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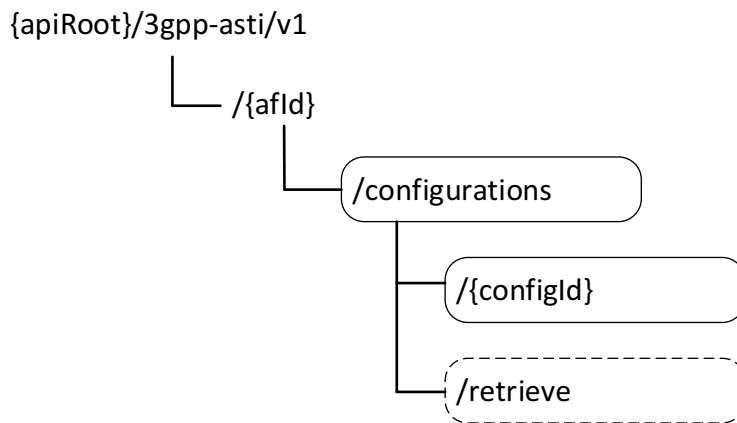
Figure 5.22.1.1-1: Resource URI structure of the ASTI API

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
AccessTimeDistri butionData	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
AccessTimeDistri butionData	M	1	201 Created	The configuration was created successfully. The URI of the created resource shall be returned in the "Location" HTTP header.

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 causes are described in clause 5.22.6.				

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].
ProblemDetails	O	0..1	403 Forbidden	(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 5.22.6.				

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   Void

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
AstiConfigStateNotification	5.22.4.3.7	Contains the report about a change in the 5G Access Stratum Time Distribution parameters for a UE	ASTIConfigReport
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
AfAsTimeDistributionParam	3GPP TS 29.565 [50]	Contains the 5G AF requested 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.	
ProblemDetails	3GPP TS 29.122 [4]	Represents error related information.	
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 5.22.5-1.	
Uri	3GPP TS 29.571 [8]	Identifies a referenced resource.	ASTIConfigReport

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)	
exterGroupId	ExternalGroupId	C	0.1	Represents a group of users. (NOTE 1)	
asTimeDisParam	AfAsTimeDistributionParam	M	1	5G access stratum time distribution parameters. (NOTE 3)	
coverageArea	SpatialValidityCond	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
astiNotifId	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 "exterGroupId" 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 the "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. This feature requires the support of the "ASTIConfigReport" feature.
4	SupportReport	This feature indicates the support of the report of whether the AF requested Time Synchronization is authorized for the requested UE's.

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	Applicability
UE_SERVICE_NOT_AUTHORIZED	403 Forbidden	The AF request is not authorized or the AF requested parameter(s) are not authorized by UE's Time Synchronization Data in UDM.	SupportReport

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 [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".

- "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 API URI.

5.23.2 Resources

5.23.2.1 Overview

This clause describes the structure for the Resource URIs as shown in Figure 5.23.2.1-1 and the resources and HTTP methods used for the DataReporting API.

The structure of the resource URIs of the DataReporting API is shown in Figure 5.23.2.1-1.

{apiRoot}/3gpp-data-reporting/<apiVersion>
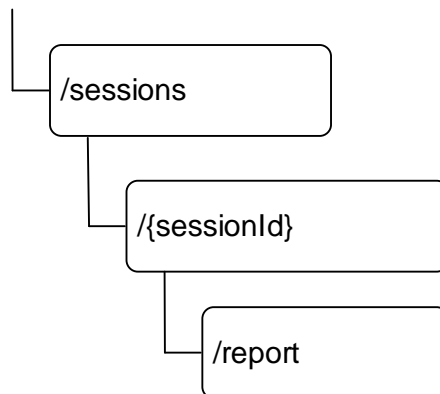
Figure 5.23.2.1-1: Resource URI structure of the DataReporting API

Table 5.23.2.1-1 provides an overview of the resources and applicable HTTP methods applicable for the DataReporting API.

Table 5.23.2.1-1: 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	Retreive 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 URI: **{apiRoot}/3gpp-data-reporting/<apiVersion>/sessions**

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

Table 5.23.2.2.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 5.23.1.

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	M	1	Representation of the Data Reporting Session to be created in the NEF. (NOTE)
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	M	1	201 Created	Successful case. A representation of the created "Individual Data Reporting Session" resource is returned. An HTTP "Location" header that contains the URI of the created resource shall be returned in the response body. (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] also apply.				
NOTE 2: The "sessionId" attribute of the DataReportingSession data type shall not be provided as it is not applicable.				

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

HTTP response header	Data type	P	Cardinality	Description
Location	string	M	1	The URI of the newly created resource, according to the structure: {apiRoot}/3gpp-data-reporting/<apiVersion>/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 URI: **{apiRoot}/3gpp-data-reporting/<apiVersion>/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 URI 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 Session" 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. (NOTE 2)
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 codes for the HTTP 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	Contains 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	Contains 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 request the update of 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 5.23.2.3.3.2-3.

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	Successful response. The "Individual Data Reporting Session" resource was updated successfully and a representation of the created resource is returned in the response body. (NOTE 2)
n/a			204 No Content	Successful response. 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 codes for the HTTP 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	Contains an alternative target 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	Contains an alternative target 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 existing "Individual Data Reporting Session" resource at the NEF.

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

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 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 codes for the HTTP 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	Contains an alternative target 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	Contains an alternative target 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 operaration 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.

- 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 API URI.

5.24.2　Resources

5.24.2.1　Overview

This clause describes the structure for the Resource URIs as shown in Figure 5.24.2.1-1 and the resources and HTTP methods used for the DataReportingProvisioning API.

The structure of the resource URIs of the DataReportingProvisioning API is shown in Figure 5.24.2.1-1.
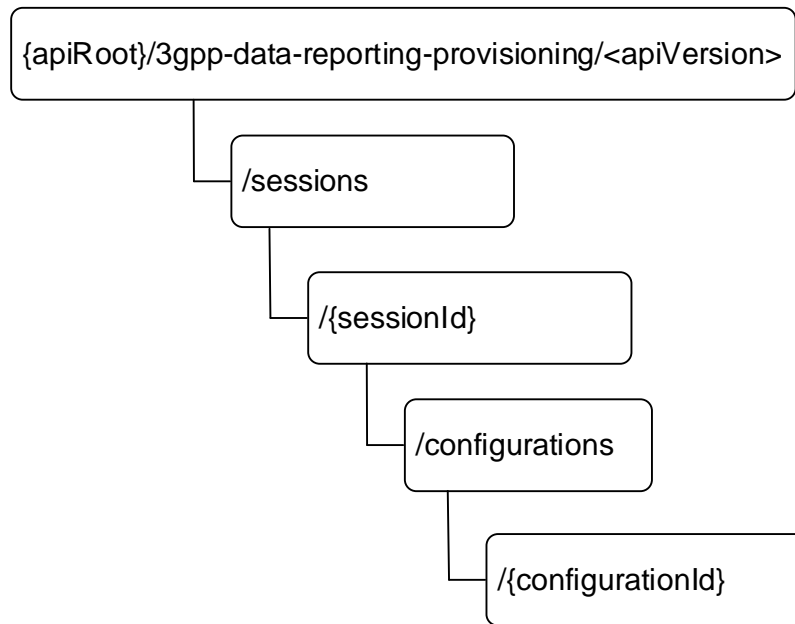
Figure 5.24.2.1-1: Resource URI structure of the DataReportingProvisioning API

Table 5.24.2.1-1 provides an overview of the resources and applicable HTTP methods applicable for the DataReportingProvisioning API.

Table 5.24.2.1-1: 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	Retreive an existing "Individual Data Reporting Provisioning Session" resource.
		DELETE	Delete an existing "Individual Data Reporting Provisioning Session" resource.

Data Reporting Configurations	/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	M	1	Representation of the Data Reporting Provisioning Session to be created in the NEF. (NOTE)
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. An HTTP "Location" header that contains the URI of the created "Individual Data Reporting Provisioning Session" resource shall be returned.
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] also apply.			
NOTE 2:	The "provisioningSessionId" attribute of the DataReportingProvisioningSession data type shall not be provided as it is not applicable.			

Table 5.24.2.2.3.1-4: Headers supported by the 201 response code on this resource

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

5.24.2.3   Resource: Individual Data Reporting Provisioning Session

5.24.2.3.1   Introduction

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

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

5.24.2.3.2   Resource Definition

Resource URI: **{apiRoot}/3gpp-data-reporting-provisioning/<apiVersion>/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 URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 5.24.1.
sessionId	string	Represents the identifierof 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	M	1	200 OK	Successful case. The requested "Individual Data Reporting Provisioning Session" resource is successfully returned to the AF. (NOTE 2)
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 codes for the HTTP 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	Contains 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	Contains 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 codes for the HTTP 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	Contains 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	Contains 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 URIL: **{apiRoot}/3gpp-data-reporting-provisioning/<apiVersion>/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 URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 5.24.1.
sessionId	string	Represents the identifier of the existing "Individual 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	M	1	Representation of the Data Reporting Configuration to be created in the NEF. (NOTE)
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	M	1	201 Created	Successful case. A representation of the created "Individual Data Reporting Configuration" resource is returned. An HTTP "Location" header that contains the URI of the created resource shall be returned in the response body. (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] 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/<apiVersion>/sessions/{sessionId}/configurations/{configurationId}

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 URI: **{apiRoot}/3gpp-data-reporting-provisioning/<apiVersion>/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 URI 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	M	1	200 OK	Successful case. The requested Individual Data Reporting Configuration resource is returned.

				(NOTE 2)	
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 codes for the HTTP 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	Contains 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	Contains 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	M	1	Parameters to updatethe Individual Data Reporting Configuration resource. (NOTE)
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	M	1	200 OK	Successful case. The "Individual Data Reporting Configuration" resource was updated successfully and a representation of the updated resource is returned in the response body. (NOTE 2)
n/a			204 No Content	Successful case. 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 codes for the HTTP 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	Contains 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	Contains 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	Contains the parameters to request the modification of the "Individual 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	M	1	200 OK	Successful case. The "Individual Data Reporting Configuration" resource was

					updated successfully by configuration data provided. (NOTE 2)
n/a				204 No Content	Successful case. 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 mandadatory HTTP error status codes for the HTTP 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	Contains 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	Contains 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 "Individual 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: The mandatory HTTP error status codes for the HTTP 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	Contains 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	Contains 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

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

5.25.2.1 Overview

This clause describes the structure for the Resource URIs as shown in figure 5.25.2.1-1 and the resources and HTTP methods used for the UEId API.
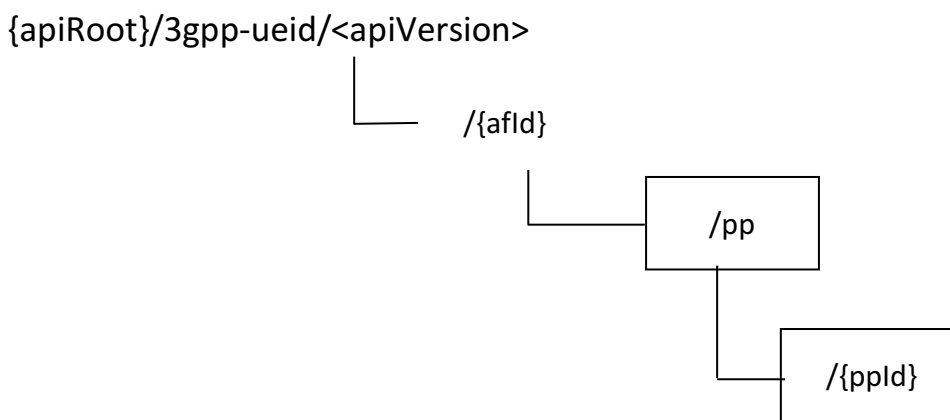
Figure 5.25.2.1-1: Resource URI structure of the UEId API

Table 5.25.2.1-1 provides an overview of the resources and applicable HTTP methods.

Table 5.25.2.1-1: Resources and methods overview

Resource name	Resource URI (relative path under API URI)	HTTP method or custom operation	Description (service operation)
UE ID Mapping Information Provisionings	/{afId}/pp	GET	Retrieve all the active UE ID Mapping Information Provisionings managed by the NEF.
		POST	Request the creation of a new UE ID Mapping Information Provisioning at the NEF.
Individual UE ID Mapping Information Provisioning	/{afId}/pp/{ppId}	GET	Retrieve an existing "Individual UE ID Mapping Information Provisioning" managed by the NEF.
		PUT	Update an existing "Individual UE ID Mapping Information Provisioning" managed by the NEF.
		PATCH	Modify an existing "Individual UE ID Mapping Information Provisioning" managed by the NEF.
		DELETE	Delete an existing "Individual UE ID Mapping

		Information Provisioning" managed by the NEF.

5.25.2.2 Resource: UE ID Mapping Information Provisionings

5.25.2.2.1 Introduction

This resource represents the collection of UE ID Mapping Information Provisionings managed by the NEF.

This resource is modelled with the Collection resource archetype (see clause C.2 of 3GPP TS 29.501 [32]).

5.25.2.2.2 Resource Definition

Resource URI: **{apiRoot}/3gpp-ueid/<apiVersion>/{afId}/pp**

This resource shall support the resource URI variables defined in table 5.25.2.2.2-1.

Table 5.25.2.2.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 5.25.1.
afId	string	Represents the identifier of the AF.

5.25.2.2.3 Resource Methods

5.25.2.2.3.1 GET

This method enables to request to retrieve all the active UE ID Mapping Information Provisionings managed by the NEF.

This method shall support the URI query parameters specified in table 5.25.2.2.3.1-1.

Table 5.25.2.2.3.1-1: 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 5.25.2.2.3.1-2 and the response data structures and response codes specified in table 5.25.2.2.3.1-3.

Table 5.25.2.2.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 5.25.2.2.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
array(UeIdMappingInfo)	M	0..N	200 OK	Successful case. All the "Individual UE ID Mapping Information Provisioning" resource(s) managed by the NEF are returned. If there are no existing "Individual UE ID Mapping Information Provisioning" resources managed at the NEF, an empty array is returned.
n/a			307 Temporary Redirect	Temporary redirection.

				The response shall include a Location header field containing an alternative target 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 target 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 HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall also apply.				

Table 5.25.2.2.3.1-4: Headers supported by the 307 Response Code on this resource

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

Table 5.25.2.2.3.1-5: Headers supported by the 308 Response Code on this resource

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

5.25.2.2.3.2 POST

This method enables an AF to request the creation of a new UE ID Mapping Information Provisioning at the NEF.

This method shall support the URI query parameters specified in table 5.25.2.2.3.2-1.

Table 5.25.2.2.3.2-1: 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 5.25.2.2.3.2-2 and the response data structures and response codes specified in table 5.25.2.2.3.2-3.

Table 5.25.2.2.3.2-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
UeIdMappingInfo	M	1	Contains the representation of the UE ID Mapping Information Provisioning to be created at the NEF.

Table 5.25.2.2.3.2-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
UeIdMappingInfo	M	1	201 Created	Successful case. A representation of the created "Individual UE ID Mapping Information 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 codes for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.

Table 5.25.2.2.3.2-4: 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-ueid/<apiVersion>/{afId}/pp/{ppId}

5.25.2.2.4   Resource Custom Operations

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

5.25.2.3   Resource: Individual UE ID Mapping Provisioning

5.25.2.3.1   Introduction

This resource represents an "Individual UE ID Mapping 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]).

5.25.2.3.2   Resource Definition

Resource URI: **{apiRoot}/3gpp-ueid/<apiVersion>/{afId}/pp/{ppId}**

This resource shall support the resource URI variables defined in table 5.25.2.3.2-1.

Table 5.25.2.3.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 5.25.1.
afId	string	Represents the identifier of the AF.
ppId	string	Represents the identifier of the "Individual UE ID Mapping Provisioning" resource.

5.25.2.3.3   Resource Methods

5.25.2.3.3.1   GET

This method enables an AF to request to retrieve an existing "Individual UE ID Mapping Information Provisioning" resource at the NEF.

This method shall support the URI query parameters specified in table 5.25.2.3.3.1-1.

Table 5.25.2.3.3.1-1: 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 5.25.2.3.3.1-2 and the response data structures and response codes specified in table 5.25.2.3.3.1-3.

Table 5.25.2.3.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 5.25.2.3.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
UeIdMappingInfo	M	1	200 OK	Successful case. The requested "Individual UE ID Mapping Information Provisioning" resource 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 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 target 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 HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall also apply.				

Table 5.25.2.3.3.1-4: Headers supported by the 307 Response Code on this resource

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

Table 5.25.2.3.3.1-5: Headers supported by the 308 Response Code on this resource

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

5.25.2.3.3.2   PUT

This method enables an AF to request the update of an existing "Individual UE ID Mapping Information Provisioning" resource at the NEF.

This method shall support the URI query parameters specified in table 5.25.2.3.3.2-1.

Table 5.25.2.3.3.2-1: 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 5.25.2.3.3.2-2 and the response data structures and response codes specified in table 5.25.2.3.3.2-3.

Table 5.25.2.3.3.2-2: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
UeIdMappingInfo	M	1	Represents the updated "Individual UE ID Mapping Information Provisioning" resource representation.

Table 5.25.2.3.3.2-3: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description
UeIdMappingInfo	M	1	200 OK	Successful response. The "Individual UE ID Mapping Information 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 UE ID Mapping Information 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 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 target 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 HTTP PUT method listed in Table 5.2.6-1 of 3GPP TS 29.122 [4] shall also apply.				

Table 5.25.2.3.3.2-4: 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 5.25.2.3.3.2-5: 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.

5.25.2.3.3.3 PATCH

This method enables an AF to request the modification of an existing "Individual UE ID Mapping Information Provisioning" resource at the NEF.

This method shall support the URI query parameters specified in table 5.25.2.3.3.3-1.

Table 5.25.2.3.3.3-1: 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 5.25.2.3.3.3-2 and the response data structures and response codes specified in table 5.25.2.3.3.3-3.

Table 5.25.2.3.3.3-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description

Data type	P	Cardinality	Description
UeIdMappingInfo Patch	M	1	Represents the requested modifications to the "Individual UE ID Mapping Information Provisioning" resource.

Table 5.25.2.3.3.3-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
UeIdMappingInfo	M	1	200 OK	Successful response. The "Individual UE ID Mapping Information 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 UE ID Mapping Information 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 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 target 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 HTTP PATCH method listed in Table 5.2.6-1 of 3GPP TS 29.122 [4] shall also apply.				

Table 5.25.2.3.3.3-4: Headers supported by the 307 Response Code on this resource

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

Table 5.25.2.3.3.3-5: Headers supported by the 308 Response Code on this resource

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

5.25.2.3.3.4 DELETE

This method enables an AF to request the deletion of an existing "Individual UE ID Mapping Information Provisioning" resource at the NEF.

This method shall support the URI query parameters specified in table 5.25.2.3.3.4-1.

Table 5.25.2.3.3.4-1: 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 5.25.2.3.3.4-2 and the response data structures and response codes specified in table 5.25.2.3.3.4-3.

Table 5.25.2.3.3.4-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 5.25.2.3.3.4-3: 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 "Individual UE ID Information Mapping 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 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 target 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 HTTP DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall also apply.			

Table 5.25.2.3.3.4-4: Headers supported by the 307 Response Code on this resource

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

Table 5.25.2.3.3.4-5: Headers supported by the 308 Response Code on this resource

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

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.

{apiRoot}/3gpp-ueid/v1
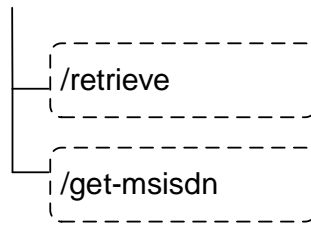
Figure 5.25.3.1-1: Custom operation URI structure of the UEId API

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.
GetMsisdn	/get-msisdn	POST	Request to get the UE ID in the form of MSISDN of the UE.

5.25.3.2 Operation: Retrieve

5.25.3.2.1 Description

The custom operation allows a service consumer to retrieve AF specific UE ID information via the NEF.

5.25.3.2.2 Operation Definition

This operation shall support the request and response data structures and response codes specified in table 5.25.3.2.2-1 and table 5.25.3.2.2-2.

Table 5.25.3.2.2-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
UeIdReq	M	1	Parameters to request to retrieve AF specific UE ID information.

Table 5.25.3.2.2-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
UeIdInfo	M	1	200 OK	The requested AF specific UE ID information was returned successfully.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative target 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.

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				The response shall include a Location header field containing an alternative target 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)
ProblemDetails	O	0..1	404 Not Found	(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] also apply.				
NOTE 2: Failure cases are described in clause 5.25.7.				

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	Contains an alternative target 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	Contains an alternative target URI of the resource located in an alternative NEF.

5.25.3.2.3   Void

5.25.3.3   Operation: GetMsisdn

5.25.3.3.1   Description

The custom operation allows a service consumer to retrieve the UE ID in the form of MSISDN via the NEF.

5.25.3.3.2   Operation Definition

This operation shall support the request and response data structures and response codes specified in table 5.25.3.3.2-1 and table 5.25.3.3.2-2.

Table 5.25.3.3.2-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
MsisdnReq	M	1	Contains the parameters to request to retrieve the UE ID in the form of MSISDN of the UE.

Table 5.25.3.3.2-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MsisdnInfo	M	1	200 OK	Successful case. The requested UE ID in the form of MSISDN of the UE is 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].
ProblemDetails	O	0..1	403 Forbidden	(NOTE 2)
ProblemDetails	O	0..1	404 Not Found	(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 5.25.7.				

Table 5.25.3.3.2-3: Headers supported by the 307 Response Code on this resource

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

Table 5.25.3.3.2-4: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI 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
MsisdnReq	5.25.5.2.4	Represents the parameters to request to retrieve the UE ID in the form of MSISDN of the UE.	
MsisdnInfo	5.25.5.2.5	Represents the UE ID in the form of MSISDN information.	
UeIdReq	5.25.5.2.2	Represents the parameters to requestAF specific UE ID retrieval.	
UeIdInfo	5.25.5.2.3	Represents AF specific UE ID information.	
UeIdMappingInfo	5.25.5.2.6	Represents the UE ID Mapping Information Provisioning.	
UeIdMappingInfoPatch	5.25.5.2.8	Represents the requested modifications to a UE ID Mapping Information Provisioning.	
RangSlUeIdMappInfo	5.25.5.2.7	Represents the Ranging/Sidelink UE ID mapping information between the Application Layer ID and the GPSI.	

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
ApplicationlayerId	3GPP TS 29.571 [8]	Represents an Application Layer ID.	
Dnn	3GPP TS 29.571 [8]	Identifies a DNN.	
ExternalId	3GPP TS 29.122 [4]	Represents an External Identifier.	
Gpsi	3GPP TS 29.571 [8]	Represents a GPSI.	
IpAddr	3GPP TS 29.571 [8]	Identifes an IP address.	
MacAddr48	3GPP TS 29.571 [8]	Identifies a MAC address.	
Msisdn	3GPP TS 29.122 [4]	Represents the MSISDN.	
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: UeIdReq

Table 5.25.5.2.2-1: Definition of type UeIdReq

Attribute name	Data type	P	Cardinality	Description	Applicability (NOTE 1)
afId	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 "ueIpAddr" 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 "ueIpAddr" attribute.	PortNumber
snssai	Snssai	O	0..1	Identifies an S-NSSAI.	
ueIpAddr	IpAddr	C	0..1	Identifies a UE IP Address. (NOTE 2)	
ueMacAddr	MacAddr48	C	0..1	Identifies a UE MAC Address. (NOTE 2)	
suppFeat	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: UeIdInfo

Table 5.25.5.2.3-1: Definition of type UeIdInfo

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.	
suppFeat	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.	

5.25.5.2.4 Type: MsisdnReq

Table 5.25.5.2.4-1: Definition of type MsisdnReq

Attribute name	Data type	P	Cardinality	Description	Applicability
afId	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 "ueIpAddr" 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 "ueIpAddr" attribute.	
snssai	Snssai	O	0..1	Identifies an S-NSSAI.	
ueIpAddr	IpAddr	C	0..1	Identifies a UE IP Address. (NOTE)	
ueMacAddr	MacAddr48	C	0..1	Identifies a UE MAC Address. (NOTE)	
suppFeat	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:	One of the "ueIpAddr" attribute or "ueMacAddr" attribute shall be included.				

5.25.5.2.5   Type: MsisdnInfo

Table 5.25.5.2.5-1: Definition of type MsisdnInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
msisdn	Msisdn	M	1	Contains the MSISDN of the UE.	
suppFeat	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.	

5.25.5.2.6   Type: UeIdMappingInfo

Table 5.25.5.2.6-1: Definition of type UeIdMappingInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
rsUeIdMappingInfo	RangSlUeIdMappInfo	C	0..1	Contains the Ranging/Sidelink UE ID Mapping information between the Application Layer ID and the GPSI. This attribute shall be present only for Ranging/Sidelink UE ID Mapping provisioning.	
suppFeat	SupportedFeatures	C	0..1	Indicates the list of supported features. This attribute shall be present only when feature negotiation needs to take place.	

5.25.5.2.7   Type: RangSlUeIdMappInfo

Table 5.25.5.2.7-1: Definition of type RangSlUeIdMappInfo

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

5.25.5.2.8   Type: UeIdMappingInfoPatch

Table 5.25.5.2.8-1: Definition of type UeIdMappingInfoPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
rsUeIdMappingInfo	RangSlUeIdMappInfo	O	0..1	Contains the updated Ranging/Sidelink UE ID Mapping information between the Application Layer ID and the GPSI. This attribute may be present only for Ranging/Sidelink UE ID Mapping provisioning.	

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	Applicability
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.	
USER_CONSENT_NOT_GRANTED	403 Forbidden	Indicates that the request is rejected because user consent is not granted.	

5.25.8   Security

The provisions of clause 6 and 7.2 of shall apply for the Nnef_UeId API. In addition:

- For the "GetMsisdn" custom operation defined in clause 5.25.3.3, RNAA procedures specified in clause 5.6.2.3.2 of 3GPP TS 29.222 [12] may be supported and the "authorization code" grant type may be supported in addition to the "Client Credentials".

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.

{apiRoot}/3gpp-mbs-us/v1

/mbs-user-services
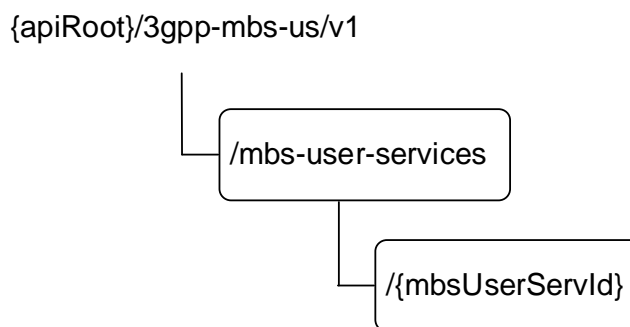
/{mbsUserServId}

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	Description (service operation)

		custom operation	
MBS User Services	/mbs-user-services	GET	Retrieve all the active MBS User Services managed by the NEF.
		POST	Request the creation of a new MBS User Service.
Individual MBS User Service	/mbs-user-services/{mbsUserServId}	GET	Retrieve an existng MBS User Service managed by the NEF.
		PUT	Update an existng MBS User Service managed by the NEF.
		PATCH	Modify an existng MBS User Service managed by the NEF.
		DELETE	Delete an existng MBS User Service managed by the NEF.

5.26.2.2 Resource: MBS User Services

5.26.2.2.1 Introduction

This resource represents the collection of MBS User Services managed by the NEF.

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

5.26.2.2.2 Resource Definition

Resource URI: **{apiRoot}/3gpp-mbs-us/v1/mbs-user-services**

This resource shall support the resource URI variables defined in table 5.26.2.2.2-1.

Table 5.26.2.2.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 5.26.1.

5.26.2.2.3 Resource Standard Methods

5.26.2.2.3.1 GET

This method allows an AF to retrieve all the active MBS User Service resources at the NEF.

This method shall support the URI query parameters specified in table 5.26.2.2.3.1-1.

Table 5.26.2.2.3.1-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 5.26.2.2.3.1-2 and the response data structures and response codes specified in table 5.26.2.2.3.1-3.

Table 5.26.2.2.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 5.26.2.2.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
array(MBSUserService)	M	0..N	200 OK	Successful case. All the active MBS User Services managed by the NEF are returned.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative target URI located in an alternative NEF. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [4].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative target URI located in an alternative NEF. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [4].
NOTE: The mandatory HTTP error status code for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.				

Table 5.26.2.2.3.1-4: Headers supported by the 307 Response Code on this resource

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

Table 5.26.2.2.3.1-5: Headers supported by the 308 Response Code on this resource

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

5.26.2.2.3.2 POST

This method enables an AF to request the creation of an MBS User Service resource at the NEF.

This method shall support the URI query parameters specified in table 5.26.2.2.3.2-1.

Table 5.26.2.2.3.2-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 5.26.2.2.3.2-2 and the response data structures and response codes specified in table 5.26.2.2.3.2-3.

Table 5.26.2.2.3.2-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
MBSUserService	M	1	Contains the parameters to request the creation of a new MBS User Service at the NEF.

Table 5.26.2.2.3.2-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MBSUserService	M	1	201 Created	Successful case. A new MBS User Service is successfully created and a representation of the created Individual MBS User Service resource is returned.

				An HTTP "Location" header that contains the resource URI of the created Individual MBS User Service resource shall also be included.
NOTE:	The mandatory HTTP error status code for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.			

Table 5.26.2.2.3.2-4: Headers supported by the 201 response code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains the URI of the newly created resource, according to the structure: {apiRoot}/3gpp-mbs-us/v1/mbs-user-services/{mbsUserServId}

5.26.2.2.4 Resource Custom Operations

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

5.26.2.3 Resource: Individual MBS User Service

5.26.2.3.1 Introduction

This resource represents an Individual MBS User Service managed by the NEF.

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

5.26.2.3.2 Resource Definition

Resource URI: **{apiRoot}/3gpp-mbs-us/v1/mbs-user-services/{mbsUserServId}**

This resource shall support the resource URI variables defined in table 5.26.2.3.2-1.

Table 5.26.2.3.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 5.26.1.
mbsUserServId	string	Contains the unique identifier of the Individual MBS User Service resource assigned by the NEF.

5.26.2.3.3 Resource Standard Methods

5.26.2.3.3.1 GET

This method allows an AF to retrieve an existing Individual MBS User Service resource at the NEF.

This method shall support the URI query parameters specified in table 5.26.2.3.3.1-1.

Table 5.26.2.3.3.1-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 5.26.2.3.3.1-2 and the response data structures and response codes specified in table 5.26.2.3.3.1-3.

Table 5.26.2.3.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description

n/a			

Table 5.26.2.3.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MBSUserService	M	1	200 OK	Successful case. The requested Individual MBS User Service resource is successfully returned.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative target URI located in an alternative NEF. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [4].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative target URI located in an alternative NEF. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [4].
NOTE: The mandatory HTTP error status code for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.				

Table 5.26.2.3.3.1-4: Headers supported by the 307 Response Code on this resource

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

Table 5.26.2.3.3.1-5: Headers supported by the 308 Response Code on this resource

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

5.26.2.3.3.2   PUT

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

This method shall support the URI query parameters specified in table 5.26.2.3.3.2-1.

Table 5.26.2.3.3.2-1: URI query parameters supported by the PUT method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 5.26.2.3.3.2-2 and the response data structures and response codes specified in table 5.26.2.3.3.2-3.

Table 5.26.2.3.3.2-2: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
MBSUserService	M	1	Contains the updated representation of the Individual MBS User Service resource that is to be updated.

Table 5.26.2.3.3.2-3: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description

MBSUserService	M	1	200 OK	Successful case. The concerned Individual MBS User Service resource is successfully updated and a representation of the updated resource is returned in the response body.
n/a			204 No Content	Successful case. The concerned Individual MBS User Service resource is successfully updated and no content is returned in the response body.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative target URI located in an alternative NEF. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [4].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative target URI located in an alternative NEF. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [4].
NOTE: The mandatory HTTP error status code for the PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.				

Table 5.26.2.3.3.2-4: Headers supported by the 307 Response Code on this resource

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

Table 5.26.2.3.3.2-5: Headers supported by the 308 Response Code on this resource

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

5.26.2.3.3.3   PATCH

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

This method shall support the URI query parameters specified in table 5.26.2.3.3.3-1.

Table 5.26.2.3.3.3-1: URI query parameters supported by the PATCH method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 5.26.2.3.3.3-2 and the response data structures and response codes specified in table 5.26.2.3.3.3-3.

Table 5.26.2.3.3.3-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
MBSUserService Patch	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.

{apiRoot}/3gpp-mbs-ud-ingest/v1

/sessions

/{sessionId}

/status-subscriptions

/{subscriptionId}
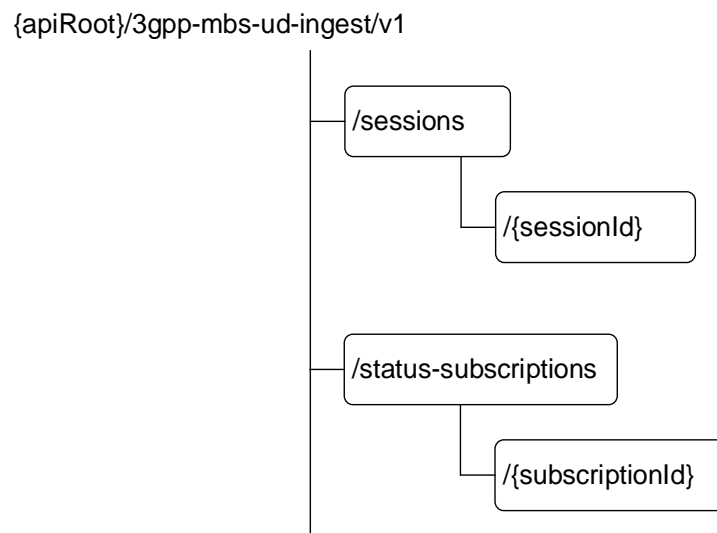
Figure 5.27.2.1-1: Resource URI structure of the MBSUserDataIngestSession API

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 Session(s) 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" resource managed by the NEF.
		PUT	Update an existing "Individual MBS User Data Ingest Session" resource managed by the NEF.
		PATCH	Modify an existing "Individual MBS User Data Ingest Session" resource managed by the NEF.
		DELETE	Delete an existing "Individual MBS User Data Ingest Session" resource managed by the NEF.
MBS User Data Ingest Session Status Subscriptions	/status-subscriptions	GET	Retrieve all the active MBS User Data Ingest Session Status Subscription(s) 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" resource managed by the NEF.
		PUT	Update an existing "Individual MBS User Data Ingest Session Status Subscription" resource managed by the NEF.
		PATCH	Modify an existing "Individual MBS User Data Ingest Session Status Subscription" resource managed by the NEF.
		DELETE	Delete an existing "Individual MBS User Data Ingest Session Status Subscription" resource managed by the NEF.

5.27.2.2　　　Resource: MBS User Data Ingest Sessions

5.27.2.2.1　　　Introduction

This resource represents the collection of MBS User Data Ingest Sessions managed by the NEF.

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

5.27.2.2.2   Resource Definition

Resource URI: **{apiRoot}/3gpp-mbs-ud-ingest/v1/sessions**

This resource shall support the resource URI variables defined in table 5.27.2.2.2-1.

Table 5.27.2.2.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 5.27.1.

5.27.2.2.3   Resource Standard Methods

5.27.2.2.3.1   GET

This method allows an AF to retrieve all the active MBS User Data Ingest Sessions managed by the NEF.

This method shall support the URI query parameters specified in table 5.27.2.2.3.1-1.

Table 5.27.2.2.3.1-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 5.27.2.2.3.1-2 and the response data structures and response codes specified in table 5.27.2.2.3.1-3.

Table 5.27.2.2.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 5.27.2.2.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
array(MBSUserDataIngSession)	M	0..N	200 OK	Successful case. All the active MBS User Data Ingest Sessions managed by the NEF are returned.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [4].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [4].
NOTE: The mandatory HTTP error status code for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.				

Table 5.27.2.2.3.1-4: Headers supported by the 307 Response Code on this resource

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

Table 5.27.2.2.3.1-5: Headers supported by the 308 Response Code on this resource

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

5.27.2.2.3.2   POST

This method enables an AF to request the creation of an MBS User Data Ingest Session at the NEF.

This method shall support the URI query parameters specified in table 5.27.2.2.3.2-1.

Table 5.27.2.2.3.2-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 5.27.2.2.3.2-2 and the response data structures and response codes specified in table 5.27.2.2.3.2-3.

Table 5.27.2.2.3.2-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
MBSUserDataIngSession	M	1	Contains the parameters to request the creation of a new MBS User Data Ingest Session at the NEF.

Table 5.27.2.2.3.2-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response Codes	Description
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.
ProblemDetailsMBS	O	0..1	400 Bad Request	(NOTE 2)
ProblemDetailsMBS	O	0..1	403 Forbidden	(NOTE 2)
ProblemDetailsMBS	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 5.27.7.				

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
MBSUserDataIng Session	M	1	Contains the updated representation of the Individual MBS User Data Ingest Session resource that is to be updated.

Table 5.27.2.3.3.2-3: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MBSUserDataIngSession	M	1	200 OK	Successful case. The concerned Individual MBS User Data Ingest Session resource is successfully updated and a representation of the updated resource is returned in the response body.
n/a			204 No Content	Successful case. The concerned Individual MBS User Data Ingest Session resource is successfully updated and no content is returned in the response body.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative target URI located in an alternative NEF. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [4].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative target URI located in an alternative NEF. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [4].

ProblemDetailsMBS	O	0..1	400 Bad Request	(NOTE 2)
ProblemDetailsMBS	O	0..1	403 Forbidden	(NOTE 2)
ProblemDetailsMBS	O	0..1	404 Not Found	(NOTE 2)
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: Failure cases are described in clause 5.27.7.				

Table 5.27.2.3.3.2-4: Headers supported by the 307 Response Code on this resource

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

Table 5.27.2.3.3.2-5: Headers supported by the 308 Response Code on this resource

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

5.27.2.3.3.3   PATCH

This method enables an AF to request the modification of an existing "Individual MBS User Data Ingest Session" resource at the NEF.

This method shall support the URI query parameters specified in table 5.27.2.3.3.3-1.

Table 5.27.2.3.3.3-1: URI query parameters supported by the PATCH method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 5.27.2.3.3.3-2 and the response data structures and response codes specified in table 5.27.2.3.3.3-3.

Table 5.27.2.3.3.3-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
MBSUserDataIngSessionPatch	M	1	Contains the parameters to request the modification of the Individual MBS User Data Ingest Session resource.

Table 5.27.2.3.3.3-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MBSUserDataIngSession	M	1	200 OK	Successful case. The concerned Individual MBS User Data Ingest Session resource is successfully modified and a representation of the updated resource is returned in the response body.
n/a			204 No Content	Successful response. The Individual MBS User Data Ingest Session resource is successfully modified and no content is returned in the response body.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative target URI located in an alternative NEF. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [4].

			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].
n/a				
ProblemDetailsMBS	O	0..1	400 Bad Request	(NOTE 2)
ProblemDetailsMBS	O	0..1	403 Forbidden	(NOTE 2)
ProblemDetailsMBS	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 5.27.7.				

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 Sesstion Status Subscription at the NEF.

This method shall support the URI query parameters specified in table 5.27.2.4.3.2-1.

Table 5.27.2.4.3.2-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 5.27.2.4.3.2-2 and the response data structures and response codes specified in table 5.27.2.4.3.2-3.

Table 5.27.2.4.3.2-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
MBSUserDataIngStatSubsc	M	1	Contains the parameters to request the creation of a new MBS User Data Ingest Session Status Subscription at the NEF.

Table 5.27.2.4.3.2-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response Codes	Description
MBSUserDataIngStatSubsc	M	1	201 Created	Successful case. A new MBS User Data Ingest Session Status Subscription is successfully created and a representation of the created Individual MBS User Data Ingest Session Status Subscription resource is returned. An HTTP "Location" header that contains the URI of the created Individual MBS User Data Ingest Session Status Subscription resource is also included.
NOTE: The mandatory HTTP error status code for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.				

Table 5.27.2.4.3.2-4: Headers supported by the 201 response code on this resource

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

5.27.2.4.4   Resource Custom Operations

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

5.27.2.5   Resource: Individual MBS User Data Ingest Session Status Subscription

5.27.2.5.1   Introduction

This resource represents an Individual MBS User Data Ingest Session Status Subscription managed by the NEF.

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

5.27.2.5.2   Resource Definition

Resource URI: **{apiRoot}/3gpp-mbs-ud-ingest/v1/status-subscriptions/{subscriptionId}**

This resource shall support the resource URI variables defined in table 5.27.2.5.2-1.

Table 5.27.2.5.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 5.27.1.
sessionId	string	Contains the unique identifier of the Individual MBS User Data Ingest Session Status Subscription resource assigned by the NEF.

5.27.2.5.3   Resource Standard Methods

5.27.2.5.3.1   GET

This method allows an AF to retrieve an existing "Individual MBS User Data Ingest Session Status Subscription" resource at the NEF.

This method shall support the URI query parameters specified in table 5.27.2.5.3.1-1.

Table 5.27.2.5.3.1-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description	Applicability

n/a					

This method shall support the request data structures specified in table 5.27.2.5.3.1-2 and the response data structures and response codes specified in table 5.27.2.5.3.1-3.

Table 5.27.2.5.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 5.27.2.5.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MBSUserDataIngStatSubsc	M	1	200 OK	Successful case. The requested Individual MBS User Data Ingest Session Status Subscription resource is successfully returned.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative target URI located in an alternative NEF. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [4].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative target URI located in an alternative NEF. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [4].
NOTE: The mandatory HTTP error status code for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.				

Table 5.27.2.5.3.1-4: Headers supported by the 307 Response Code on this resource

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

**Table 5.27.2.5.3.1-5: Headers supported by the 308 Response Code on this resource**

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

5.27.2.5.3.2   PUT

The PATCH method allows an AF to update an existing "Individual MBS User Data Ingest Session Status Subscription" resource managed by the NEF.

This method shall support the URI query parameters specified in table 5.27.2.5.3.2-1.

Table 5.27.2.5.3.2-1: URI query parameters supported by the PUT method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 5.27.2.5.3.2-2 and the response data structures and response codes specified in table 5.27.2.5.3.2-3.

Table 5.27.2.5.3.2-2: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
MBSUserDataIng StatSubsc	M	1	Contains the parameters to request the modification of an existing "Individual MBS User Data Ingest Session Status Subscription" resource.

Table 5.27.2.5.3.2-3: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MBSUserDataIngStat Subsc	M	1	200 OK	Successful case. The concerned "Individual MBS User Data Ingest Session Status Subscription" resource is successfully updated and a representation of the updated resource is returned in the response body.
n/a			204 No Content	Successful case. The concerned "Individual MBS User Data Ingest Session Status Subscription" resource is successfully updated, and no content is returned in the response body.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [4].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [4].
NOTE: The mandatory HTTP error status code for the PUT method listed in Table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.				

Table 5.27.2.5.3.2-4: Headers supported by the 307 Response Code on this resource

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

Table 5.27.2.5.3.2-5: Headers supported by the 308 Response Code on this resource

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

5.27.2.5.3.3 PATCH

The PATCH method allows an AF to modify an existing "Individual MBS User Data Ingest Session Status Subscription" resource managed by the NEF.

This method shall support the URI query parameters specified in table 5.27.2.5.3.3-1.

Table 5.27.2.5.3.3-1: URI query parameters supported by the PATCH method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 5.27.2.5.3.3-2 and the response data structures and response codes specified in table 5.27.2.5.3.3-3.

Table 5.27.2.5.3.3-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
MBSUserDataIng StatSubscPatch	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
MBSUserDataIngStatS ubsc	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
MBSUserDataIng StatNotif	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 Void

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.	
ProblemDetailsMBS	3GPP TS 29.580 [66]	Represents an extension to the ProblemDetails data structure with potentially additional error information related to MBS.	MBSErrorHandling

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	Void	
2	Void	
3	5MBS2	This feature indicates the support of the Rel-18 enhancements to the 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 Core Networks). - NR RedCap UE Information provisioning during MBS Distribution Session creation/update.
4	MBSErrorHandling	Represents the support of the MBS related error handling procedures. The following functionalities are supported: - Support of the missing MBS Session related error handling procedures to enable end-to-end relaying of errors. - Support MBS Data Ingest Session specific error handling. - Support partial MBS Distribution Session creation/update failure management.

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	Applicability
INVALID_MBS_SERVICE_INFO	400 Bad Request	Indicates that the provided MBS Service Information is invalid (e.g. invalid QoS reference), incorrect or insufficient to perform MBS policy authorization.	MBSErrorHandling
MBS_SERVICE_AREA_NOT_SUPPORTED	403 Forbidden	Indicates that the requested MBS Service Area is not supported by the 3GPP Core Network.	MBSErrorHandling
MBS_SERVICE_INFO_NOT_AUTHORIZED	403 Forbidden	Indicates the provided MBS Service Information is rejected.	MBSErrorHandling
MBS_DIST_SESSION_ALREADY_CREATED	403 Forbidden	Indicates that the requested MBS Distribution Session has already been created.	MBSErrorHandling
OVERLAPPING_MBS_SERVICE_AREA	403 Forbidden	Indicates that the provided MBS service area overlaps with the MBS service area of an existing MBS Distribution Session that shares the same MBS session Identifier.	MBSErrorHandling
UNKNOWN_MBS_SERVICE_AREA	404 Not Found	Indicates that the requested MBS service area (e.g., identified by the Area Session ID) cannot be found.	MBSErrorHandling

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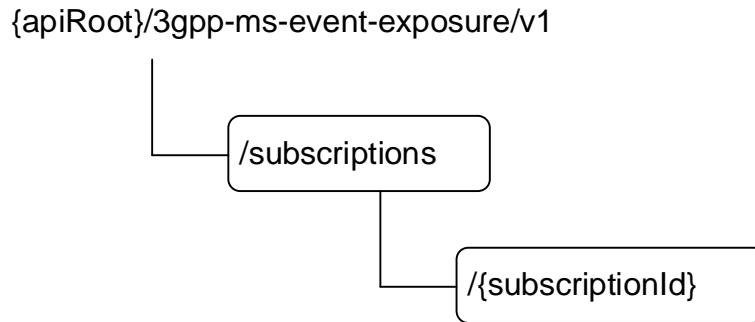
Figure 5.28.2.1-1: Resource URI structure of the MSEventExposure API

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 Sreaming 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   Void

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}/<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-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.

{apiRoot}/3gpp-mbs-group-msg/v1
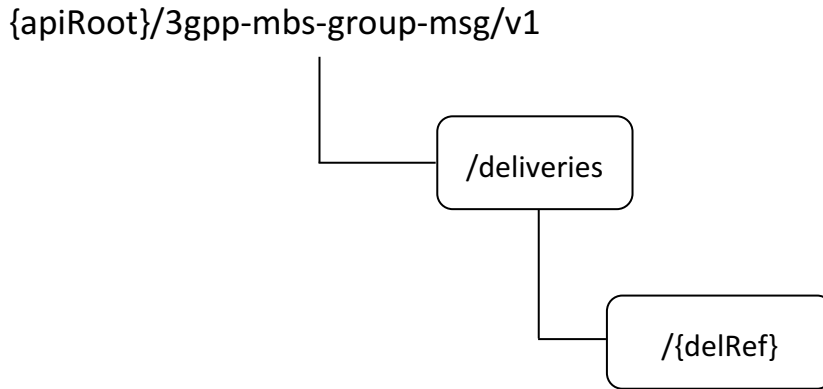
Figure 5.29.2.1-1: Resource URI structure of the MBSGroupMsgDelivery API

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 there are no active MBS Group Message Delivery(ies) 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
MbsGroupMsgDelPatch	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 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].
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 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 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	Enables the NEF to notify a previously subscribed 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 5.29.4.2.3-2.

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

Data type	P	Cardinality	Description
MbsGroupMsgDel StatusNotif	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 API 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.	
NrRedCapUeInfo	3GPP TS 29.571 [8]	Represents NR RedCap UE Information.	
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]	Represents a Uri.	
UserServiceDescription	3GPP TS 26.517 [71]	Represents 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 requests.	
extGroupId	ExternalGroupId	M	1	Contains the identifier of the targeted group of UEs.	
payload	Bytes	M	1	Contains the payload of the requested MBS Group Message Delivery.	
mbsServArea	MbsServArea	M	1	Contains the targeted MBS Service Area.	
startTime	DateTime	M	1	Contains the start time of the MBS Group Message Delivery.	
endTime	DateTime	M	1	Contains the end time of the MBS Group Message Delivery.	
notifUri	Uri	M	1	Contains the notification URI via which the AF desires to receive notifications on the	

Attribute name	Data type	P	Cardinality	Description	Applicability
delStatus	boolean	C	0..1	Indicates the status of this MBS 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 Modification 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.	
nrRedCapUeInfo	NrRedCapUeInfo	O	0..1	Contains the NR RedCap UE Information.	
suppFeat	SupportedFeatures	C	0..1	Indicates the list of supported features. This attribute shall be present only when feature negotiation needs to take place.	

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	Contains the updated MBS Service Area.	
startTime	DateTime	O	0..1	Contains the updated start time of the MBS Group Message Delivery.	
endTime	DateTime	O	0..1	Contains 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 this MBS Group Message Delivery.	

nrRedCapUeInfo	NrRedCapUeInfo	O	0..1	Contains the NR RedCap UE Information.	

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 MBS Group Message Delivery creation/update request is rejected because the requested MBS Service Area is not supported by the 3GPP Core Network.	

5.30 DNAIMapping API

5.30.1 Introduction

The Nnef_DNAIMapping service shall use the DNAIMapping API.

The API URI of the DNAIMapping 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-dnai-mapping".

- "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.

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 DNAIMapping API.
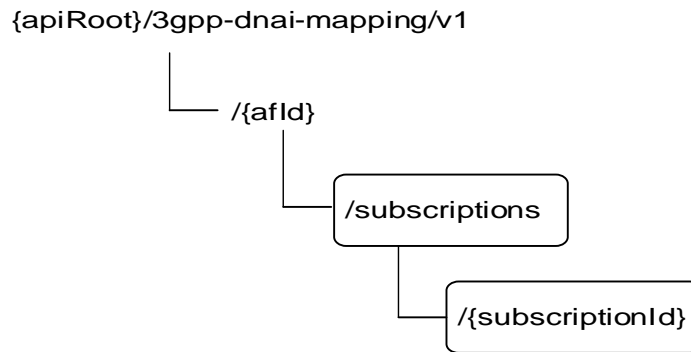
Figure 5.30.2.1-1: Resource URI structure of the DNAIMapping API

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

Table 5.30.2.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method	Description
DNAI Mapping Subscriptions	/{afId}/subscriptions	GET	Retrieve all the active DNAI Mapping Subscriptions at the NEF.
		POST	Create a new DNAI Mapping Subscription.
Individual DNAI Mapping Subscription	/{afId}/subscriptions/{subscriptionId}	GET	Retrieve an existing DNAI Mapping Subscription.
		DELETE	Delete an existing DNAI Mapping Subscription.

5.30.2.2   Resource: DNAI Mapping Subscriptions

5.30.2.2.1   Introduction

This resource represents all the active DNAI Mapping Subscriptions managed by the NEF for a 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/<apiVersion>/{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	See clause 5.30.1.
afId	string	Represents the identifier of the AF.

5.30.2.2.3   Resource Standard Methods

5.30.2.2.3.1   Void

5.30.2.2.3.2   GET

The HTTP GET method allows to retrieve all the active DNAI Mapping Subscriptions managed by the NEF for a given AF.

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	Successful case. All the "Individual DNAI Mapping Subscription" resource(s) managed by the NEF are returned. If there are no active "Individual DNAI Mapping Subscription" resources at the NEF, an empty array is returned.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative target 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 target 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 HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall 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 target URI of the resource located in an alternative NEF.

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 target URI of the resource located in an alternative NEF.

5.30.2.2.3.3 POST

The HTTP POST method allows to create a new DNAI Mapping Subscription at the NEF for a given AF.

This method shall support the URI query parameters specified in table 5.30.2.2.3.3-1.

Table 5.30.2.2.3.3-1: 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 5.30.2.2.3.3-1 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	Contains the parameters to request the creation of a new DNAI Mapping Subscription at 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	Successful case. A representation of the created "Individual DNAI Mapping Subscription" 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 codes for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall 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/<apiVersion>/{afId}/subscriptions/{subscriptionId}

5.30.2.2.4 Resource Custom Operations

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

5.30.2.3 Resource: Individual DNAI Mapping Subscription

5.30.2.3.1 Introduction

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

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

5.30.2.3.2 Resource Definition

Resource URI: **{apiRoot}/3gpp-dnai-mapping/<apiVersion>/{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	See clause 5.30.1.
afId	string	Represents the identifier of the AF.
subscriptionId	string	Represents the identifier of the "Individual DNAI Mapping Subscription" resource.

5.30.2.3.3 Resource Standard Methods

5.30.2.3.3.1 Void

5.30.2.3.3.2 GET

The HTTP GET method allows to retrieve an existing "Individual DNAI Mapping Subscription" resource at the NEF.

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	Successful case. The requested "Individual DNAI Mapping Subscription" 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 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 target 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 HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall 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 target URI of the resource located in an alternative NEF.

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 target URI of the resource located in an alternative NEF.

5.30.2.3.3.3   DELETE

The HTTP DELETE method allows to deletes an existing "Individual DNAI Mapping Subscription" resource at the NEF.

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	Successful case. The "Individual DNAI Mapping 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 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 target 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 HTTP DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall 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 target URI of the resource located in an alternative NEF.

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 target URI of the resource located in an alternative NEF.

5.30.2.3.4   Resource Custom Operations

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

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

Notifications shall comply to 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)
DNAI Mapping Information Update Notification	{notifUri}	POST	Enbales the NEF to notify a previously subscribed AF on the updates of the DNAI-EAS address(es) information.

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 updates of the DNAI Mapping information to a previously 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	Represents the callback URI encoded as a string formatted as a URI.

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 5.30.4.2.3.1-1 and the response data structures and response codes specified in table 5.30.4.2.3.1-2.

Table 5.30.4.2.3.1-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
DnaiMapUpdateN otif	M	1	Represents the DNAI Mapping Information Update Notification.

Table 5.30.4.2.3.1-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	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 5.30.4.2.3.1-3: Headers supported by the 307 Response Code on this resource

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

Table 5.30.4.2.3.1-4: Headers supported by the 308 Response Code on this resource

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

5.30.4.2.3.2   Void

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 API specific Data Types

Data type	Clause defined	Description	Applicability
DnaiMapSub	5.30.5.2.2	Represents a DNAI Mapping Subscription.	

| DnaiMapUpdateNotif | 5.30.5.2.3 | Represents a DNAI Mapping Information Update Notification. | |

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: DNAIMapping API re-used Data Types

Data type	Reference	Comments	Applicability
DnaiEasInfo	3GPP TS 29.519 [23]	Represents EAS information for a DNAI.	
Dnn	3GPP TS 29.571 [8]	Represents a DNN.	
Fqdn	3GPP TS 29.571 [8]	Represents an FQDN.	
IpAddr	3GPP TS 29.571 [8]	Represents an IP address.	
ReportingInformation	3GPP TS 29.523 [22]	Represents the event reporting requirements.	
Snssai	3GPP TS 29.571 [8]	Represents an S-NSSAI.	
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]	Represents a URI.	

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	Contains the IP address(es) of the EAS(s) in the Local part of the DN or the IP address range(s) (i.e., IPv4 subnetwork(s) and/or IPv6 prefix(es)) of the Local part of the DN where the EAS(s) is/are deployed. (NOTE)	
fqdns	array(Fqdn)	C	1..N	Contains the 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	Contains 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	Contains an S-NSSAI.	
immReports	array(DnaiMapUpdateNotif)	C	1..N	Contains the DNAI EAS mapping information. This attribute shall be present only in subscription creation/update responses and only when immediate reporting was requested in the	

				corresponding subscription creation/update request and the information is available.	
eventReq	ReportingInformation	O	0..1	Contains the event reporting requirements.	
notifUri	Uri	M	1	Contains the URI via which the DNAI Mapping Information Update notifications shall be delivered.	
notifCorrId	string	M	1	Contains the notification correlation identifier.	
suppFeat	SupportedFeatures	C	0..1	Contains the list of supported features used as defined in clause 5.30.6. This attribute shall be present only when feature negotiation needs to take place.	
NOTE: These attributes are mutually exclusive. Either one of them shall be present.					

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)	C	1..N	Contains the mapping information between the DNAI(s) and the EAS address(es). This attribute shall be present unless the notification is sent to notify deletion.	
mappingId	string	M	1	Identifies the mapping information provided in the "dnaiEasAddrMap" attribute. For notifying deletion, this attribute shall be provided without the "dnaiEasAddrMap" attribute.	
notifCorrId	string	M	1	Contains the 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

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

There are no data types describing alternative data types or combinations of data types defined for this API in this release of the specification.

5.30.6 Used Features

The optional features listed in table 5.30.6-1 are defined for the DNAIMapping API. They shall be negotiated using the extensibility mechanism defined in clause 5.2.7 of 3GPP TS 29.122 [4].

Table 5.30.6-1: Features used by DNAIMapping API

Feature number	Feature Name	Description
1	Void	
2	Void	

5.30.7 Error handling

5.30.7.1 General

For the DNAIMapping 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 DNAIMapping API.

5.30.7.2 Protocol Errors

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

5.30.7.3 Application Errors

The application errors defined for the DNAIMapping API are listed in table 5.30.7.3-1.

Table 5.30.7.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

5.31 PdtqPolicyNegotiation API

5.31.0 Introduction

The Nnef_PdtqPolicyNegotiation service shall use the PdtqPolicyNegotiation API.

The API URI of PdtqPolicyNegotiation 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-pdtq-policy-negotiation".

- "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 API URI.

5.31.1 Resources

5.31.1.1 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 PdtqPolicyNegotiation API.

The structure of the resource URIs of the PdtqPolicyNegotiation API is shown in Figure 5.31.1.1-1.

{apiRoot}/3gpp-pdtq-policy-negotiation/<apiVersion>

/{afId}

/subscriptions

/{subscriptionId}
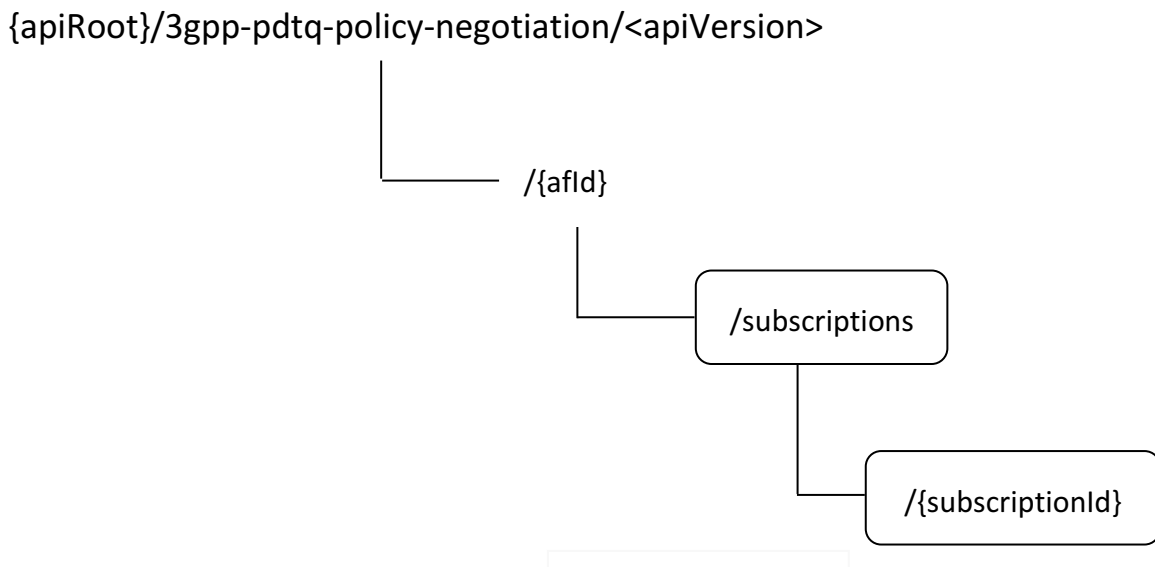
Figure 5.31.1.1-1: Resource URI structure of the PdtqPolicyNegotiation API

Table 5.31.1.1-1 provides an overview of the resources and applicable HTTP methods.

Table 5.31.1.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method or custom operation	Description
PDTQ Policy Subscriptions	/{afId}/subscriptions	GET	Read all the active PDTQ Policy Subscription resources for a given AF.
		POST	Create a new PDTQ Policy Subscription.
Individual PDTQ Policy Subscription	/{afId}/subscriptions/{subscriptionId}	GET	Retrieve an existing "Individual PDTQ Policy Subscription" resource.
		PATCH	Modify an existing "Individual PDTQ Policy Subscription" resource.
		DELETE	Delete an existing "Individual PDTQ Policy Subscription" resource.

5.31.1.2 Resource: PDTQ Policy Subscriptions

5.31.1.2.1 Introduction

This resource represents all the active PDTQ Policy Subscriptions managed by the NEF for a given AF.

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

5.31.1.2.2 Resource Definition

Resource URI: **{apiRoot}/3gpp-pdtq-policy-negotiation/<apiVersion>/{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	See clause 5.31.0.
afId	string	Represents the identifier of the AF.

5.31.1.2.3 Resource Standard Methods

5.31.1.2.3.1 Void

5.31.1.2.3.2 GET

The HTTP GET method allows to retrieve all the active PDTQ Policy Subscriptions managed by the NEF.

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	0..N	200 OK	Successful case. All the "Individual PDTQ Policy Subscription" resource(s) managed by the NEF are returned. If there are no active "Individual PDTQ Policy Subscription" resources at the NEF, an empty array is returned.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative target 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 target 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 HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall 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	Contains an alternative target 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	Contains an alternative target URI of the resource located in an alternative NEF.

5.31.1.2.3.3   POST

The HTTP POST method allows to create a new PDTQ Policy Subscription at the NEF.

This method shall support the URI query parameters specified in table 5.31.1.2.3.3-1.

Table 5.31.1.2.3.3-1: 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 5.31.1.2.3.3-2 and the response data structures and response codes specified in table 5.31.1.2.3.3-3.

Table 5.31.1.2.3.3-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
Pdtq	M	1	Contains the parameters to request the creation of a new PDTQ Policy Subscription at the NEF.

Table 5.31.1.2.3.3-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
Pdtq	M	1	201 Created	Successful case. A representation of the created "Individual PDTQ Policy Subscription" 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 codes for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall also apply.			

Table 5.31.1.2.3.3-4: 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-pdtq-policy-negotiation/<apiVersion>/{afId}/subscriptions/{subscriptionId}

5.31.1.2.4   Resource Custom Operations

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

5.31.1.3   Resource: Individual PDTQ Policy Subscription

5.31.1.3.1   Introduction

This resource represents an "Individual PDTQ Policy Subscription" resource managed by the NEF.

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

5.31.1.3.2   Resource Definition

Resource URI: **{apiRoot}/3gpp-pdtq-policy-negotiation/<apiVersion>/{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	See clause 5.31.0.
afId	string	Represents the identifier of the AF.
subscriptionId	string	Represents the identifier of the "Individual PDTQ Policy Subscription" resource.

5.31.1.3.3   Resource Standard Methods

5.31.1.3.3.1   Void

5.31.1.3.3.2   GET

The HTTP GET method allows to retrieve an existing "Individual PDTQ Policy Subscription" resource at the NEF.

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	Successful case. The requested "Individual PDTQ Policy Subscription" 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 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 target 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 HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall 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	Contains an alternative target 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	Contains an alternative target URI of the resource located in an alternative NEF.

5.31.1.3.3.3   PATCH

The HTTP PATCH method allows to modify an existing "Individual PDTQ Policy Subscription" resource at the NEF.

This method shall support the URI query parameters specified in table 5.31.1.3.3.3-1.

Table 5.31.1.3.3.3-1: 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 5.31.1.3.3.3-2 and the response data structures and response codes specified in table 5.31.1.3.3.3-3.

Table 5.31.1.3.3.3-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
PdtqPatch	M	1	Represents the requested modifications to the "Individual PDTQ Policy Subscription" resource.

Table 5.31.1.3.3.3-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
Pdtq	M	1	200 OK	Successful response. The "Individual PDTQ Policy 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 PDTQ Policy 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 target 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 target 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 HTTP PATCH method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall also apply.				

Table 5.31.1.3.3.3-4: Headers supported by the 307 Response Code on this resource

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

Table 5.31.1.3.3.3-5: Headers supported by the 308 Response Code on this resource

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

5.31.1.3.3.4 DELETE

The HTTP DELETE method allows to delete an existing "Individual PDTQ Policy Subscription" resource at the NEF.

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	Successful case. The "Individual PDTQ Policy Subscription" resource is successfully deleted.

			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative target 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 target 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 HTTP DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall 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	Contains an alternative target 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	Contains an alternative target URI of the resource located in an alternative NEF.

5.31.1.3.4   Resource Custom Operations

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

5.31.1A Custom Operations without associated resources

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

5.31.2   Notifications

5.31.2.1   General

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

Table 5.31.2.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
PDTQ Warning Notification	{notifUri}	POST	Enables the NEF to notify a previously subscribed AF on PDTQ warning event(s).

5.31.2.2 PDTQ Warning Notification

5.31.2.2.1 Description

This notification is used by the NEF to notify a previously subscribed AF on PDTQ warning event(s), i.e., the changed conditions for a planned data transfer with QoS requirements (e.g., 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 "{**notifUri**}" 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	Definition
notifUri	Represents the callback URI encoded as a string formatted as a URI.

5.31.2.2.3 Operation Definition

5.31.2.2.3.1 Notification via HTTP POST

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	P	Cardinality	Description
PdtqNotification	M	1	Represents 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
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 5.31.2.2.3.1-3: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description

Location	string	M	1	Contains an alternative URI representing the end point of an alternative AF towards which the notification should be redirected.

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	Contains 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
Pdtq	5.31.3.3.2	Represents a PDTQ Policy Subscription.	
PdtqNotification	5.31.3.3.4	Represents a PDTQ Warning Notification.	
PdtqPatch	5.31.3.3.3	Represents the requested modifications to a PDTQ Policy Subscription.	

Table 5.31.3.1-2 specifies data types re-used by the PdtqPolicyNegotiation API from other specifications, including a reference to their respective specifications, and when needed, a short description of their use within the PdtqPolicyNegotiation API.

Table 5.31.3.1-2: PdtqPolicyNegotiation API re-used Data Types

Data type	Reference	Comments
AltQosParamSet	3GPP TS 29.543 [68]	Represents the alternative QoS requirements expressed as a list of individual QoS parameters sets.
ApplicationId	3GPP TS 29.571 [8]	Represents the application identifier.
LocationArea5G	3GPP TS 29.122 [4]	Represents the user location area information.
PdtqPolicy	3GPP TS 29.543 [68]	Represents a PDTQ policy.
PdtqReferenceId	3GPP TS 29.543 [68]	Represents a PDTQ Reference ID.
QosParamSet	3GPP TS 29.543 [68]	Represents 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 time window.
Uri	3GPP TS 29.122 [4]	Represents a URI.

5.31.3.2 Void

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

Table 5.31.3.3.2-1: Definition of type Pdtq

Attribute name	Data type	P	Cardinality	Description	Applicability
altQosParamSets	array(AltQosParamSet)	O	1..N	Contains the alternative QoS requirements expressed as a list of individual QoS parameters 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 a 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)	
appId	ApplicationId	O	0..1	Contains the identifier of the application.	
aspId	string	M	1	Contains the identifier of the application service provider.	
desTimeInts	array(TimeWindow)	M	1..N	Contains the time interval(s).	
locationArea5G	LocationArea5G	O	0..1	Contains the area within which the AF request shall apply.	
notifUri	Uri	O	0..1	Contains the URI via which the PDTQ warning notifications should be delivered.	
numberOfUEs	integer	M	1	Contains the number of UEs.	
pdtqPolicies	array(PdtqPolicy)	O	1..N	Contains 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 a QoS Reference. (NOTE 2)	
referenceId	PdtqReferenceId	O	0..1	Contains the identifier of 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. This attribute shall not be present during resource creation, it may be provided only in a subsequent resource update. (NOTE 5)	
warnNotifEnabled	boolean	O	0..1	Indicates whether the PDTQ warning notification is enabled or not. - "true" indicates that the PDTQ warning notification is enabled. - "false" indicates that the PDTQ warning notification is disabled.	

				- The default value is "false" when this attribute is omitted.	
suppFeat	SupportedFeatures	O	0..1	Contains the list of supported features among the ones defined in clause 5.31.4.	
NOTE 1: Void.					
NOTE 2: These attributes are mutually exclusive. Either one of them shall be present.					
NOTE 3: This attribute may be present only if the "qosReference" attribute is present.					
NOTE 4: This attribute may be presentonly if the "qosParamSet" attribute is present.					
NOTE 5: When this attribute is present and set to the value "0", it indicates that no PDTQ policy is selected.					

5.31.3.3.3   Type: PdtqPatch

Table 5.31.3.3.3-1: Definition of type PdtqPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
selectedPolicy	integer	O	0..1	Contains the identifier of the selected PDTQ policy. (NOTE)	
warnNotifEnabled	boolean	O	0..1	Indicates whether the PDTQ warning notification is enabled or not. - "true" indicates that the PDTQ warning notification is enabled; - "false" indicates that the PDTQ warning notification is not enabled.	
notifUri	Uri	O	0..1	Contains the updated URI via which the PDTQ warning notifications should be delivered.	
NOTE: When this attribute is present and set to the value "0", it indicates that no PDTQ policy is selected.					

5.31.3.3.4   Type: PdtqNotification

Table 5.31.3.3.4-1: Definition of type Notification

Attribute name	Data type	P	Cardinality	Description	Applicability
pdtqRefId	PdtqReferenceId	M	1	Contains the identifier of the PDTQ policy to which the notification corresponds.	
candPolicies	array(PdtqPolicy)	M	1..N	Contains 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

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

There are no data types describing alternative data types or combinations of data types defined for this API in this release of the specification.

5.31.4 Used Features

The optional features listed in table 5.31.4-1 are defined for the PdtqPolicyNegotiation API. They shall be negotiated using the extensibility mechanism defined 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

For the PdtqPolicyNegotiation 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 PdtqPolicyNegotiation API.

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 Nnef_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.

- 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 API URI.

5.32.2 Resources

5.32.2.1 Overview

This clause describes the structure for the Resource URIs as shown in Figure 5.32.2.1-1 and the resources and HTTP methods used for the MemberUESelectionAssistance API.
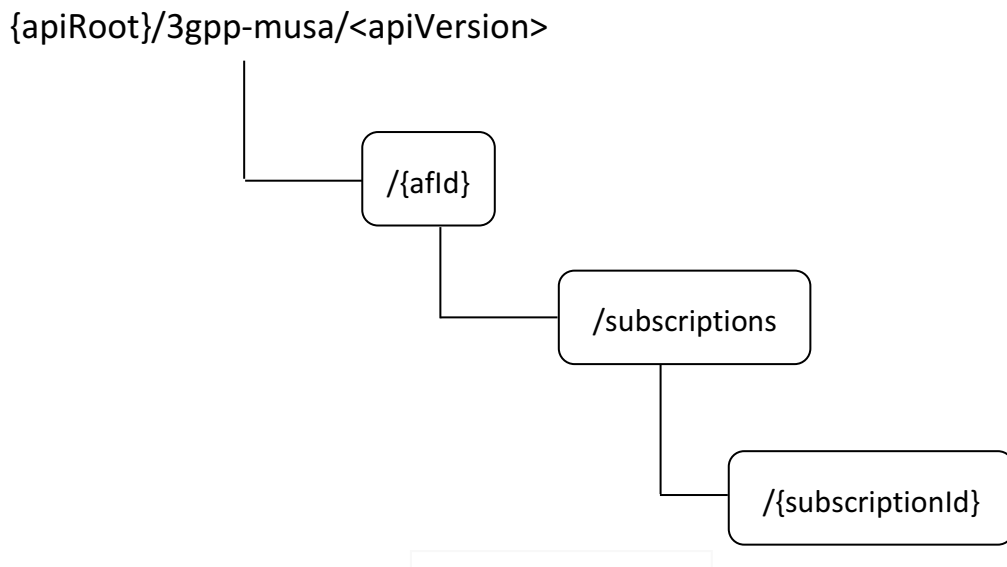
Figure 5.32.2.1-1: Resource URI structure of the MemberUESelectionAssistance API

Table 5.32.2.1-1 provides an overview of the resources and applicable HTTP methods applicable for the MemberUESelectionAssistance API.

Table 5.32.2.1-1: 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	/{afId}/subscriptions	POST	Create a new Member UE Selection Assistance Subscription.
		GET	Retreive all the active Member UE Selection Assistance Subscription resources.
Individual Member UE Selection Assistance Subscription	/{afId}/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 represents all the active Member UE Selection Assistance Subscriptions managed by the NEF for a given AF.

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

5.32.2.2.2　　　　Resource definition

Resource URL: **{apiRoot}/3gpp-musa/<apiVersion>/{afId}/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	See clause 5.32.1.
afId	string	Represents the identifier of the AF.

5.32.2.2.3　　　　Resource Standard Methods

5.32.2.2.3.1　　　　POST

The HTTP POST method enables 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	Contains the parameters to request the creation of a new Member UE Selection Assistance Subscription at 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" 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 codes for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall 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/<apiVersion>/{afId}/subscriptions/{subscriptionId}

5.32.2.2.3.2 GET

The HTTP GET method enables to retrieve all the active Member UE Selection Assistance Subscriptions managed by the NEF.

This method shall support the URI query parameters specified in table 5.32.2.2.3.2-1.

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	Successful case. All the "Individual Member UE Selection Assistance Subscription" resource(s) managed by the NEF are returned. If there are no active "Individual Member UE Selection Assistance Subscription" resources at the NEF, an empty array is returned.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative target 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 target 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 HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall 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	Contains an alternative target 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	Contains an alternative target URI of the resource located in an alternative NEF.

5.32.2.2.4 Resource Custom Operations

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

5.32.2.3 Resource: Individual Member UE Selection Assistance Subscription

5.32.2.3.1 Introduction

This resource represents an "Individual Member UE Selection Assistance Subscription" resource managed by the NEF.

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

5.32.2.3.2 Resource Definition

Resource URL: **{apiRoot}/3gpp-musa/<apiVersion>/{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	See clause 5.32.1.
afId	string	Represents the identifier of the AF.
subscriptionId	string	Represents the identifier of the "Individual Member UE Selection Assistance Subscription" resource.

5.32.2.3.3 Resource Standard Methods

5.32.2.3.3.1 GET

The HTTP GET method enables 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 in the response body.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative target 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 target 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 HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall 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	Contains an alternative target URI of the resource 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	Contains an alternative target URI of the resource located in an alternative NEF.

5.32.2.3.3.2 PUT

The HTTP PUT method enables to request the update of an existing "Individual Member UE Selection Assistance Subscription" resource at the NEF.

This method shall support the URI query parameters specified in table 5.32.2.3.3.2-1.

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
n/a				

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	Contains the updated "Individual Member UE Selection Assistance Subscription" resource representation.

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	Successful response. The "Individual Member UE Selection Assistance Subscription" 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 Member UE Selection Assistance 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 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 target 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 HTTP PUT method listed in Table 5.2.6-1 of 3GPP TS 29.122 [4] shall 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	Contains an alternative target 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	Contains an alternative target URI of the resource located in an alternative NEF.

5.32.2.3.3.3   PATCH

This method enables 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
MemUeSelectAssistSubsc Patch	M	1	Contains the requested modifications to 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 response. The "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 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 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 target 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 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	Contains an alternative target 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	Contains an alternative target URI of the resource located in an alternative NEF.

5.32.2.3.3.4   DELETE

The HTTP DELETE method enables to request the deletion of an existing "Individual Member UE Selection Assistance Subscription" resource at the NEF.

This method shall support the URI query parameters specified in table 5.32.2.3.3.4-1.

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 is successfully deleted.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative target 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 target 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 HTTP DELETE method listed in Table 5.2.6-1 of 3GPP TS 29.122 [4] shall 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	Contains an alternative target 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	Contains an alternative target URI of the resource located in an alternative NEF.

5.32.2.3.4 Resource Custom Operations

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

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 a previously subscribed AF on Member UE Selection Assistance.

5.32.4.2 Member UE Selection Assistance Notification

5.32.4.2.1 Description

The Member UE Selection Assistance Notification is used by the NEF to report Member UE Selection Assistance related event(s) 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	Represents the callback URI encoded as a string formatted as a URI.

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
array(MemUeSeletAssistNotif)	M	1..N	Represents the Member UE Selection Assistance Notification.

Table 5.32.4.2.3-2: 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 5.32.4.2.3-3: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains 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	Contains 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	Represents the Access types and Rat types filtering criteria for Member UE selection.
CandUeInfo	5.32.5.2.16	Represents the candidate UE information.
CandiUeListInfo	5.32.5.2.13	Represents the lists of candidate UEs and recommended time window for performing the application operation.
DnnFilterCriteria	5.32.5.2.12	Represents the DNN filtering criteria for Member UE selection.
E2ETransTimeFilterCriteria	5.32.5.2.6	Represents the End-to-end data volume transfer time filtering criteria for Member UE selection.
FilterCriterionType	5.32.5.3.3	Represents the filter criterion type.
MemUeSeletAssistNotif	5.32.5.2.3	Represents a Member UE Selection Assistance Notification.
MemUeSelectAssistSubsc	5.32.5.2.2	Represents a Member UE Selection Assistance Subscription.
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	Represents a Member UE selection report.
UeDirectionFilterCriteria	5.32.5.2.9	Represents the UE direction filtering criteria for Member UE selection.
UeDistanceFilterCriteria	5.32.5.2.10	Represents the UE distance filtering criteria for Member UE selection.
UeHisLocFilterCriteria	5.32.5.2.8	Represents the UE historical location filtering criteria for Member UE selection.
UeLocFilterCriteria	5.32.5.2.7	Represents the UE location filtering criteria for Member UE selection.

| QoSFilterCriteria | 5.32.5.2.4 | Represents the QoS filtering criteria for Member UE selection. |
| ServiceExpFilterCriteria | 5.32.5.2.11 | Represents 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: MemberUESelectionAssistance API re-used Data Types

Data type	Reference	Comments	Applicability
AccessType	3GPP TS 29.571 [8]	Represents the access type.	
AmfEventType	3GPP TS 29.518 [18]	Represents the events exposed by an AMF.	
DataVolumeTransferTime	3GPP TS 29.520 [27]	Represents 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 units of seconds.	
DurationSecRm	3GPP TS 29.122 [4]	Represents the time duration, same as the DurationSec data type, but with the OpenAPI "nullable: true" property.	
Direction	3GPP TS 29.520 [27]	Represents the UE direction.	
Dnai	3GPP TS 29.571 [8]	Represents a user plane access to one or more DN(s).	
Dnn	3GPP TS 29.571 [8]	Represents a DNN.	
Gpsi	3GPP TS 29.571 [8]	Represents a GPSI.	
GeoDistributionInfo	3GPP TS 29.520 [27]	Represents the geographical distribution of the UEs.	
IpAddr	3GPP TS 29.571 [8]	Represents 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]	Represents the events exposed by an 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]	Represents the events exposed by an SMF.	
Snssai	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]	Represents an unsigned integer.	
Uri	3GPP TS 29.122 [4]	Represents a URI.	

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

afId	string	O	0..1	Contains the identifier of the AF.	
tgtUeIds	array(Gpsi)	C	1..N	Identifies the list of identifier(s) of the UE(s) for which Member UE Selection Assistance Reporting is requested. (NOTE 2)	
tgtUeIps	array(IpAddr)	C	1..N	Contains the IP address(es) of the UE(s) for which Member UE Selection Assistance Reporting is requested. (NOTE 2)	
notifUri	Uri	M	1	Contains the URI via which Member UE Selection Assistance notifications shall be delivered.	
notifId	string	M	1	Contains the Notification Correlation ID assigned by the AF.	
qosFilters	array(QoSFilterCriteria)	C	1..N	Contains the QoS filtering criteria for Member UE selection. (NOTE 1)	
accRatTypeFilters	array(AccessRatTypeFilterCriteria)	C	1..N	Contains The Access types and Rat types filtering criteria for Member UE selection. (NOTE 1)	
e2eTransTimeFilters	array(E2ETransTimeFilterCriteria)	C	1..N	Contains the End-to-end data volume transfer time filtering criteria for Member UE selection. (NOTE 1)	
ueLocFilters	array(UeLocFilterCriteria)	C	1..N	Contains the UE location filtering criteria for Member UE selection. (NOTE 1)	
ueHisLocFilters	array(UeHisLocFilterCriteria)	C	1..N	Contains the UE historical location filtering criteria for Member UE selection. (NOTE 1)	
ueDirFilters	array(UeDirectionFilterCriteria)	C	1..N	Contains the UE direction filtering criteria for Member UE selection. (NOTE 1)	
ueDistanceFilters	array(UeDistanceFilterCriteria)	C	1..N	Contains the UE distance filtering criteria for Member UE selection. (NOTE 1)	
serviceExpFilters	array(ServiceExpFilterCriteria)	C	1..N	Contains the Service Experience filtering criteria for Member UE selection. (NOTE 1)	
dnnFilters	array(DnnFilterCriteria)	C	1..N	Contains the DNN filtering criteria for Member UE selection. (NOTE 1)	

memUpdatePeriod	DurationSec	O	0..1	Contains the periodicity information for updating the member UEs.	
maxUeNum	Uinteger	O	0..1	Contains The maximum number of candidate UEs.	
timeWin	TimeWindow	O	0..1	Contains the start time and end time for selecting the candidate UEs.	
expTime	DateTime	O	0..1	Contains the subscription expiry time.	
suppFeat	SupportedFeatures	C	0..1	Contains the list of Supported features used as defined in clause 5.32.6. This attribute shall be present only when feature negotiation needs to take place.	
NOTE 1: At least one of these attribtues shall be present.					
NOTE 2: These attributes are mutually exclusive and one of them 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	Contains the Notification Correlation ID.	
candiUeInfos	array(CandiUeListInfo)	M	1..N	Contains the list of candidate UEs and the related information.	
memUeSelectRpts	array(MemUeSeletReport)	O	1..N	Contains the Member UE Selection report(s).	

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	Contains the SMF event which may be used to retrieve the QoS monitoring information. The only applicable value for this attribute is "QOS_MON".	
appId	string	O	0..1	Contains the identifier of the targeted application.	
dnn	Dnn	O	0..1	Contains the 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	Contains the network slice information.	
ulDelay	Uinteger	O	0..1	Contains the uplink packet delay in units of milliseconds.	
dlDelay	Uinteger	O	0..1	Contains the downlink packet delay in units of milliseconds.	
rtDelay	Uinteger	O	0..1	Contains the 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	Contains the SMF event(s) which may be used to retrieve the Access Type and/or RAT Type of the selected UE. The only applicable values within each array element of this attribute are "AC_TY_CH" or "RAT_TY_CH".	
dnn	Dnn	O	0..1	Contains 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	Contains the network slice information.	
accTypes	array(AccessType)	O	1..N	Contains the Access Type of the selected UE.	
ratTypes	array(RatType)	O	1..N	Contains the RAT Type(s) 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	Contains the NWDAF event which may be used to retrieve the End-to-end data volume transfer time. The only applicable value for this attribute is "E2E_DATA_VOL_TRANS_TIME".	
appId	string	O	0..1	Contains the identifier of the targeted an application.	
dnn	Dnn	O	0..1	Contains the 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	Contains the network slice information.	
dataVolTransTime	DataVolumeTransferTime	O	0..1	Contains the E2E data volume transfer time and the data volume used to derive the transfer time.	
geoDistrInfos	array(GeoDistributionInfo)	O	1..N	Contains the request for geographical distribution of UEs.	
locationArea	LocationArea5G	O	0..1	Contains the location area of the candidate UEs.	
numDataTrans	Uinteger	O	0..1	Contains the target number of data transmission repetitions.	
timeInterval	DurationSec	O	0..1	Contains the target time interval (in units of 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	Contains the AMF event which may be used to retrieve the UE location. The only applicable value for this attribute is "LOCATION_REPORT".	
loc	LocationArea5G	O	0..1	Contains the location area within which the selected UE is currently located.	

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	Contains the NWDAF event which may be used to retrieve the UE Mobility. The only applicable value for this attribute is "UE_MOBILITY".	
loc	LocationArea5G	O	0..1	Contains 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	Contains the NWDAF event which may be used to retrieve the UE Mobility. The only applicable value for this attribute is "UE_MOBILITY".	
directions	array(Direction)	O	1..N	Contains 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	Contains the NWDAF event which may be used to retrieve the Relative Proximity. The only applicable value for this attribute is "RELATIVE_PROXIMITY".	
distance	Uinteger	O	0..1	Contains the minimum UE to UE separating distance 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	Contains the NWDAF event which may be used to retrieve the Service Experience. The only applicable value for this attribute is "SERVICE_EXPERIENCE".	
snssai	Snssai	O	0..1	Contains the network slice information.	
dnn	Dnn	O	0..1	Contains the DNN, a full DNN with both the Network Identifier and Operator Identifier, or a DNN with the Network Identifier only.	
appId	string	O	0..1	Contains the identifier of the targeted application.	
dnai	Dnai	O	0..1	Contains the DNAI indicating the user plane access to DN to which the subscription applies.	
loc	LocationArea5G	O	0..1	Contains the area of interest.	
contribWeightThr	Uinteger	O	0..1	Contains the Service Experience Contribution weight reporting threshold.	
expTypes	array(ServiceExperienceType)	O	1..N	Contains 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	Contains the SMF event which may be used to retrieve the DNN. The only applicable value for this attribute is "QFI_ALLOC".	
dnn	Dnn	O	0..1	Contains the DNN of the selected UE for the PDU Session used by the application.	

5.32.5.2.13 Type: CandiUeListInfo

Table 5.32.5.2.13-1: Definition of type CandiUeListInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
candUeInfos	array(CandUeInfo)	M	1..N	Contains the list of the identifier(s) of the candidate UE(s).	
remdTimeWin	TimeWindow	O	0..1	Contains the recommended time window for performing the application operation.	

| | | | | It shall be a subset of the time window specified by "timeWin" attribute of the MemUeSelectAssistSubsc or MemUeSelectAssistSubscPatch data types representing the corresponding subscription resource. | |

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	Contains the filter criterion type.	
numForCriterion	Uinteger	M	1	Contains 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	Contains the updated URI via which Member UE Selection Assistance notifications shall be delivered.	
notifId	string	O	0..1	Contains the updated Notification Correlation ID assigned by the AF.	
qosFilters	array(QoSFilterCriteria)	O	1..N	Contains the updated QoS filtering criteria for Member UE selection.	
accRatTypeFilters	array(AccessRatTypeFilterCriteria)	O	1..N	Contains the updated Access types and Rat types filtering criteria for Member UE selection.	
e2eTransTimeFilters	array(E2ETransTimeFilterCriteria)	O	1..N	Contains the updated End-to-end data volume transfer time filtering criteria for Member UE selection.	
ueLocFilters	array(UeLocFilterCriteria)	O	1..N	Contains the updated UE location filtering criteria for Member UE selection.	
ueHisLocFilters	array(UeHisLocFilterCriteria)	O	1..N	Contains the updated UE historical location filtering criteria for Member UE selection.	
ueDirFilters	array(UeDirectionFilterCriteria)	O	1..N	Contains the updated UE direction filtering criteria for Member UE selection.	
ueDistanceFilters	array(UeDistanceFilterCriteria)	O	1..N	Contains the updated UE distance filtering criteria for Member UE selection.	
serviceExpFilters	array(ServiceExpFilterCriteria)	O	1..N	Contains the updated Service Experience filtering criteria for Member UE selection.	
dnnFilters	array(DnnFilterCriteria)	O	1..N	Contains the updated DNN filtering criteria for Member UE selection.	

expTime	DateTime	O	0..1	Contains the updated expiry time of the subscription.	
memUpdatePeriod	DurationSecRm	O	0..1	Contains the updated periodicity information for updating the member UEs.	
maxUeNum	UintegerRm	O	0..1	Contains the updated maximum number of candidate UEs.	
timeWin	TimeWindow	O	0..1	Contains the updated the start time and end time for selecting the candidate UEs.	

5.32.5.2.16 Type: CandUeInfo

Table 5.32.5.2.16-1: Definition of type CandUeInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
candUeId	Gpsi	C	0..1	Contains the GPSI of a candidate UE. (NOTE)	
candUeIp	IpAddr	C	0..1	Containsthe IP address of a candidate UE. (NOTE)	
qosFilter	QoSFilterCriteria	O	0..1	Contains the QoS filtering criteria for Member UE selection.	
accRatTypeFilter	AccessRatTypeFilterCriteria	O	0..1	Contains the Access types and RAT types filtering criteria for Member UE selection.	
e2eTransTimeFilter	E2ETransTimeFilterCriteria	O	0..1	Contains the End-to-end data volume transfer time filtering criteria for Member UE selection.	
ueLocFilter	UeLocFilterCriteria	O	0..1	Contains the UE location filtering criteria for Member UE selection.	
ueHisLocFilter	UeHisLocFilterCriteria	O	0..1	Contains the UE historical location filtering criteria for Member UE selection.	
ueDirFilter	UeDirectionFilterCriteria	O	0..1	Contains the UE direction filtering criteria for Member UE selection.	
ueDistanceFilter	UeDistanceFilterCriteria	O	0..1	Contains the UE distance filtering criteria for Member UE selection.	
serviceExpFilter	ServiceExpFilterCriteria	O	0..1	Contains the Service Experience filtering criteria for Member UE selection.	
dnnFilter	DnnFilterCriteria	O	0..1	Contains the DNN filtering criteria for Member UE selection.	
NOTE: Either the "candUeId" attribute or the "candUeIp" attribute shall be present.					

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 5.32.5.3.3-1.

Table 5.32.5.3.3-1: Enumeration FilterCriterionType

Enumeration value	Description
QOS	Indicates that the type of filter criterion is QoS criterion.
ACCESS_RAT_TYPE	Indicates that the type of filter criterion is Access and Rat types criterion.
E2E_DATA_VOLUME_TRANSFER_TIME	Indicates that the type of filter criterion is End-to-end data volume transfer time criterion.
UE_LOCATION	Indicates that the type of filter criterion is UE location criterion.
UE_HISTORICAL_LOCATION	Indicates that the type of filter criterion is UE historical location criterion.
UE_DIRECTION	Indicates that the type of filter criterion is UE direction criterion.
UE_DISTANCE	Indicates that the type of filter criterion is UE distance criterion.
SERVICE_EXPERIENCE	Indicates that the type of filter criterion is Service Experience criterion.
DNN	Indicates that the type of filter criterion is DNN criterion.

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

There are no data types describing alternative data types or combinations of data types defined for this API in this release of the specification.

5.32.6 Used Features

The optional features listed in table 5.32.6-1 are defined for the MemberUESelectionAssistance API. They shall be negotiated using the extensibility mechanism defined 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

For the MemberUESelectionAssistance 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 MemberUESelectionAssistance API.

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	Applicability

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}/<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-grp-pp".

- "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 API 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 5.33, the NEF takes the role of the SCEF and the service consumer (i.e., AF) takes the role of the SCS/AS.

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.

{apiRoot}/3gpp-grp-pp/<apiVersion>

```
                        ┌──────────┐
          ┌─────────────┤   /pp    │
                        └──────────┘
                             │
                             │
                        ┌──────────┐
          ┌─────────────┤  /{ppId} │
                        └──────────┘
```
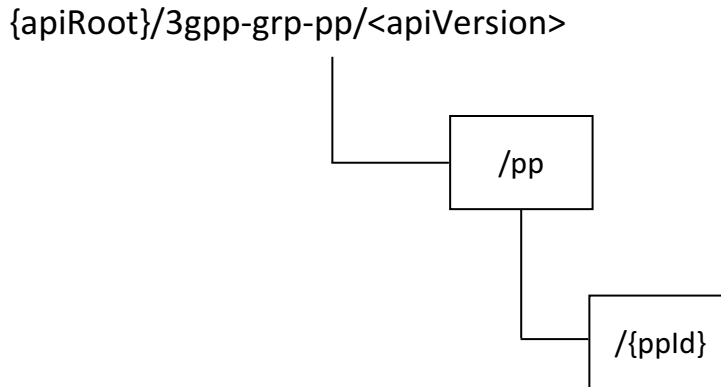
Figure 5.33.2.1-1: Resource URI structure of the GroupParametersProvisioning API

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 active "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. If there are no existing "Individual Group Parameters Provisioning" resources managed at the NEF, an empty array is returned.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative target 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 target 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 HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall 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	Contains 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	Contains 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	Contains the 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 codes for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall 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 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 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 target 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 HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall 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	Contains 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	Contains 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 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 target 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 HTTP PUT method listed in Table 5.2.6-1 of 3GPP TS 29.122 [4] shall 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	Contains an alternative target 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	Contains an alternative target 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 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 target 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 HTTP PATCH method listed in Table 5.2.6-1 of 3GPP TS 29.122 [4] shall 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	Contains an alternative target 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	Contains an alternative target 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 "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 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 target 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 HTTP DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall 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	Contains 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	Contains 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.	
Snssai	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	Contains the identifier of the MTC Service Provider and/or MTC Application.	
dnnSnssaiGrpData	DnnSnssaiGrpData	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.	
suppFeat	SupportedFeatures	C	0..1	Contains the list of supported features among the ones defined in clause 5.33.6. This attribute shall be present only 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
dnnSnssaiGrpData	DnnSnssaiGrpData	O	0..1	Contains the updated DNN and S-NSSAI specific Group data that the AF requests to provision.	

5.33.5.2.4 Type: DnnSnssaiGrpData

Table 5.33.5.2.4-1: Definition of type DnnSnssaiGrpData

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.	
snssai	Snssai	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(GeographicArea)	C	1..N	Represents the LADN Service Area in the form of a list of geographic area(s). (NOTE)	
civicAddresses	array(CivicAddress)	C	1..N	Represents the LADN Service Area in the form of a list of civic addresse(s). (NOTE)	
tais	array(Tai)	C	1..N	Represents the LADN Service Area in the form of a 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

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

There are no data types describing alternative data types or combinations of data types defined for this API in this release of the specification.

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

For the GroupParametersProvisioning 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 GroupParametersProvisioning API.

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	Applicability

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}/<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-slice-pp".

- "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 API 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 5.34, the NEF takes the role of the SCEF and the service consumer (i.e., AF) takes the role of the SCS/AS.

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.

{apiRoot}/3gpp-slice-pp/<apiVersion>

/pp

/{ppId}
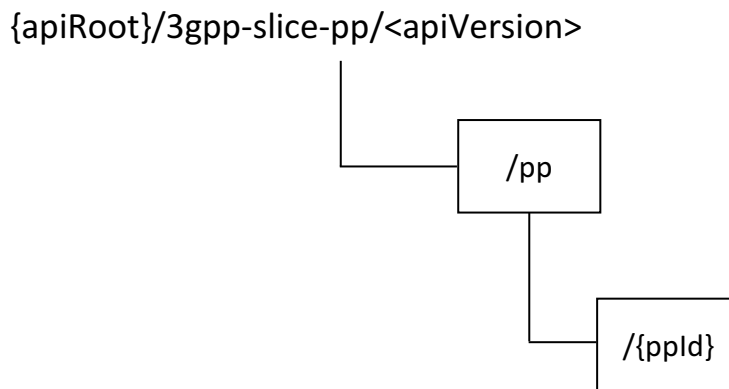
Figure 5.34.2.1-1: Resource URI structure of the SliceParamProvision API

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" resource managed by the NEF.

		PUT	Update an existing "Individual Slice Parameters Provisioning" resource managed by the NEF.
		PATCH	Modify an existing "Individual Slice Parameters Provisioning" resource managed by the NEF.
		DELETE	Delete an existing "Individual Slice Parameters Provisioning" resource 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 active 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	Description

			codes	
array(SlicePpData)	M	0..N	200 OK	Successful case. All the "Individual Slice Parameters Provisioning" resource(s) managed by the NEF are returned. If there are no active "Individual Slice Parameters Provisioning" resources at the NEF, an empty array is returned.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative target 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 target 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 HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall 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	Contains 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	Contains 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	Contains the 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 codes for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall 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 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 target 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 HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall 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	Contains 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	Contains 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 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 target 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 HTTP PUT method listed in Table 5.2.6-1 of 3GPP TS 29.122 [4] shall 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	Contains 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	Contains 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 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 target 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 HTTP PATCH method listed in Table 5.2.6-1 of 3GPP TS 29.122 [4] shall 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	Contains 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	Contains 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 "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 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 target 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 HTTP DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall 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	Contains 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	Contains 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.	
SliceUsageControlInfo	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 is 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	Contains the identifier of 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 (that is provided within the "snssai" attribute of the corresponding map value encoded via the SliceUsageControlInfo data structure) to which the provisioned Network Slice Usage Control information is related. 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 present only 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 (that is provided within the "snssai" attribute of the corresponding map value encoded via the SliceUsageControlInfo data structure) to which the provisioned Network Slice Usage Control information isrelated.	

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

For the SliceParamProvision 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 SliceParamProvision API.

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	Applicability

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}/<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 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.

- 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 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.

{apiRoot}/3gpp-ue-address/<apiVersion>
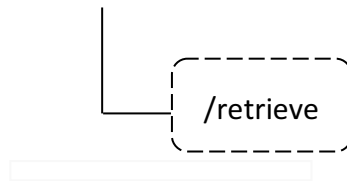
Figure 5.35.3.1-1: Custom operation URI structure of the UeAddress API

Table 5.35.3.1-1 provides an overview of the custom operations and applicable HTTP methods defined for the UeAddress API.

Table 5.35.3.1-1: Custom operations without associated resources

Custom operation name	Custom operation URI	Mapped HTTP method	Description
Retrieve	/retrieve	POST	Enables an AF to request to retrieve UE Address information.

The custom operations shall support the URI variables defined in table 5.35.3.1-2.

Table 5.35.3.1-2: URI variables for this custom operation

Name	Data type	Definition
apiRoot	string	See clause 5.35.1.

5.35.3.2 Operation: Retrieve

5.35.3.2.1 Description

The custom operation allows 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	Contains the 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	Successful case. The UE Address information request is successfully processed, and UE address information 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 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 target 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 HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall 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	Contains an alternative target 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	Contains an alternative target 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 information.	
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]	Represents a GPSI.
IpAddr	3GPP TS 29.571 [8]	Represents an IP address.
SupportedFeatures	3GPP TS 29.571 [8]	Represents the list of supported feature(s) and is 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	Contains the target GPSI.	
suppFeat	SupportedFeatures	C	0..1	Contains the list of supported features used as defined in clause 5.35.6. This attribute shall be present only when 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
ueIpAddrs	array(IpAddr)	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

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

There are no data types describing alternative data types or combinations of data types defined for this API in this release of the specification.

5.35.6   Used Features

The optional features listed in table 5.35.6-1 are defined for the UeAddress API. They shall be negotiated using the extensibility mechanism defined 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

For the UeAddress 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 UeAddress API.

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	Applicability

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}/<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-ecs-address".

- "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 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 the ECSAddress API.

{apiRoot}/3gpp-ecs-address/<apiVersion>

/{afId}

/configurations

/{configId}
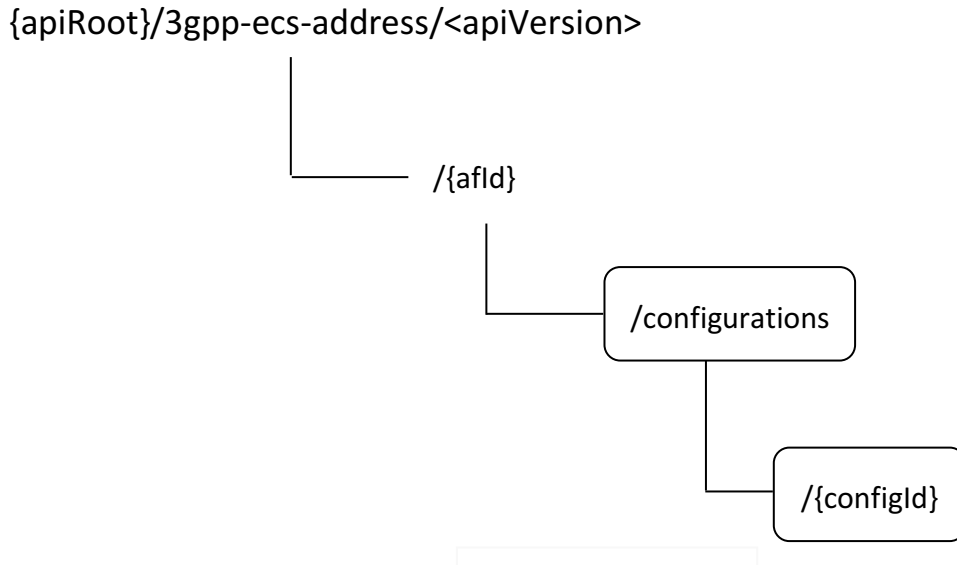
Figure 5.36.2.1-1: Resource URI structure of the northbound ECSAddress API

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 Sets	/{afId}/configurations	GET	Retrieve all the active ECS Address Configuration Information Sets.
		POST	Create a new ECS Address Configuration Information Set.
Individual ECS Address Configuration Information Set	/{afId}/configurations/{configId}	GET	Retrieve an existing "Individual ECS Address Configuration Information Set" resource.
		PUT	Update an existing "Individual ECS Address Configuration Information Set" resource.
		PATCH	Modify an existing "Individual ECS Address Configuration Information Set" resource.
		DELETE	Delete an existing "Individual ECS Address Configuration Information Set" resource.

5.36.2.2 Resource: ECS Address Configuration Information Sets

5.36.2.2.1 Introduction

This resource represents all the active ECS Address Configuration Information Sets managed by the NEF for a given AF.

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

5.36.2.2.2 Resource Definition

Resource URI: **{apiRoot}/3gpp-ecs-address/<apiVersion>/{afId}/configurations**

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 5.36.1.
afId	string	Represents the identifier of the AF.

5.36.2.2.3 Resource Standard Methods

5.36.2.2.3.1 Void

5.36.2.2.3.2 GET

The HTTP GET method allows to retrieve all the active ECS Address Configuration Information Sets at the NEF 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	Successful case. All the active "Individual ECS Address Configuration Information Set" resource(s) are returned. If there are no active "Individual ECS Address Configuration Information Set" resources at the NEF, an empty array is returned.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative target 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 target 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 HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall 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	Contains an alternative target URI of the resource located in an alternative 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	Contains an alternative target URI of the resource located in an alternative NEF.

5.36.2.2.3.3 POST

The HTTP POST method allows to create a new ECS Address Configuration Information Set at the NEF for a given AF.

This method shall support the URI query parameters specified in table 5.36.2.2.3.3-1.

Table 5.36.2.2.3.3-1: 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 5.36.2.2.3.3-1, 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	Contains the parameters to request the cretaion of an ECS Address Configuration Information Set.

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	Successful case. A representation of the created "Individual ECS Address Configuration Information Set" resource is returned in the response body. The URI of the created resource shall be returned in the "Location" HTTP header.
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 5.36.2.2.3.3-3: 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/<apiVersion>/{afId}/configurations/{configId}

5.36.2.2.4 Resource Custom Operations

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

5.36.2.3 Resource: Individual ECS Address Configuration Information Set

5.36.2.3.1 Introduction

This resource represents an "Individual ECS Address Configuration Information Set" resource managed by the NEF.

5.36.2.3.2 Resource Definition

Resource URI: **{apiRoot}/3gpp-ecs-address/<apiVersion>/{afId}/configurations/{configId}**

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 5.36.1.
afId	string	Represents the identifier of the AF.
configId	string	Represents the identifier of the "Individual ECS Address Configuration Information Set" resource.

5.36.2.3.3 Resource Standard Methods

5.36.2.3.3.1 Void

5.36.2.3.3.2 GET

The HTTP GET method allows to retrieve an existing "Individual ECS Address Configuration Information Set" resource at the NEF.

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 and the response data structures and response codes specified in table 5.36.2.3.3.2-3.

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 requested "Individual ECS Address Configuration Information Set" 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 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 target 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 HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall 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	Contains an alternative target URI of the resource located in an alternative 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	Contains an alternative target URI of the resource located in an alternative NEF.

5.36.2.3.3.3   PUT

The HTTP PUT method allows to update an existing "Individual ECS Address Configuration Information Set" resource at the NEF.

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 and the response data structures and response codes specified in table 5.36.2.3.3.3-3.

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	Contains the updated representation of the "Individual ECS Address Configuration Information Set" 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 "Individual ECS Address Configuration Information Set" 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 "Individual ECS Address Configuration Information Set" 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 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 target 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 HTTP PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall 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	Contains an alternative target URI of the resource located in an alternative 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	Contains an alternative target URI of the resource located in an alternative NEF.

5.36.2.3.3.3A   PATCH

This method enables to request the modification of an existing "Individual ECS Address Configuration Information Set" resource at the NEF.

This method shall support the URI query parameters specified in table 5.36.2.3.3.3A-1.

Table 5.36.2.3.3.3A-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 5.36.2.3.3.3A-2 and the response data structures and response codes specified in table 5.36.2.3.3.3A-3.

Table 5.36.2.3.3.3A-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
EcsAddrInfoPatch	M	1	Contains the requested modifications to the "Individual ECS Address Configuration Information Set" resource.

Table 5.36.2.3.3.3A-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
EcsAddrInfo	M	1	200 OK	Successful response. The "Individual ECS Address Configuration Information Set" 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 ECS Address Configuration Information Set" 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 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 target 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 HTTP PATCH method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall also apply.				

Table 5.36.2.3.3.3A-4: Headers supported by the 307 Response Code on this resource

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

Table 5.36.2.3.3.3A-5: Headers supported by the 308 Response Code on this resource

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

5.36.2.3.3.4   DELETE

The HTTP DELETE method allows to delete an existing "Individual ECS Address Configuration Information Set" resource at the NEF.

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 and the response data structures and response codes specified in table 5.36.2.3.3.4-3.

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	Successful case. The "Individual ECS Address Configuration Information Set" resource is successfully deleted.
N/A			307 Temporary Redirect	Temporary redirection.

				The response shall include a Location header field containing an alternative target 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 target 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 HTTP DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall 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	Contains an alternative target URI of the resource located in an alternative 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	Contains an alternative target URI of the resource located in an alternative NEF.

5.36.2.3.4 Resource Custom Operations

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

5.36.3 Custom Operations without associated resources

5.36.3.1 Overview

The structure of the custom operation URIs of the ECSAddress API is shown in Figure 5.36.3.1-1.

{apiRoot}/3gpp-ecs-address/v1

/remove-ecsaddr
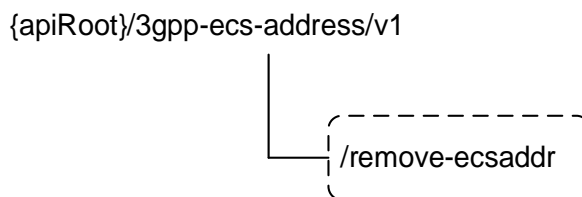
Figure 5.36.3.1-1: Custom operation URI structure of the ECSAddress API

Table 5.36.3.1-1 provides an overview of the custom operations and applicable HTTP methods defined for the ECSAddress API.

Table 5.36.3.1-1: Custom operations without associated resources

Custom operation name	Custom operation URI	Mapped HTTP method	Description
RemoveEcsAddr	/remove-ecsaddr	POST	Enables to request the NEF to delete ECS Address Configuration information based on given attributes.

The custom operations shall support the URI variables defined in table 5.36.3.1-2.

Table 5.36.3.1-2: URI variables for this custom operation

Name	Data type	Definition
apiRoot	string	See clause 5.36.1.

5.36.3.2 Operation: RemoveEcsAddr

5.36.3.2.1 Description

The custom operation enables 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	Contains the 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 case. The request to remove ECS Address Configuration information based on given criteria is successfully received and processed.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative target 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 target 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 HTTP POST method listed in Table 5.2.6-1 of 3GPP TS 29.122 [4] shall 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	Contains an alternative target 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	Contains an alternative target 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	Represents an ECS Address Configuration Information.	
EcsAddrInfoPatch	5.36.5.3.4	Represents the requested modifications to an ECS Address Configuration Information.	

Table 5.36.5.1-2 specifies data types re-used by the ECSAddress API from other specifications, including a reference to their respective specifications, and when needed, a short description of their use within the ECSAddress API.

Table 5.36.5.1-2: ECSAddress API re-used Data Types

Data type	Reference	Comments	Applicability
Dnn	3GPP TS 29.571 [8]	Represents a DNN.	
EcsAuthMethod	3GPP TS 29.503 [17]	Represents the ECS Authentication Methods.	
EcsServerAddr	3GPP TS 29.571 [8]	Represents the Edge Configuration Server (ECS) address configuration information.	
Link	3GPP TS 29.122 [4]	Represents a link.	
Snssai	3GPP TS 29.571 [8]	Represents an S-NSSAI.	
SupportedFeatures	3GPP TS 29.571 [8]	Represents the list of supported feature(s) and is used to negotiate the applicability of the optional features.	
SupportedPlmn	3GPP TS 29.503 [17]	ID of the PLMN supported by the ECS along with the list of ECSPs associated with the PLMN.	
TargetUeId	5.6.3.3.7	Represents the target UE(s) information.	

5.36.5.2 Void

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. This attribute shall be present in the HTTP GET response when retrieving all the resources for an AF.	
ecsServerAddr	EcsServerAddr	M	1	Contains the ECS address(es).	
spatialValidityCond	SpatialValidityCond	O	0..1	Contains the spatial validity conditions.	
dnn	Dnn	O	0..1	Contains an HPLMN DNN.	
snssai	Snssai	O	0..1	Contains an HPLMN S-NSSAI.	
ecsAuthMethods	array(EcsAuthMethod)	O	1..N	Contains the Supported ECS Authentication Method(s).	
supportedPlmns	array(SupportedPlmn)	O	1..N	The List of PLMNs and associated ECSPs for which EDN configuration information can be provided by the ECS.	
suppFeat	SupportedFeatures	C	0..1	Contains the list of supported features used as defined in clause 5.36.6. This attribute shall be present only when feature negotiation needs to take place.	

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
afIds	array(string)	C	1..N	Contains the targeted identifier(s) of the AF(s). (NOTE 1)	
dnn	Dnn	C	0..1	Contains the DNN to be used as deletion criterion. (NOTE 1)	
snssai	Snssai	C	0..1	Contains the S-NSSAI to be used as deletion criterion. (NOTE 1)	
ecsAddrInfo	EcsAddrInfo	C	0..1	Contains the 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)	
suppFeat	SupportedFeatures	C	0..1	Contains the list of supported features used as defined in clause 5.36.6. This attribute shall be present only when feature negotiation needs to take place.	
NOTE 1: At least one of these attributes shall be present.					

NOTE 2:	The "self" and "suppFeat" attributes of the "ecsAddrInfo" attribute (encoded using the EcsAddrInfo data type) shall not be provided and shall not be considered when finding the matching entries.

5.36.5.3.4 Type: EcsAddrInfoPatch

Table 5.36.5.3.4-1: Definition of type EcsAddrInfoPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
ecsServerAddr	EcsServerAddr	O	0..1	Represents the updated ECS address(es) information.	
ecsAuthMethods	array(EcsAuthMethod)	O	1..N	Contains the Supported ECS Authentication Method(s).	
supportedPlmns	array(SupportedPlmn)	O	1..N	Contains the List of PLMNs and associated ECSPs for which EDN configuration information can be provided by the ECS.	
spatialValidityCond	SpatialValidityCond	O	0..1	Contains the updated spatial validity conditions.	

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

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

There are no data types describing alternative data types or combinations of data types defined for this API in this release of the specification.

5.36.6 Used Features

The optional features listed in table 5.36.6-1 are defined for the ECSAddress API. They shall be negotiated using the extensibility mechanism defined 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

For the ECSAddress 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 ECSAddress API.

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

5.37 RSLPPIParametersProvisioning API

5.37.1 Introduction

The Nnef_ParameterProvision service shall use the RSLPPIParametersProvisioning API for:

- RSLPPI Parameters provisioning.

The API URI of the RSLPPIParametersProvisioning 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-rslppi-pp".

- "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 API URI.

5.37.2 Resources

5.37.2.1 Overview

This clause describes the structure for the Resource URIs as shown in figure 5.37.2.1-1 and the resources and HTTP methods used for the RSLPPIParametersProvisioning API.

{apiRoot}/3gpp-rslppi-pp/<apiVersion>
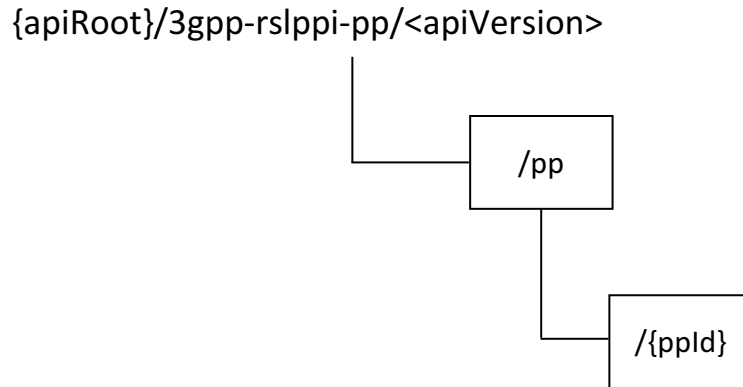
Figure 5.37.2.1-1: Resource URI structure of the RSLPPIParametersProvisioning API

Table 5.37.2.1-1 provides an overview of the resources and applicable HTTP methods.

Table 5.37.2.1-1: Resources and methods overview

Resource name	Resource URI (relative path under API URI)	HTTP method or custom operation	Description (service operation)
RSLPPI Parameters Provisionings	/pp	GET	Retrieve all the active RSLPPI Parameters Provisionings managed by the NEF.
		POST	Request the creation of a new RSLPPI Parameters Provisioning at the NEF.
Individual RSLPPI Parameters Provisioning	/pp/{ppId}	GET	Retrieve an existing "Individual RSLPPI Parameters Provisioning" managed by the NEF.
		PUT	Update an existing "Individual RSLPPI Parameters Provisioning" managed by the NEF.
		PATCH	Modify an existing "Individual RSLPPI Parameters Provisioning" managed by the NEF.
		DELETE	Delete an existing "Individual RSLPPI Parameters Provisioning" managed by the NEF.

5.37.2.2　　Resource: RSLPPI Parameters Provisionings

5.37.2.2.1　　Introduction

This resource represents the collection of RSLPPI 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]).

5.37.2.2.2　　Resource Definition

Resource URI: **{apiRoot}/3gpp-rslppi-pp/<apiVersion>/pp**

This resource shall support the resource URI variables defined in table 5.37.2.2.2-1.

Table 5.37.2.2.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 5.37.1.

5.37.2.2.3 Resource Methods

5.37.2.2.3.1 GET

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

This method shall support the URI query parameters specified in table 5.37.2.2.3.1-1.

Table 5.37.2.2.3.1-1: 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 5.37.2.2.3.1-2 and the response data structures and response codes specified in table 5.37.2.2.3.1-3.

Table 5.37.2.2.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 5.37.2.2.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
array(RslppiPpData)	M	0..N	200 OK	Successful case. All the "Individual RSLPPI Parameters Provisioning" resources managed by the NEF are returned. If there are no existing "Individual RSLPPI Parameters Provisioning" resources managed at the NEF, an empty array is returned.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative target 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 target 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 HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall also apply.				

Table 5.37.2.2.3.1-4: Headers supported by the 307 Response Code on this resource

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

Table 5.37.2.2.3.1-5: Headers supported by the 308 Response Code on this resource

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

5.37.2.2.3.2 POST

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

This method shall support the URI query parameters specified in table 5.37.2.2.3.2-1.

Table 5.37.2.2.3.2-1: 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 5.37.2.2.3.2-2 and the response data structures and response codes specified in table 5.37.2.2.3.2-3.

Table 5.37.2.2.3.2-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
RslppiPpData	M	1	Contains the representation of the RSLPPI Parameters Provisioning to be created at the NEF.

Table 5.37.2.2.3.2-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
RslppiPpData	M	1	201 Created	Successful case. A representation of the created "Individual RSLPPI 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 codes for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.				

Table 5.37.2.2.3.2-4: 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-rslppi-pp/<apiVersion>/pp/{ppId}

5.37.2.2.4 Resource Custom Operations

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

5.37.2.3 Resource: Individual RSLPPI Parameters Provisioning

5.37.2.3.1 Introduction

This resource represents an "Individual RSLPPI 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]).

5.37.2.3.2 Resource Definition

Resource URI: **{apiRoot}/3gpp-rslppi-pp/<apiVersion>/pp/{ppId}**

This resource shall support the resource URI variables defined in table 5.37.2.3.2-1.

Table 5.37.2.3.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 5.37.1.
ppId	string	Represents the identifier of the "Individual RSLPPI Parameters Provisioning" resource.

5.37.2.3.3 Resource Methods

5.37.2.3.3.1 GET

This method enables an AF to request to retrieve an existing "Individual RSLPPI Parameters Provisioning" resource at the NEF.

This method shall support the URI query parameters specified in table 5.37.2.3.3.1-1.

Table 5.37.2.3.3.1-1: 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 5.37.2.3.3.1-2 and the response data structures and response codes specified in table 5.37.2.3.3.1-3.

Table 5.37.2.3.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 5.37.2.3.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
RslppiPpData	M	1	200 OK	Successful case. The requested "Individual RSLPPI Parameters Provisioning" resource 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 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 target 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 HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall also apply.

Table 5.37.2.3.3.1-4: Headers supported by the 307 Response Code on this resource

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

Table 5.37.2.3.3.1-5: Headers supported by the 308 Response Code on this resource

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

5.37.2.3.3.2   PUT

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

This method shall support the URI query parameters specified in table 5.37.2.3.3.2-1.

Table 5.37.2.3.3.2-1: 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 5.37.2.3.3.2-2 and the response data structures and response codes specified in table 5.37.2.3.3.2-3.

Table 5.37.2.3.3.2-2: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
RslppiPpData	M	1	Represents the updated "Individual RSLPPI Parameters Provisioning" resource representation.

Table 5.37.2.3.3.2-3: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description
RslppiPpData	M	1	200 OK	Successful response. The "Individual RSLPPI 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 RSLPPI 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 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 target 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 HTTP PUT method listed in Table 5.2.6-1 of 3GPP TS 29.122 [4] shall also apply.			

Table 5.37.2.3.3.2-4: 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 5.37.2.3.3.2-5: 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.

5.37.2.3.3.3   PATCH

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

This method shall support the URI query parameters specified in table 5.37.2.3.3.3-1.

Table 5.37.2.3.3.3-1: 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 5.37.2.3.3.3-2 and the response data structures and response codes specified in table 5.37.2.3.3.3-3.

Table 5.37.2.3.3.3-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
RslppiPpDataPatch	M	1	Represents the requested modifications to the "Individual RSLPPI Parameters Provisioning" resource.

Table 5.37.2.3.3.3-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
RslppiPpData	M	1	200 OK	Successful response. The "Individual RSLPPI 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 RSLPPI 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 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.

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				The response shall include a Location header field containing an alternative target 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 HTTP PATCH method listed in Table 5.2.6-1 of 3GPP TS 29.122 [4] shall also apply.			

Table 5.37.2.3.3.3-4: 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 5.37.2.3.3.3-5: 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.

5.37.2.3.3.4   DELETE

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

This method shall support the URI query parameters specified in table 5.37.2.3.3.4-1.

Table 5.37.2.3.3.4-1: 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 5.37.2.3.3.4-2 and the response data structures and response codes specified in table 5.37.2.3.3.4-3.

Table 5.37.2.3.3.4-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 5.37.2.3.3.4-3: 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 "Individual RSLPPI 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 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 target 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 HTTP DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] shall also apply.			

Table 5.37.2.3.3.4-4: Headers supported by the 307 Response Code on this resource

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

Table 5.37.2.3.3.4-5: Headers supported by the 308 Response Code on this resource

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

5.37.2.3.4   Resource Custom Operations

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

5.37.3   Custom Operations without associated resources

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

5.37.4   Notifications

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

5.37.5   Data Model

5.37.5.1   General

This clause specifies the application data model supported by the RSLPPIParametersProvisioning API. Table 5.37.5.1-1 specifies the data types defined for the RSLPPIParametersProvisioning API.

Table 5.37.5.1-1: RSLPPIParametersProvisioning API specific Data Types

Data type	Clause defined	Description	Applicability
RslppiData	5.37.5.2.2	Represents RSLPPI parameters data.	
RslppiPpData	5.37.5.2.3	Represents RSLPPI Parameters Provisioning data.	
RslppiPpDataPatch	5.37.5.2.4	Represents the requested modification to an existing RSLPPI Parameters Provisioning data.	

Table 5.37.5.1-2 specifies data types re-used by the RSLPPIParametersProvisioning API from other specifications, including a reference to their respective specifications, and when needed, a short description of their use within the RSLPPIParametersProvisioning API.

Table 5.37.5.1-2: RSLPPIParametersProvisioning API re-used Data Types

Data type	Reference	Comments	Applicability
ExternalGroupId	3GPP TS 29.122 [4]	Represents the External Group Identifier for a user group.	
Gpsi	3GPP TS 29.571 [8]	Represents a GPSI.	
Rslppi	3GPP TS 29.503 [17]	Represents the RSLPPI information.	

Attribute name	Data type	P	Cardinality	Description	Applicability
SupportedFeatures	3GPP TS 29.571 [8]			Represents the list of supported feature(s) and used to negotiate the applicability of the optional features.	

5.37.5.2   Structured data types

5.37.5.2.1   Introduction

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

5.37.5.2.2   Type: RslppiData

Table 5.37.5.2.2-1: Definition of type RslppiData

Attribute name	Data type	P	Cardinality	Description	Applicability
extGroupId	ExternalGroupId	C	0..1	Represents the external group identifier of the targeted group. (NOTE)	
gpsi	Gpsi	C	0..1	Represents the GPSI of the targeted UE. (NOTE)	
rslppi	Rslppi	M	1	Contains the RSLPPI parameters.	
NOTE: These attributes are mutually exclusive. Either one of them shall be present.					

5.37.5.2.3   Type: RslppiPpData

Table 5.37.5.2.3-1: Definition of type RslppiPpData

Attribute name	Data type	P	Cardinality	Description	Applicability
afId	string	M	1	Contains the identifier of the AF that is sending the request.	
rslppiData	RslppiData	C	0..1	Contains the RSLPPI data that the AF requests to provision. This attribute shall be present only when the AF requests to provision RSLPPI parameters.	
suppFeat	SupportedFeatures	C	0..1	Contains the list of supported features among the ones defined in clause 5.37.6. This attribute shall be present when only feature negotiation needs to take place.	

5.37.5.2.4   Type: RslppiPpDataPatch

Table 5.37.5.2.4-1: Definition of type RslppiPpDataPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
rslppiData	RslppiData	O	0..1	Contains the modified RSLPPI data that the AF requests to provision.	

5.37.5.3 Simple data types and enumerations

5.37.5.3.1 Introduction

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

5.37.5.3.2 Simple data types

The simple data types defined in table 5.37.5.3.2-1 shall be supported.

Table 5.37.5.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

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

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

5.37.6 Used Features

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

Table 5.37.6-1: Supported Features

Feature number	Feature Name	Description

5.37.7 Error handling

5.37.7.1 General

For the RSLPPIParametersProvisioning 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 RSLPPIParametersProvisioning API.

5.37.7.2 Protocol Errors

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

5.37.7.3 Application Errors

The application errors defined for the RSLPPIParametersProvisioning API are listed in table 5.37.7.3-1.

Table 5.37.7.3-1: 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
  description: |
    API for AF traffic influence
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.522 V18.6.0; 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-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':
```

```yaml
                      $ref: 'TS29122_CommonData.yaml#/components/responses/411'
                    '413':
                      $ref: 'TS29122_CommonData.yaml#/components/responses/413'
                    '415':
                      $ref: 'TS29122_CommonData.yaml#/components/responses/415'
                    '429':
                      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
                    '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:
```

```yaml
          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.
        websockNotifConfig:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/WebsockNotifConfig'
        self:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Link'
        trafficDataSets:
          type: object
          additionalProperties:
            $ref: '#/components/schemas/TrafficDataSet'
          minProperties: 2
          description: >
            Contains multiple sets of traffic filters with the corresponding N6 traffic
            routing requirements. The key of the map shall be the value of the setId attribute of
            the TrafficDataSet data structure.
        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]
        - required: [trafficDataSets]
      - 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
      trafficDataSets:
        type: object
        additionalProperties:
```

```
          $ref: '#/components/schemas/TrafficDataSetRm'
        minProperties: 1
        description: >
          Contains one or several set(s) of traffic filters with the corresponding N6 traffic
          routing requirements. The key of the map shall be the value of the setId attribute of
          the TrafficDataSet data structure.
      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 DNAIs 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'
      offloadPlmnId:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/PlmnId'
      hDnn:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
      hSnssai:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
```

```
      suppFeatures:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
    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

  TrafficDataSet:
    description: >
      Represents a set of traffic filters and the corresponding N6 traffic routing requirements.
    properties:
      setId:
        type: string
      trafficFilters:
        type: array
        items:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/FlowInfo'
        minItems: 1
      ethTrafficFilters:
        type: array
        items:
          $ref: 'TS29514_Npcf_PolicyAuthorization.yaml#/components/schemas/EthFlowDescription'
        minItems: 1
      trafficRoutes:
        type: array
        items:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/RouteToLocation'
        minItems: 1
    required:
      - setId
      - trafficRoutes
    oneOf:
      - required: [trafficFilters]
      - required: [ethTrafficFilters]

  TrafficDataSetRm:
    description: >
      This data type is defined in the same way as the TrafficDataSet data, but with the OpenAPI
      nullable property set to true. Removable attributes trafficFilters and ethTrafficFilters and
      trafficRoutes are defined as nullable in the OpenAPI.
    properties:
      setId:
        type: string
      trafficFilters:
```

ETSI

```
              type: array
              items:
                $ref: 'TS29122_CommonData.yaml#/components/schemas/FlowInfo'
              minItems: 1
              nullable: true
            ethTrafficFilters:
              type: array
              items:
                $ref: 'TS29514_Npcf_PolicyAuthorization.yaml#/components/schemas/EthFlowDescription'
              minItems: 1
              nullable: true
            trafficRoutes:
              type: array
              items:
                $ref: 'TS29571_CommonData.yaml#/components/schemas/RouteToLocation'
              minItems: 1
              nullable: true
        nullable: true
        required:
          - setId

    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: 1.2.2
  description: |
    API for Analytics Exposure.
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    All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.522 V18.8.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'

security:
  - {}
  - oAuth2ClientCredentials: []

servers:
  - url: '{apiRoot}/3gpp-analyticsexposure/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in clause 5.2.4 of 3GPP TS 29.122.

paths:
  /{afId}/subscriptions:
    get:
      summary: read all of the active subscriptions for the AF
      operationId: ReadAllSubscriptions
      tags:
        - Analytics Exposure Subscriptions
      parameters:
        - name: afId
          in: path
          description: Identifier of the AF
          required: true
          schema:
            type: string
        - name: supp-feat
          in: query
          description: Features supported by the NF service consumer
          required: false
          schema:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      responses:
        '200':
          description: OK (Successful get all of the active subscriptions for the AF)
          content:
            application/json:
              schema:
                type: array
                items:
                  $ref: '#/components/schemas/AnalyticsExposureSubsc'
                minItems: 0
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
```

```
        '404':
         $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '406':
         $ref: 'TS29122_CommonData.yaml#/components/responses/406'
        '429':
         $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
         $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
         $ref: 'TS29122_CommonData.yaml#/components/responses/503'
       default:
         $ref: 'TS29122_CommonData.yaml#/components/responses/default'

    post:
      summary: Creates a new subscription resource
      operationId: CreateNewSubscription
      tags:
       - Analytics Exposure Subscriptions
      parameters:
       - name: afId
         in: path
         description: Identifier of the AF
         required: true
         schema:
           type: string
      requestBody:
        description: new subscription creation
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/AnalyticsExposureSubsc'
      callbacks:
        notification:
          '{$request.body#/notifUri}':
            post:
              requestBody:  # contents of the callback message
                required: true
                content:
                  application/json:
                    schema:
                      $ref: '#/components/schemas/AnalyticsEventNotification'
              responses:
                '204':
                 description: No Content (successful notification)
                '307':
                 $ref: 'TS29122_CommonData.yaml#/components/responses/307'
                '308':
                 $ref: 'TS29122_CommonData.yaml#/components/responses/308'
                '400':
                 $ref: 'TS29122_CommonData.yaml#/components/responses/400'
                '401':
                 $ref: 'TS29122_CommonData.yaml#/components/responses/401'
                '403':
                 $ref: 'TS29122_CommonData.yaml#/components/responses/403'
                '404':
                 $ref: 'TS29122_CommonData.yaml#/components/responses/404'
                '411':
                 $ref: 'TS29122_CommonData.yaml#/components/responses/411'
                '413':
                 $ref: 'TS29122_CommonData.yaml#/components/responses/413'
                '415':
                 $ref: 'TS29122_CommonData.yaml#/components/responses/415'
                '429':
                 $ref: 'TS29122_CommonData.yaml#/components/responses/429'
                '500':
                 $ref: 'TS29122_CommonData.yaml#/components/responses/500'
                '503':
                 $ref: 'TS29122_CommonData.yaml#/components/responses/503'
               default:
                 $ref: 'TS29122_CommonData.yaml#/components/responses/default'
      responses:
        '201':
          description: Created (Successful creation)
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/AnalyticsExposureSubsc'
```

```
              headers:
                Location:
                  description: Contains the URI of the newly created resource.
                  required: true
                  schema:
                    type: string
            '204':
              description: >
                Successful case. The resource has been successfully created and no additional
                content is to be sent in the response message.
            '400':
              $ref: 'TS29122_CommonData.yaml#/components/responses/400'
            '401':
              $ref: 'TS29122_CommonData.yaml#/components/responses/401'
            '403':
              $ref: 'TS29122_CommonData.yaml#/components/responses/403'
            '404':
              $ref: 'TS29122_CommonData.yaml#/components/responses/404'
            '411':
              $ref: 'TS29122_CommonData.yaml#/components/responses/411'
            '413':
              $ref: 'TS29122_CommonData.yaml#/components/responses/413'
            '415':
              $ref: 'TS29122_CommonData.yaml#/components/responses/415'
            '429':
              $ref: 'TS29122_CommonData.yaml#/components/responses/429'
            '500':
              $ref: 'TS29122_CommonData.yaml#/components/responses/500'
            '503':
              $ref: 'TS29122_CommonData.yaml#/components/responses/503'
            default:
              $ref: 'TS29122_CommonData.yaml#/components/responses/default'

  /{afId}/subscriptions/{subscriptionId}:
    get:
      summary: read an active subscription for the AF and the subscription Id
      operationId: ReadAnSubscription
      tags:
        - Individual Analytics Exposure Subscription
      parameters:
        - name: afId
          in: path
          description: Identifier of the AF
          required: true
          schema:
            type: string
        - name: subscriptionId
          in: path
          description: Identifier of the subscription resource
          required: true
          schema:
            type: string
        - name: supp-feat
          in: query
          description: Features supported by the NF service consumer
          required: false
          schema:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      responses:
        '200':
          description: OK (Successful get the active subscription)
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/AnalyticsExposureSubsc'
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '406':
```

```
          $ref: 'TS29122_CommonData.yaml#/components/responses/406'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'

    put:
      summary: Fully updates/replaces an existing subscription resource
      operationId: FullyUpdateAnSubscription
      tags:
        - Individual Analytics Exposure Subscription
      parameters:
        - name: afId
          in: path
          description: Identifier of the AF
          required: true
          schema:
            type: string
        - name: subscriptionId
          in: path
          description: Identifier of the subscription resource
          required: true
          schema:
            type: string
      requestBody:
        description: Parameters to update/replace the existing subscription
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/AnalyticsExposureSubsc'
      responses:
        '200':
          description: OK (Successful deletion of the existing subscription)
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/AnalyticsExposureSubsc'
        '204':
          description: >
            Successful case. The resource has been successfully updated and no additional
            content is to be sent in the response message.
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '411':
          $ref: 'TS29122_CommonData.yaml#/components/responses/411'
        '413':
          $ref: 'TS29122_CommonData.yaml#/components/responses/413'
        '415':
          $ref: 'TS29122_CommonData.yaml#/components/responses/415'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'

    delete:
      summary: Deletes an already existing subscription
      operationId: DeleteAnSubscription
      tags:
        - Individual Analytics Exposure Subscription
```

```
        parameters:
          - name: afId
            in: path
            description: Identifier of the AF
            required: true
            schema:
              type: string
          - name: subscriptionId
            in: path
            description: Identifier of the subscription resource
            required: true
            schema:
              type: string
        responses:
          '204':
            description: No Content (Successful deletion of the existing subscription)
          '307':
            $ref: 'TS29122_CommonData.yaml#/components/responses/307'
          '308':
            $ref: 'TS29122_CommonData.yaml#/components/responses/308'
          '400':
            $ref: 'TS29122_CommonData.yaml#/components/responses/400'
          '401':
            $ref: 'TS29122_CommonData.yaml#/components/responses/401'
          '403':
            $ref: 'TS29122_CommonData.yaml#/components/responses/403'
          '404':
            $ref: 'TS29122_CommonData.yaml#/components/responses/404'
          '429':
            $ref: 'TS29122_CommonData.yaml#/components/responses/429'
          '500':
            $ref: 'TS29122_CommonData.yaml#/components/responses/500'
          '503':
            $ref: 'TS29122_CommonData.yaml#/components/responses/503'
          default:
            $ref: 'TS29122_CommonData.yaml#/components/responses/default'

  /{afId}/fetch:
    post:
      summary: Fetch analytics information
      operationId: FetchAnalyticsInfo
      tags:
        - AnalyticsExposure API Fetch analytics information
      parameters:
        - name: afId
          in: path
          description: Identifier of the AF
          required: true
          schema:
            type: string
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/AnalyticsRequest'
      responses:
        '200':
          description: The requested information was returned successfully.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/AnalyticsData'
        '204':
          description: No Content (The requested Analytics data does not exist)
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '411':
```

```
            $ref: 'TS29122_CommonData.yaml#/components/responses/411'
          '413':
            $ref: 'TS29122_CommonData.yaml#/components/responses/413'
          '415':
            $ref: 'TS29122_CommonData.yaml#/components/responses/415'
          '429':
            $ref: 'TS29122_CommonData.yaml#/components/responses/429'
          '500':
            description: >
              The request is rejected by the NEF and more details (not only the ProblemDetails)
              are returned.
            content:
              application/problem+json:
                schema:
                  $ref:
'TS29520_Nnwdaf_AnalyticsInfo.yaml#/components/schemas/ProblemDetailsAnalyticsInfoRequest'
          '503':
            $ref: 'TS29122_CommonData.yaml#/components/responses/503'
          default:
            $ref: 'TS29122_CommonData.yaml#/components/responses/default'

components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{tokenUrl}'
          scopes: {}

  schemas:
    AnalyticsExposureSubsc:
      description: Represents an analytics exposure subscription.
      type: object
      properties:
        analyEventsSubs:
          type: array
          items:
            $ref: '#/components/schemas/AnalyticsEventSubsc'
          minItems: 1
        analyRepInfo:
          $ref: 'TS29523_Npcf_EventExposure.yaml#/components/schemas/ReportingInformation'
        notifUri:
          $ref: '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'
        cancelAccuInd:
          type: boolean
          description: >
            Indicates cancelled subscription of the analytics accuracy information.
            Set to "true" indicates the NWDAF cancelled subscription of analytics accuracy
            information as the NWDAF does not support the accuracy checking capability.
            Otherwise set to "false". Default value is "false" if omitted.
        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
        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
      dataVlTrnsTmReqs:
```

```yaml
        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
      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'
        cancelAccuInd:
          type: boolean
          description: >
            Indicates cancelled request of the analytics accuracy information.
            Set to "true" indicates the NWDAF cancelled request of analytics accuracy
            information as the NWDAF does not support the accuracy checking capability.
            Otherwise set to "false". Default value is "false" if omitted.
```

```
      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

  QosSustainabilityExposure:
    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

  WlanPerformInfo:
    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

  AnalyticsFailureEventInfo:
```

```
      description: >
        Represents an event for which the subscription request was not successful
        and including the associated failure reason.
      type: object
      properties:
        event:
          $ref: '#/components/schemas/AnalyticsEvent'
        failureCode:
          $ref: '#/components/schemas/AnalyticsFailureCode'
      required:
        - event
        - failureCode

    AnalyticsEvent:
      anyOf:
      - type: string
        enum:
          - UE_MOBILITY
          - UE_COMM
          - ABNORMAL_BEHAVIOR
          - CONGESTION
          - NETWORK_PERFORMANCE
          - QOS_SUSTAINABILITY
          - DISPERSION
          - DN_PERFORMANCE
          - SERVICE_EXPERIENCE
          - 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
          - NO_ROAMING_SUPPORT
          - 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.
          - NO_ROAMING_SUPPORT: Indicates that the request shall be rejected because roaming analytics
            or data are required and the NWDAF that was invoked by the NEF neither supported roaming
            exchange capabilitiy nor could it forward the request to another NWDAF.
          - OTHER: The event is rejected due to other reasons.
```

A.5   5GLANParameterProvision API

```
openapi: 3.0.0

info:
  title: 3gpp-5glan-pp
  version: 1.2.1
  description: |
    API for 5G LAN Parameter Provision.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.522 V18.7.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'

security:
  - {}
  - oAuth2ClientCredentials: []

servers:
  - url: '{apiRoot}/3gpp-5glan-pp/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in clause 5.2.4 of 3GPP TS 29.122.

paths:
  /{afId}/subscriptions:
    get:
      summary: read all of the active subscriptions for the AF
      operationId: RealAllSubscriptions
      tags:
        - 5GLAN Parameters Provision Subscriptions
      parameters:
        - name: afId
          in: path
          description: Identifier of the AF
          required: true
          schema:
            type: string
      responses:
        '200':
          description: OK (Successful get all of the active subscriptions for the AF)
          content:
            application/json:
              schema:
                type: array
                items:
                  $ref: '#/components/schemas/5GLanParametersProvision'
                minItems: 0
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
```

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

ETSI

```
            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'
        5gLanParams:
          $ref: '#/components/schemas/5GLanParameters'

    5GLanParameters:
      description: Represents 5G LAN service related parameters that need to be provisioned.
      type: object
      properties:
        exterGroupId:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/ExternalGroupId'
        gpsis:
          type: object
          additionalProperties:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
          minProperties: 1
          description: >
            Contains the list of 5G VN Group members, each member is identified by GPSI.
            Any string value can be used as a key of the map.
        dnn:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
        aaaIpv4Addr:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv4Addr'
        aaaIpv6Addr:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Addr'
        aaaUsgs:
          type: array
          items:
            $ref: '#/components/schemas/AaaUsage'
          minItems: 1
          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".
        vnGroupCommType:
          $ref: 'TS29503_Nudm_PP.yaml#/components/schemas/5GVnGroupCommunicationType'
        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'
      required:
        - exterGroupId
        - gpsis
        - dnn
        - snssai
        - sessionType
        - appDesps

    5GLanParametersPatch:
      deprecated: true
      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'
        ecsAuthMethods:
          type: array
          items:
            $ref: 'TS29503_Nudm_PP.yaml#/components/schemas/EcsAuthMethod'
          minItems: 1
        supportedPlmns:
          type: array
          items:
            $ref: 'TS29503_Nudm_PP.yaml#/components/schemas/SupportedPlmn'
          minItems: 1
      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: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '406':
          $ref: 'TS29122_CommonData.yaml#/components/responses/406'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'

    post:
      summary: Creates a new subscription resource
      operationId: CreateNewSubscription
      tags:
        - Applied BDT Policy Subscription
      requestBody:
        description: Request to create a new subscription resource
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/AppliedBdtPolicy'
      responses:
        '201':
          description: Created (Successful creation of subscription)
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/AppliedBdtPolicy'
          headers:
            Location:
              description: Contains the URI of the newly created resource.
              required: true
              schema:
                type: string
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '411':
          $ref: 'TS29122_CommonData.yaml#/components/responses/411'
        '413':
          $ref: 'TS29122_CommonData.yaml#/components/responses/413'
        '415':
          $ref: 'TS29122_CommonData.yaml#/components/responses/415'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'
```

```
/{afId}/subscriptions/{subscriptionId}:
  parameters:
    - name: afId
      in: path
      description: Identifier of the AF
      required: true
      schema:
        type: string
    - name: subscriptionId
      in: path
      description: Identifier of the subscription resource
      required: true
      schema:
        type: string
  get:
    summary: read an active subscriptions for the SCS/AS and the subscription Id
    operationId: ReadAnSubscription
    tags:
      - Individual Applied BDT Policy Subscription
    responses:
      '200':
        description: OK (Successful get the active subscription)
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/AppliedBdtPolicy'
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '406':
        $ref: 'TS29122_CommonData.yaml#/components/responses/406'
      '429':
        $ref: 'TS29122_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29122_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29122_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29122_CommonData.yaml#/components/responses/default'

  patch:
    summary: Partial updates/replaces an existing subscription resource
    operationId: PartialUpdateAnSubscription
    tags:
      - Individual Applied BDT Policy Subscription
    requestBody:
      required: true
      content:
        application/merge-patch+json:
          schema:
            $ref: '#/components/schemas/AppliedBdtPolicyPatch'
    responses:
      '200':
        description: OK. The subscription was modified successfully.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/AppliedBdtPolicy'
      '204':
        description: No content. The subscription was modified successfully.
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
```

```yaml
                $ref: 'TS29122_CommonData.yaml#/components/responses/403'
              '404':
                $ref: 'TS29122_CommonData.yaml#/components/responses/404'
              '411':
                $ref: 'TS29122_CommonData.yaml#/components/responses/411'
              '413':
                $ref: 'TS29122_CommonData.yaml#/components/responses/413'
              '415':
                $ref: 'TS29122_CommonData.yaml#/components/responses/415'
              '429':
                $ref: 'TS29122_CommonData.yaml#/components/responses/429'
              '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
  description: |
    API for IPTV configuration.
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    All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.522 V18.6.0; 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-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
  description: |
    API for Location Privacy Indication Parameters Provisioning.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.522 V18.6.0; 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-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: 1.2.1
  description: |
    API for AF service paramter
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
```

```
externalDocs:
  description: >
    3GPP TS 29.522 V18.7.0; 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-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: gpsis
          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-addrs
          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-addrs query parameter.
          required: false
          schema:
            type: string
        - name: mac-addrs
          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.
websockNotifConfig:
  $ref: 'TS29122_CommonData.yaml#/components/schemas/WebsockNotifConfig'
paramOverPc5:
  $ref: '#/components/schemas/ParameterOverPc5'
paramOverUu:
  $ref: '#/components/schemas/ParameterOverUu'
paramForProSeDd:
  $ref: '#/components/schemas/ParamForProSeDd'
paramForProSeDc:
  $ref: '#/components/schemas/ParamForProSeDc'
paramForProSeU2NRelUe:
  $ref: '#/components/schemas/ParamForProSeU2NRelUe'
paramForProSeRemUe:
  $ref: '#/components/schemas/ParamForProSeRemUe'
paramForProSeU2URelUe:
  $ref: '#/components/schemas/ParamForProSeU2URelUe'
paramForProSeEndUe:
  $ref: '#/components/schemas/ParamForProSeEndUe'
paramForRangingSlPos:
  $ref: '#/components/schemas/ParamForRangingSlPos'
urspGuidance:
  type: array
  items:
    $ref: '#/components/schemas/UrspRuleRequest'
  minItems: 1
  description: Contains the service parameter used to guide the URSP.
vpsUrspGuidance:
  type: array
  items:
    $ref: '#/components/schemas/UrspRuleRequest'
  minItems: 1
  description: >
    Contains the service parameters used to guide the VPLMN-specific URSP
    rule(s).
a2xParamsPc5:
  $ref: '#/components/schemas/A2xParamsPc5'
a2xParamsUu:
  $ref: '#/components/schemas/A2xParamsUu'
```

```yaml
      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'
      urspGuidance:
        type: array
        items:
          $ref: '#/components/schemas/UrspRuleRequest'
        minItems: 1
        description: Contains the service parameter used to guide the URSP.
      vpsUrspGuidance:
        type: array
        items:
          $ref: '#/components/schemas/UrspRuleRequest'
        minItems: 1
        description: >
          Contains the service parameters used to guide the VPLMN-specific
          URSP rule(s).
        nullable: true
      a2xParamsPc5:
        $ref: '#/components/schemas/A2xParamsPc5Rm'
      a2xParamsUu:
        $ref: '#/components/schemas/A2xParamsUuRm'
      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

  A2xParamsUu:
    description: >
      Represents configuration parameters for A2X communications over Uu reference point.
    type: string

  A2xParamsUuRm:
    description: >
      Represents the same as the A2xParamsUu 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.
      opSpecConnCaps:
        type: array
        items:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Bytes'
        minItems: 1
        maxItems: 128
        description: >
          Operator specific connection 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]
        - required: [opSpecConnCaps]

  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'

  Failure:
    anyOf:
    - 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
        - IOT_DELAY_TOLERANT
        - IOT_NON_DELAY_TOLERANT
        - DL_STREAMING
        - UL_STREAMING
        - VEHIC_COMM
        - REAL_TIME_INTERACTIVE
        - UNIFIED_COMM
        - BACKGROUND
        - MISS_CRITICAL
        - TIME_CRITICAL
        - LOW_LAT_LOSS_TOL_UNACK
    - 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.
          - IOT_DELAY_TOLERANT: Indicates the connection capability to support IoT
            delay-tolerant services.
          - IOT_NON_DELAY_TOLERANT: Indicates the connection capability to support IoT
            non-delay-tolerant services.
          - DL_STREAMING: Indicates the connection capability to support downlink streaming
            services.
          - UL_STREAMING: Indicates the connection capability to support uplink streaming services
          - VEHIC_COMM: Indicates the connection capability to support vehicular communication
            services.
          - REAL_TIME_INTERACTIVE: Indicates the connection capability to support real time
            interactive services.
          - UNIFIED_COMM: Indicates the connection capability to support unified communication
            services.
          - BACKGROUND: Indicates the connection capability to support background services.
          - MISS_CRITICAL: Indicates the connection capability to support mission critical services.
          - TIME_CRITICAL: Indicates the connection capability to support time critical services.
          - LOW_LAT_LOSS_TOL_UNACK: Indicates the connection capability to support low latency
            loss tolerant communications in un-acknowledged mode.
```

A.10   ACSParameterProvision API

```
openapi: 3.0.0
info:
  title: 3gpp-acs-pp
  version: 1.1.2
  description: |
    API for 5G ACS Parameter Provision.
    © 2022, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
externalDocs:
  description: >
    3GPP TS 29.522 V17.8.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'
security:
  - {}
  - oAuth2ClientCredentials: []
servers:
  - url: '{apiRoot}/3gpp-acs-pp/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in clause 5.2.4 of 3GPP TS 29.122.
paths:
  /{afId}/subscriptions:
    get:
      summary: read all of the active subscriptions for the AF
      operationId: ReadAllSubscriptions
      tags:
        - ACS Configuration Subscriptions
      parameters:
        - name: afId
          in: path
          description: Identifier of the AF
          required: true
          schema:
            type: string
      responses:
        '200':
          description: OK (Successful get all of the active subscriptions for the AF)
          content:
            application/json:
              schema:
                type: array
```

```
                items:
                  $ref: '#/components/schemas/AcsConfigurationData'
                minItems: 0
          '307':
            $ref: 'TS29122_CommonData.yaml#/components/responses/307'
          '308':
            $ref: 'TS29122_CommonData.yaml#/components/responses/308'
          '400':
            $ref: 'TS29122_CommonData.yaml#/components/responses/400'
          '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
  description: |
    API for UE updated location information notification.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
externalDocs:
  description: >
    3GPP TS 29.522 V18.6.0; 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-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
  description: |
    API for AKMA.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
externalDocs:
  description: >
    3GPP TS 29.522 V18.6.0; 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-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:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'
      callbacks:
        ServiceDisablementNotification:
          '{$request.body#/notifUri}':
            post:
              requestBody:
                description: >
                  Represents the AKMA service disablement information.
                required: true
                content:
                  application/json:
                    schema:
                      $ref: '#/components/schemas/ServiceDisableNotif'
              responses:
                '204':
                  description: No content. The notification is successfully received and processed.
                '307':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/307'
                '308':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/308'
                '400':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/400'
                '401':
```

```
                    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
                '403':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/403'
                '404':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
                '411':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/411'
                '413':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/413'
                '415':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/415'
                '429':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
                '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:
            nnef-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'
        notifUri:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
        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

    ServiceDisableNotif:
      description: Represents the AKMA Service Disable Notification.
      type: object
      properties:
        aKId:
```

```
          $ref: '#/components/schemas/AKId'
      required:
        - aKId


#Simple Data types


    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: 1.1.1
  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 V18.8.0; 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-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: ReadAllConfirguations
      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'
```

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```
          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
```

ETSI

```
        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
```

ETSI

```
          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.
        websockNotifConfig:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/WebsockNotifConfig'
        suppFeat:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      required:
        - subsNotifUri
        - subsNotifId
      oneOf:
        - required: [gpsis]
        - required: [anyUeInd]
        - required: [exterGroupId]

    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/ReportedCapability'
        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
            enum:
              - true
          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
```

```
  AvailReport:
    description: Contains the availability status for a UE/DS-TT.
    type: object
    properties:
      avStatus:
        $ref: '#/components/schemas/AvailStatus'

  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: >
          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 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.

    AvailStatus:
      anyOf:
      - type: string
        enum:
           - PDU_SESSION_TERMINATION
      - 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 availability status.
        Possible values are:
        - PDU_SESSION_TERMINATION: The UE is not available for (g)PTP services because the PDU
          session is terminated.

    ReportedCapability:
      allOf:
        - $ref: '#/components/schemas/EventFilter'
        - $ref: '#/components/schemas/AvailReport'
      description: >
        Extends the EventFilter data type to indicate the availability status of the
        UE/DS-TT.
```

A.14 EcsAddressProvision API

```
openapi: 3.0.0

info:
  title: 3gpp-ecs-address-provision
  version: 1.1.1
```

```
    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 V18.7.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'

security:
  - {}
  - oAuth2ClientCredentials: []

servers:
  - url: '{apiRoot}/3gpp-ecs-address-provision/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in clause 5.2.4 of 3GPP TS 29.122.

paths:
  /{afId}/configurations:
    get:
      summary: Read all active configurations for a given AF
      operationId: ReadAllConfigurations
      tags:
        - ECS Address Provision Configurations (Collection)
      parameters:
        - name: afId
          in: path
          description: Identifier of the AF
          required: true
          schema:
            type: string
      responses:
        '200':
          description: OK (Successful get all of the active resources for the AF)
          content:
            application/json:
              schema:
                type: array
                items:
                  $ref: '#/components/schemas/EcsAddressProvision'
                minItems: 0
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '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'
        ecsAuthMethods:
          type: array
          items:
            $ref: 'TS29503_Nudm_PP.yaml#/components/schemas/EcsAuthMethod'
          minItems: 1
        supportedPlmns:
          type: array
          items:
            $ref: 'TS29503_Nudm_PP.yaml#/components/schemas/SupportedPlmn'
```

```
          minItems: 1
        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 aaplication 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.
        websockNotifConfig:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/WebsockNotifConfig'
      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
  description: |
    AMInfluence API Service.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.522 V18.6.0; 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'
```

ETSI

```
          '400':
            $ref: 'TS29122_CommonData.yaml#/components/responses/400'
          '401':
            $ref: 'TS29122_CommonData.yaml#/components/responses/401'
          '403':
            $ref: 'TS29122_CommonData.yaml#/components/responses/403'
          '404':
            $ref: 'TS29122_CommonData.yaml#/components/responses/404'
          '411':
            $ref: 'TS29122_CommonData.yaml#/components/responses/411'
          '413':
            $ref: 'TS29122_CommonData.yaml#/components/responses/413'
          '415':
            $ref: 'TS29122_CommonData.yaml#/components/responses/415'
          '429':
            $ref: 'TS29122_CommonData.yaml#/components/responses/429'
          '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: '{tokenUrl}'
          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.
        dnnSnssaiInfos:
          type: array
          items:
            $ref: '#/components/schemas/DnnSnssaiInformation'
          minItems: 1
          description: Each of the element identifies a (DNN, S-NSSAI) combination.
        afAppIds:
          type: array
          items:
            type: string
          minItems: 1
          description: Each of the element identifies an application.
        highThruInd:
          type: boolean
        geoAreas:
          type: array
          items:
            $ref: 'TS29522_AMPolicyAuthorization.yaml#/components/schemas/GeographicalArea'
          minItems: 1
          description: Identifies geographic areas of the user where the request is applicable.
        policyDuration:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/DurationSec'
        self:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Link'
        subscribedEvents:
          type: array
          items:
            $ref: '#/components/schemas/AmInfluEvent'
          minItems: 1
          description: Indicates one or more AM influence related events.
```

```
      notificationDestination:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/Link'
      requestTestNotification:
        type: boolean
        description: >
          Set to true by the AF to request the NEF to send a test notification
          as defined in clause 5.2.5.3 of 3GPP TS 29.122. Set to false or omitted otherwise.
      websockNotifConfig:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/WebsockNotifConfig'
      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: 1.1.1
  description: |
    API for the allocation, deallocation and management of TMGI(s) for MBS.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.522 V18.7.0; 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-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'
```

```yaml
            '308':
             $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
        websockNotifConfig:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/WebsockNotifConfig'
        suppFeat:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      required:
        - afId
        - tmgiParams
      not:
        required: [mbsServiceArea, extMbsServiceArea]

    TmgiAllocResponse:
      description: >
```

```
        Represents MBS TMGI(s) allocation information or the refreshed expiry time for
        already allocated TMGI(s)
      type: object
      properties:
        tmgiInfo:
          $ref: 'TS29532_Nmbsmf_TMGI.yaml#/components/schemas/TmgiAllocated'
        suppFeat:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      required:
        - tmgiInfo

    TmgiDeallocRequest:
      description: Represents information to request the deallocation of MBS TMGI(s).
      type: object
      properties:
        afId:
          type: string
        tmgis:
          type: array
          items:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/Tmgi'
          minItems: 1
      required:
        - afId
        - tmgis

    ExpiryNotif:
      description: Represents MBS TMGI(s) timer expiry notification information.
      type: object
      properties:
        tmgis:
          type: array
          items:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/Tmgi'
          minItems: 1
      required:
        - tmgis

    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'
        reducedMbsServAreas:
          type: array
          items:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/MbsServiceArea'
          minItems: 1
        reducedExtMbsServAreas:
          type: array
          items:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/ExternalMbsServiceArea'
          minItems: 1
      oneOf:
        - required: [reducedMbsServArea]
        - required: [reducedExtMbsServArea]
      allOf:
        - not:
            required: [reducedMbsServArea, reducedExtMbsServAreas]
        - not:
            required: [reducedExtMbsServArea, reducedMbsServAreas]

    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: 1.2.1
  description: |
    API for MBS Session Management.
    © 2025, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.522 V18.9.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'

servers:
  - url: '{apiRoot}/3gpp-mbs-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
               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 GPSI(s) of the member UE(s) constituting the multicast MBS
          group. Any
          value of type can be used as a key of the map.
      mbsSessionIdList:
        $ref: 'TS29503_Nudm_PP.yaml#/components/schemas/5MbsAuthorizationInfo'
    required:
      - extGroupId
      - mbsSessionIdList

  MbsPpDataPatch:
    description: >
      Represents the requested modification to existing MBS Parameters Provisioning data.
    type: object
    properties:
      mbsSessAuthData:
        $ref: '#/components/schemas/MbsSessAuthData'
      mbsSessAssistInfo:
        $ref: '#/components/schemas/MbsSessAssistInfo'

  MbsSessAssistInfo:
    description: >
      Represents the MBS Session Assistance information data set(s).
    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
  description: |
    API for AF provisioned EAS Deployment.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.522 V18.6.0; 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-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:
```

ETSI

```
            $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
          description: >
            Contains a service on behalf of which the AF is issuing the request.
        fqdnPatternList:
          type: array
          items:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/FqdnPatternMatchingRule'
          minItems: 1
          description: >
            Contains the 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.
        appId:
          type: string
          description: >
            Contains the application for which the EAS Deployment Information corresponds to.
        dnn:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
        snssai:
```

```yaml
            $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
          description: >
            Contains the list of DNS server identifier for each DNAI.
        easIpAddrs:
          type: array
          items:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/IpAddr'
          minItems: 1
          description: >
            Contains the IP address(s) of the EASs in the local DN for each DNAI.
      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

```yaml
openapi: 3.0.0
```

```
info:
  title: 3gpp-asti
  version: 1.1.0
  description: |
    API for ASTI.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.522 V18.6.0; 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-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/404'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '411':
          $ref: 'TS29122_CommonData.yaml#/components/responses/411'
        '413':
          $ref: 'TS29122_CommonData.yaml#/components/responses/413'
        '415':
          $ref: 'TS29122_CommonData.yaml#/components/responses/415'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'

  /{afId}/configurations/{configId}:
    get:
      summary: Reads an active configuration for the AF and the configuration Id
      operationId: ReadAnConfiguration
      tags:
        - Individual ASTI Configuration
      parameters:
        - name: afId
          in: path
          description: Identifier of the AF
          required: true
          schema:
            type: string
        - name: configId
          in: path
```

```
          description: Identifier of the configuration resource
          required: true
          schema:
            type: string
      responses:
        '200':
          description: OK (Successful get the active configuration)
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/AccessTimeDistributionData'
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '406':
          $ref: 'TS29122_CommonData.yaml#/components/responses/406'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'

    put:
      summary: Modifies an active configuration for the AF and the configuration Id
      operationId: FullyModifyAnConfiguration
      tags:
        - Individual ASTI Configuration
      parameters:
        - name: afId
          in: path
          description: Identifier of the AF
          required: true
          schema:
            type: string
        - name: configId
          in: path
          description: Identifier of the configuration resource
          required: true
          schema:
            type: string
      requestBody:
        description: Parameters to update/replace the existing configuration
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/AccessTimeDistributionData'
      responses:
        '200':
          description: OK (Successful update of the configuration)
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/AccessTimeDistributionData'
        '204':
          description: No Content
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
```

```
          '404':
           $ref: 'TS29122_CommonData.yaml#/components/responses/404'
          '411':
           $ref: 'TS29122_CommonData.yaml#/components/responses/411'
          '413':
           $ref: 'TS29122_CommonData.yaml#/components/responses/413'
          '415':
           $ref: 'TS29122_CommonData.yaml#/components/responses/415'
          '429':
           $ref: 'TS29122_CommonData.yaml#/components/responses/429'
          '500':
           $ref: 'TS29122_CommonData.yaml#/components/responses/500'
          '503':
           $ref: 'TS29122_CommonData.yaml#/components/responses/503'
          default:
           $ref: 'TS29122_CommonData.yaml#/components/responses/default'

    delete:
      summary: Deletes an already existing configuration
      operationId: DeleteAnConfiguration
      tags:
       - Individual ASTI Configuration
      parameters:
       - name: afId
         in: path
         description: Identifier of the AF
         required: true
         schema:
           type: string
       - name: configId
         in: path
         description: Identifier of the configuration resource
         required: true
         schema:
           type: string
      responses:
        '204':
         description: No Content (Successful deletion of the existing configuration)
        '307':
         $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
         $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
         $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
         $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
         $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
         $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '429':
         $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
         $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
         $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
         $ref: 'TS29122_CommonData.yaml#/components/responses/default'


components:

  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{tokenUrl}'
          scopes: {}

  schemas:

    AccessTimeDistributionData:
      description: >
        Contains the parameters for the creation of 5G access stratum time distribution
configuration.
      type: object
      properties:
```

```
  gpsis:
    type: array
    items:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
    minItems: 1
  exterGroupId:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/ExternalGroupId'
  asTimeDisParam:
    $ref: 'TS29565_Ntsctsf_ASTI.yaml#/components/schemas/AfAsTimeDistributionParam'
  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: [exterGroupId]

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: 1.1.0
  description: |
    API for 3GPP Data Reporting.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.522 V18.6.0; 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/<apiVersion>/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: 1.1.0
  description: |
    API for 3GPP Data Reporting and Provisioning.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
```

```
externalDocs:
  description: >
    3GPP TS 29.522 V18.6.0; 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-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/<apiVersion>/sessions/{sessionId}
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '411':
          $ref: 'TS29122_CommonData.yaml#/components/responses/411'
        '413':
          $ref: 'TS29122_CommonData.yaml#/components/responses/413'
        '415':
          $ref: 'TS29122_CommonData.yaml#/components/responses/415'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'

  /sessions/{sessionId}:
    parameters:
      - name: sessionId
        in: path
        description: Identifier of the Data Reporting Provisioning Session.
        required: true
```

```
        schema:
          type: string
    get:
      summary: Request the retrieval of an existing Individual Data Reporting Provisioning Session
resource.
      operationId: GetIndDataRepProvSession
      tags:
        - Individual Data Reporting Provisioning Session
      responses:
        '200':
          description: >
            OK. The requested Individual Data Reporting Provisioning Session resource is
            Successfully returned.
          content:
            application/json:
              schema:
                $ref:
'TS26532_Ndcaf_DataReportingProvisioning.yaml#/components/schemas/DataReportingProvisioningSession'
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '411':
          $ref: 'TS29122_CommonData.yaml#/components/responses/411'
        '413':
          $ref: 'TS29122_CommonData.yaml#/components/responses/413'
        '415':
          $ref: 'TS29122_CommonData.yaml#/components/responses/415'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'

    delete:
      summary: Deletes an already existing Individual Data Reporting Provisioning Session resource.
      operationId: DeleteIndDataRepProvSession
      tags:
        - Individual Data Reporting Provisioning Session
      responses:
        '204':
          description: >
            No Content. The concerned Individual Data Reporting Provisioning Session resource was
            successfully deleted.
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'

  /sessions/{sessionId}/configurations:
    parameters:
```

```
    - name: sessionId
      in: path
      description: Identifier of the Data Reporting Provisioning Session.
      required: true
      schema:
        type: string
  post:
    summary: Create a new Data Reporting Configuration resource.
    operationId: CreateDataRepConfig
    tags:
      - Data Reporting Configurations
    requestBody:
      description: >
        Representation of the Data Reporting Configuration to be created in the NEF.
      required: true
      content:
        application/json:
          schema:
            $ref:
'TS26532_Ndcaf_DataReportingProvisioning.yaml#/components/schemas/DataReportingConfiguration'
    responses:
      '201':
        description: Created. Successful creation of a new Data Reporting Configuration.
        content:
          application/json:
            schema:
              $ref:
'TS26532_Ndcaf_DataReportingProvisioning.yaml#/components/schemas/DataReportingConfiguration'
        headers:
          Location:
            required: true
            schema:
              type: string
            description: >
              Contains the URI of the newly created resource, according to the structure
              {apiRoot}/3gpp-data-reporting-
provisioning/<apiVersion>/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: 1.1.1
  description: |
    API for UE ID service.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: 3GPP TS 29.522 V18.7.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'
security:
  - {}
  - oAuth2ClientCredentials: []

servers:
  - url: '{apiRoot}/3gpp-ueid/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in subclause 5.2.4 of 3GPP TS 29.122.

paths:
  /retrieve:
    post:
      summary: Retrieve AF specific UE ID.
      operationId: RetrieveUEId
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/UeIdReq'
      responses:
        '200':
          description: The requested information was returned successfully.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/UeIdInfo'
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
```

```
                   '401':
                     $ref: 'TS29122_CommonData.yaml#/components/responses/401'
                   '403':
                     $ref: 'TS29122_CommonData.yaml#/components/responses/403'
                   '404':
                     $ref: 'TS29122_CommonData.yaml#/components/responses/404'
                   '411':
                     $ref: 'TS29122_CommonData.yaml#/components/responses/411'
                   '413':
                     $ref: 'TS29122_CommonData.yaml#/components/responses/413'
                   '415':
                     $ref: 'TS29122_CommonData.yaml#/components/responses/415'
                   '429':
                     $ref: 'TS29122_CommonData.yaml#/components/responses/429'
                   '500':
                     $ref: 'TS29122_CommonData.yaml#/components/responses/500'
                   '503':
                     $ref: 'TS29122_CommonData.yaml#/components/responses/503'
                   default:
                     $ref: 'TS29122_CommonData.yaml#/components/responses/default'

  /get-msisdn:
    post:
      summary: GET the MSISDN of the UE.
      operationId: GetMsisdn
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/MsisdnReq'
      responses:
        '200':
          description: Successful case. The requested UE ID in the form of MSISDN is returned.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/MsisdnInfo'
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '411':
          $ref: 'TS29122_CommonData.yaml#/components/responses/411'
        '413':
          $ref: 'TS29122_CommonData.yaml#/components/responses/413'
        '415':
          $ref: 'TS29122_CommonData.yaml#/components/responses/415'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '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}/pp:
    parameters:
      - name: afId
        in: path
        description: Represents the identifier of the AF.
        required: true
        schema:
          type: string

    get:
      summary: Request to retrieve all the active UE ID Mapping Information Provisionings at the NEF.
      operationId: GetUeIdMappingProvisionings
      tags:
```

```
               - UE ID Mapping Information Provisionings (Collection)
         responses:
           '200':
             description: >
               OK. All the Individual UE ID Mapping Information Provisioning resource(s) managed by the
               NEF are returned.
               If there are no existing Individual UE ID Mapping Information Provisioning resources at
               the NEF, an empty array is returned.
             content:
               application/json:
                 schema:
                   type: array
                   items:
                     $ref: '#/components/schemas/UeIdMappingInfo'
                   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 UE ID Mapping Information Provisioning.
       operationId: CreateUeIdMappingProvisioning
       tags:
         - UE ID Mapping Information Provisioning (Collection)
       requestBody:
         required: true
         content:
           application/json:
             schema:
               $ref: '#/components/schemas/UeIdMappingInfo'
       responses:
         '201':
           description: >
             Created. A representation of the created Individual UE ID Mapping Information
             Provisioning resource is returned in the response body.
           content:
             application/json:
               schema:
                 $ref: '#/components/schemas/UeIdMappingInfo'
           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}/pp/{ppId}:
    parameters:
      - name: afId
        in: path
        description: Represents the identifier of the AF.
        required: true
        schema:
          type: string
      - name: ppId
        in: path
        description: >
          Represents the identifier of the Individual UE ID Mapping Information Provisioning
          resource.
        required: true
        schema:
          type: string

    get:
      summary: Request to retrieve an existing Individual UE ID Mapping Information Provisioning
resource.
      operationId: GetIndUeIdMappingProvisioning
      tags:
        - Individual UE ID Mapping Information Provisioning (Document)
      responses:
        '200':
          description: >
            OK. The requested Individual UE ID Mapping Information Provisioning resource is returned
            in the response body.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/UeIdMappingInfo'
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '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 UE ID Mapping Information Provisioning
resource.
      operationId: UpdateIndUeIdMappingProvisioning
      tags:
        - Individual UE ID Mapping Information Provisioning (Document)
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/UeIdMappingInfo'
      responses:
```

```
        '200':
         description: >
           OK. The Individual UE ID Mapping Information 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/UeIdMappingInfo'
        '204':
         description: >
           No Content. The Individual UE ID Mapping Information 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 UE ID Mapping Information
Provisioning resource.
      operationId: ModifyIndUeIdMappingProvisioning
      tags:
        - Individual UE ID Mapping Information Provisioning (Document)
      requestBody:
        required: true
        content:
          application/merge-patch+json:
            schema:
              $ref: '#/components/schemas/UeIdMappingInfoPatch'
      responses:
        '200':
         description: >
           OK. The Individual UE ID Mapping Information 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/UeIdMappingInfo'
        '204':
         description: >
           No Content. The Individual UE ID Mapping Information 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':
```

```yaml
              $ref: 'TS29122_CommonData.yaml#/components/responses/411'
            '413':
              $ref: 'TS29122_CommonData.yaml#/components/responses/413'
            '415':
              $ref: 'TS29122_CommonData.yaml#/components/responses/415'
            '429':
              $ref: 'TS29122_CommonData.yaml#/components/responses/429'
            '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 UE ID Mapping Information Provisioning
resource.
      operationId: DeleteIndUeIdMappingProvisioning
      tags:
        - Individual UE ID Mapping Information Provisioning (Document)
      responses:
        '204':
          description: >
            No Content. The Individual UE ID Mapping Information 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:
    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

  MsisdnReq:
    description: Represents the parameters to request the retrieval of MSISDN of the UE.
    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]

  MsisdnInfo:
    description: Represents MSISDN information.
    type: object
    properties:
      msisdn:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/Msisdn'
      suppFeat:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
    required:
      - msisdn

  UeIdMappingInfo:
    description: >
      Represents the UE ID Mapping Information Provisioning.
    type: object
    properties:
      rsUeIdMappingInfo:
        $ref: '#/components/schemas/RangSlUeIdMappInfo'
      suppFeat:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'

  RangSlUeIdMappInfo:
    description: >
      Represents the Ranging/Sidelink UE ID mapping information between the Application Layer ID
      and the GPSI.
    type: object
    properties:
      appLayerId:
```

ETSI

```
                $ref: 'TS29571_CommonData.yaml#/components/schemas/ApplicationlayerId'
              gpsi:
                $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
            required:
              - appLayerId
              - gpsi

        UeIdMappingInfoPatch:
          description: >
            Represents the requested modification to a UE ID Mapping Information Provisioning.
          type: object
          properties:
            rsUeIdMappingInfo:
              $ref: '#/components/schemas/RangSlUeIdMappInfo'
```

A.24 MBSUserService API

```
openapi: 3.0.0

info:
  title: 3gpp-mbs-us
  version: 1.1.0
  description: |
    API for MBS User Service.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.522 V18.6.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'

servers:
  - url: '{apiRoot}/3gpp-mbs-us/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in clause 5.2.4 of 3GPP TS 29.122

security:
  - {}
  - oAuth2ClientCredentials: []

paths:
  /mbs-user-services:
    get:
      summary: Retrieve all the active MBS User Service resources managed by the NEF.
      tags:
        - MBS User Services
      operationId: RetrieveMBSUserServices
      responses:
        '200':
          description: >
            OK. All the active MBS User Services managed by the NEF are returned.
          content:
            application/json:
              schema:
                type: array
                items:
                  $ref: 'TS29580_Nmbsf_MBSUserService.yaml#/components/schemas/MBSUserService'
                minItems: 0
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '406':
          $ref: 'TS29122_CommonData.yaml#/components/responses/406'
```

```
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'

    post:
      summary: Request the creation of a new Individual MBS User Service resource.
      tags:
        - MBS User Services
      operationId: CreateMBSUserService
      requestBody:
        description: >
          Contains the parameters to request the creation of a new MBS User Service at the NEF.
        required: true
        content:
          application/json:
            schema:
              $ref: 'TS29580_Nmbsf_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_Nmbsf_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:
```

```yaml
            '200':
             description: >
               OK. The requested Individual MBS User Service resource is successfully returned.
             content:
               application/json:
                 schema:
                   $ref: 'TS29580_Nmbsf_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_Nmbsf_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_Nmbsf_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_Nmbsf_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_Nmbsf_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: 1.1.1
  description: |
    API for MBS User Data Ingest Session.
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    All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.522 V18.9.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'

servers:
  - url: '{apiRoot}/3gpp-mbs-ud-ingest/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in clause 5.2.4 of 3GPP TS 29.122

security:
  - {}
  - oAuth2ClientCredentials: []

paths:
  /sessions:
    get:
      summary: Retrieve all the active MBS User Data Ingest Sessions managed by the NEF.
      tags:
        - MBS User Data Ingest Sessions (Collection)
      operationId: RetrieveMBSUserDataIngestSessions
      responses:
        '200':
          description: >
            OK. All the active MBS User Data Ingest Sessions managed by the NEF are returned.
          content:
            application/json:
              schema:
                type: array
                items:
```

```
                $ref:
'TS29580_Nmbsf_MBSUserDataIngestSession.yaml#/components/schemas/MBSUserDataIngSession'
              minItems: 0
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '406':
          $ref: 'TS29122_CommonData.yaml#/components/responses/406'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'

    post:
      summary: Request the creation of a new Individual MBS User Data Ingest Session resource.
      tags:
        - MBS User Data Ingest Sessions (Collection)
      operationId: CreateMBSUserDataIngestSession
      requestBody:
        description: >
          Contains the parameters to request the creation of a new MBS User Data Ingest Session
          at the NEF.
        required: true
        content:
          application/json:
            schema:
              $ref:
'TS29580_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':
          description: >
            The request is rejected by the NEF and more details (along with ProblemDetails) may be
            returned.
          content:
            application/problem+json:
              schema:
                $ref:
'TS29580_Nmbsf_MBSUserDataIngestSession.yaml#/components/schemas/ProblemDetailsMBS'
        '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:
'TS29580_Nmbsf_MBSUserDataIngestSession.yaml#/components/schemas/ProblemDetailsMBS'
        '404':
          description: >
            The request is rejected by the NEF and more details (along with ProblemDetails) may be
            returned.
          content:
            application/problem+json:
              schema:
                $ref:
'TS29580_Nmbsf_MBSUserDataIngestSession.yaml#/components/schemas/ProblemDetailsMBS'
        '411':
          $ref: 'TS29122_CommonData.yaml#/components/responses/411'
        '413':
          $ref: 'TS29122_CommonData.yaml#/components/responses/413'
        '415':
          $ref: 'TS29122_CommonData.yaml#/components/responses/415'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '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_Nmbsf_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':
              description: >
                The request is rejected by the NEF and more details (along with ProblemDetails) may be
                returned.
              content:
                application/problem+json:
                  schema:
                    $ref:
'TS29580_Nmbsf_MBSUserDataIngestSession.yaml#/components/schemas/ProblemDetailsMBS'
            '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:
'TS29580_Nmbsf_MBSUserDataIngestSession.yaml#/components/schemas/ProblemDetailsMBS'
            '404':
              description: >
                The request is rejected by the NEF and more details (along with ProblemDetails) may be
                returned.
              content:
                application/problem+json:
                  schema:
                    $ref:
'TS29580_Nmbsf_MBSUserDataIngestSession.yaml#/components/schemas/ProblemDetailsMBS'
            '411':
              $ref: 'TS29122_CommonData.yaml#/components/responses/411'
            '413':
              $ref: 'TS29122_CommonData.yaml#/components/responses/413'
            '415':
              $ref: 'TS29122_CommonData.yaml#/components/responses/415'
            '429':
              $ref: 'TS29122_CommonData.yaml#/components/responses/429'
            '500':
              $ref: 'TS29122_CommonData.yaml#/components/responses/500'
            '503':
              $ref: 'TS29122_CommonData.yaml#/components/responses/503'
            default:
              $ref: 'TS29122_CommonData.yaml#/components/responses/default'

      patch:
        summary: Request the modification of an existing Individual MBS User Data Ingest Session
resource.
        tags:
          - Individual MBS User Data Ingest Session (Document)
```

```
      operationId: ModifyIndivMBSUserDataIngestSession
      requestBody:
        description: >
          Contains the parameters to request the modification of the Individual MBS User Data Ingest
          Session resource.
        required: true
        content:
          application/merge-patch+json:
            schema:
              $ref:
'TS29580_Nmbsf_MBSUserDataIngestSession.yaml#/components/schemas/MBSUserDataIngSessionPatch'
      responses:
        '200':
          description: >
            OK. The concerned Individual MBS User Data Ingest Session resource is successfully
            modified and a representation of the updated resource is returned.
          content:
            application/json:
              schema:
                $ref:
'TS29580_Nmbsf_MBSUserDataIngestSession.yaml#/components/schemas/MBSUserDataIngSession'
        '204':
          description: >
            No Content. The concerned Individual MBS User Data Ingest Session resource is
            successfully modified.
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          description: >
            The request is rejected by the NEF and more details (along with ProblemDetails) may be
            returned.
          content:
            application/problem+json:
              schema:
                $ref:
'TS29580_Nmbsf_MBSUserDataIngestSession.yaml#/components/schemas/ProblemDetailsMBS'
        '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:
'TS29580_Nmbsf_MBSUserDataIngestSession.yaml#/components/schemas/ProblemDetailsMBS'
        '404':
          description: >
            The request is rejected by the NEF and more details (along with ProblemDetails) may be
            returned.
          content:
            application/problem+json:
              schema:
                $ref:
'TS29580_Nmbsf_MBSUserDataIngestSession.yaml#/components/schemas/ProblemDetailsMBS'
        '411':
          $ref: 'TS29122_CommonData.yaml#/components/responses/411'
        '413':
          $ref: 'TS29122_CommonData.yaml#/components/responses/413'
        '415':
          $ref: 'TS29122_CommonData.yaml#/components/responses/415'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'

    delete:
      summary: Deletes an existing Individual MBS User Data Ingest Session resource.
      tags:
        - Individual MBS User Data Ingest Session (Document)
      operationId: DeleteIndivMBSUserDataIngestSession
```

```
      responses:
        '204':
          description: >
            No Content. The Individual MBS User Data Ingest Session resource is successfully
            deleted.
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'


  /status-subscriptions:
    get:
      summary: Retrieve all the active MBS User Data Ingest Session Status Subscriptions resources
managed by the NEF.
      tags:
        - MBS User Data Ingest Session Status Subscriptions (Collection)
      operationId: RetrieveMBSUserDataIngStatSubscs
      responses:
        '200':
          description: >
            OK. All the active MBS User Data Ingest Session Status Subscriptions managed by the NEF
            are returned.
          content:
            application/json:
              schema:
                type: array
                items:
                  $ref:
'TS29580_Nmbsf_MBSUserDataIngestSession.yaml#/components/schemas/MBSUserDataIngStatSubsc'
                minItems: 0
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '406':
          $ref: 'TS29122_CommonData.yaml#/components/responses/406'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'

    post:
      summary: Creates a new Individual MBS User Data Ingest Session Status Subscription resource.
      tags:
        - MBS User Data Ingest Session Status Subscriptions (Collection)
      operationId: CreateMBSUserDataIngStatSubsc
      requestBody:
        description: >
          Contains the parameters to request the creation of a new MBS User Data Ingest Session
```

```
              Status Subscription resource.
          required: true
          content:
            application/json:
              schema:
                $ref:
'TS29580_Nmbsf_MBSUserDataIngestSession.yaml#/components/schemas/MBSUserDataIngStatSubsc'
      responses:
        '201':
          description: >
            Created. Successful creation of a new Individual MBS User Data Ingest Session
            Status Subscription resource.
          content:
            application/json:
              schema:
                $ref:
'TS29580_Nmbsf_MBSUserDataIngestSession.yaml#/components/schemas/MBSUserDataIngStatSubsc'
          headers:
            Location:
              description: Contains the URI of the newly created resource.
              required: true
              schema:
                type: string
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '411':
          $ref: 'TS29122_CommonData.yaml#/components/responses/411'
        '413':
          $ref: 'TS29122_CommonData.yaml#/components/responses/413'
        '415':
          $ref: 'TS29122_CommonData.yaml#/components/responses/415'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'
      callbacks:
        mbsUserDataIngestSessionStatusNotif:
          '{$request.body#/notifUri}':
            post:
              requestBody:
                required: true
                content:
                  application/json:
                    schema:
                      $ref:
'TS29580_Nmbsf_MBSUserDataIngestSession.yaml#/components/schemas/MBSUserDataIngStatNotif'
              responses:
                '204':
                  description: No Content. Successful reception of the notification.
                '307':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/307'
                '308':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/308'
                '400':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/400'
                '401':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/401'
                '403':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/403'
                '404':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
                '411':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/411'
                '413':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/413'
                '415':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/415'
                '429':
```

```yaml
                $ref: 'TS29122_CommonData.yaml#/components/responses/429'
              '500':
                $ref: 'TS29122_CommonData.yaml#/components/responses/500'
              '503':
                $ref: 'TS29122_CommonData.yaml#/components/responses/503'
            default:
              $ref: 'TS29122_CommonData.yaml#/components/responses/default'


  /status-subscriptions/{subscriptionId}:
    parameters:
      - name: subscriptionId
        in: path
        description: >
          Identifier of the Individual MBS User Data Ingest Session Status Subscription resource.
        required: true
        schema:
          type: string

    get:
      summary: Retrieve an existing Individual MBS User Data Ingest Session Status Subscription
resource.
      tags:
        - Individual MBS User Data Ingest Session Status Subscription (Document)
      operationId: RetrieveIndMBSUserDataIngStatSubsc
      responses:
        '200':
          description: >
            OK. Successful retrieval of the requested Individual MBS User Data Ingest Session
            Status Subscription resource.
          content:
            application/json:
              schema:
                $ref:
'TS29580_Nmbsf_MBSUserDataIngestSession.yaml#/components/schemas/MBSUserDataIngStatSubsc'
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '406':
          $ref: 'TS29122_CommonData.yaml#/components/responses/406'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'

    put:
      summary: Request the update of an existing Individual MBS User Data Ingest Session Status
Subscription resource.
      tags:
        - Individual MBS User Data Ingest Session Status Subscription (Document)
      operationId: UpdateIndMBSUserDataIngStatSubsc
      requestBody:
        description: >
          Contains the updated representation of the Individual MBS User Data Ingest Session Status
          Subscription resource.
        required: true
        content:
          application/json:
            schema:
              $ref:
'TS29580_Nmbsf_MBSUserDataIngestSession.yaml#/components/schemas/MBSUserDataIngStatSubsc'
      responses:
        '200':
          description: >
            OK. The concerned Individual MBS User Data Ingest Session Status Subscription resource
```

```
              is successfully updated and a representation of the updated resource is returned in the
              response body.
            content:
              application/json:
                schema:
                  $ref:
'TS29580_Nmbsf_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_Nmbsf_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_Nmbsf_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
    description: |
      API for Media Streaming Event Exposure.
      © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
      All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.522 V18.6.0; 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: 1.0.2
  description: |
    API for MBS Group Message Delivery.
    © 2025, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.522 V18.9.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'

security:
  - {}
  - oAuth2ClientCredentials: []

servers:
  - url: '{apiRoot}/3gpp-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.
            If there are no active MBS Group Message Delivery(ies) is available at the NEF, an empty
            array shall be returned.
          content:
            application/json:
              schema:
                type: array
                items:
                  $ref: '#/components/schemas/MbsGroupMsgDel'
                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 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 Individual MBS Group Message Delivery resource.
      operationId: GetMbsGroupMsgDelivery
      tags:
        - Individual MBS Group Message Delivery (Document)
      responses:
        '200':
          description: >
            OK. The requested Individual MBS Group Message Delivery resource 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 Individual MBS Group Message Delivery
resource.
      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. 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. 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 Individual MBS Group Message Delivery 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
```

```
    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'
        nrRedCapUeInfo:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/NrRedCapUeInfo'
        suppFeat:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      required:
        - extGroupId
        - payload
        - mbsServArea
        - startTime
        - endTime
        - notifUri

    MbsGroupMsgDelPatch:
      description: Represents the requested modifications to an existing MBS Group Message Delivery.
      type: object
      properties:
        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'
        nrRedCapUeInfo:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/NrRedCapUeInfo'

    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-dnai-mapping
  version: 1.0.0
  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 V18.6.0; 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-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:
    parameters:
      - name: afId
        in: path
        description: Represents the identifier of the AF.
        required: true
        schema:
          type: string

    get:
      summary: Read all the active DNAI Mapping Subscriptions managed by the NEF.
      operationId: ReadDNAIMapSubscs
      tags:
        - DNAI Mapping Subscriptions (Collection)
      responses:
        '200':
          description: >
            OK. All the Individual DNAI Mapping Subscription resource(s) managed by the NEF are
            returned.
            If there are no active Individual DNAI Mapping Subscription resources at the NEF, an
            empty array is returned.
          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: Create a new DNAI Mapping Subscription.
      operationId: DNAIMapSubsc
      tags:
        - DNAI Mapping Subscriptions (Collection)
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/DnaiMapSub'
      responses:
        '201':
          description: >
            Created. A representation of the created Individual DNAI Mapping Subscription resource
            is returned in the response body.
          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:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'
      callbacks:
        DNAIMapInfoUpdateNotif:
          '{$request.body#/notifUri}':
            post:
              requestBody:
                required: true
                content:
                  application/json:
                    schema:
                      $ref: '#/components/schemas/DnaiMapUpdateNotif'
              responses:
                '204':
                  description: >
                    No Content. The notification is successfully received and 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}/subscriptions/{subscriptionId}:
    parameters:
      - name: afId
        in: path
        description: Represents the identifier of the AF.
        required: true
        schema:
          type: string
      - name: subscriptionId
        in: path
        description: Represents the identifier of the Individual DNAI Mapping Subscription resource.
        required: true
        schema:
          type: string

    get:
      summary: Retrieve an existing Individual DNAI Mapping Subscription resource.
      operationId: ReadIndDNAIMapSubsc
      tags:
        - Individual DNAI Mapping Subscription (Document)
      responses:
        '200':
          description: >
            OK. The requested Individual DNAI Mapping Subscription resource is successfully returned
            in the response body.
          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: Delete an existing Individual DNAI Mapping Subscription resource.
```

```
      operationId: DeleteIndDNAIMapSubsc
      tags:
        - Individual Dnai Mapping Subscription (Document)
      responses:
        '204':
          description: >
            No Content. The Individual DNAI Mapping 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: {}

  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: >
            Contains the IP address(es) of the EAS(s) in the Local part of the DN or the IP address
            Range(s)(IPv4 subnetwork(s) and/or IPv6 prefix(es)) of the Local part of the DN where the
            EAS(s) is/are deployed.
        fqdns:
          type: array
          items:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/Fqdn'
          minItems: 1
          description: >
            Contains the FQDN(s) of the EAS(s) in the Local part of the DN 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'
        immReports:
          type: array
          items:
            $ref: '#/components/schemas/DnaiMapUpdateNotif'
          minItems: 1
          description: Contains the DNAI EAS mapping information.
        notifUri:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
        notifCorrId:
          type: string
          description: Contains the updated notification correlation identifier.
        suppFeat:
```

```
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
        oneOf:
          - required: [easIpAddrs]
          - required: [fqdns]
        required:
          - notifUri
          - notifCorrId

    DnaiMapUpdateNotif:
      description: Represents a DNAI Mapping Information Update 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).
        mappingId:
          type: string
          description: Identifies the provided mapping information.
        notifCorrId:
          type: string
          description: Contains the notification correlation identifier.
      required:
        - mappingId
        - notifCorrId
```

A.29   PDTQPolicyNegotiation API

```
openapi: 3.0.0

info:
  title: 3gpp-pdtq-policy-negotiation
  version: 1.0.0
  description: |
    API for PDTQ Policy Negotiation.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.522 V18.6.0; 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-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: Represents the identifier of the AF.
        in: path
        required: true
        schema:
          type: string

    get:
      summary: Retrieve all the active PDTQ Policy Subscriptions managed by the NEF.
      operationId: GetPDTQPolicySubscs
      tags:
        - PDTQ Policy Subscriptions (Collection)
      responses:
        '200':
          description: >
```

```
        OK. All the Individual PDTQ Policy Subscription resource(s) managed by the NEF are
        returned.
        If there are no active Individual PDTQ Policy Subscription resources at the NEF, an
        empty array is returned.
      content:
        application/json:
          schema:
            type: array
            items:
              $ref: '#/components/schemas/Pdtq'
            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 PDTQ Policy Subscription.
    operationId: CreatePDTQPolicySubsc
    tags:
      - PDTQ Policy Subscriptions (Collection)
    requestBody:
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/Pdtq'
    responses:
      '201':
        description: >
          Created. A representation of the created Individual PDTQ Policy Subscription resource is
          returned in the response body.
        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#/notifUri}':
            post:
              requestBody:
                required: true
                content:
                  application/json:
                    schema:
                      $ref: '#/components/schemas/PdtqNotification'
              responses:
                '204':
                  description: >
                    No Content. The notification is successfully received and 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}/subscriptions/{subscriptionId}:
    parameters:
      - name: afId
        description: Represents the identifier of the AF.
        in: path
        required: true
        schema:
          type: string
      - name: subscriptionId
        description: >
          Represents the identifier of the Individual PDTQ Policy Subscription resource.
        in: path
        required: true
        schema:
          type: string

    get:
      summary: Retrieve an existing Individual PDTQ Policy Subscription resource at the NEF.
      operationId: GetIndPDTQPolicySubsc
      tags:
        - Individual PDTQ Policy Subscription (Document)
      responses:
        '200':
          description: >
            OK. The requested Individual PDTQ Policy Subscription resource is successfully
            returned in the response body.
          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: Request the modification of an existing Individual PDTQ Policy Subscription resource.
      operationId: ModifyIndPDTQPolicySubsc
      tags:
        - Individual PDTQ Policy Subscription (Document)
      requestBody:
        required: true
        content:
          application/merge-patch+json:
            schema:
              $ref: '#/components/schemas/PdtqPatch'
      responses:
        '200':
          description: >
            OK. The Individual PDTQ Policy Subscription resource is successfully modified and a
            representation of the updated resource is returned in the response body.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/Pdtq'
        '204':
          description: >
            No Content. The Individual PDTQ Policy 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'

    delete:
      summary: Request the deletion of an existing Individual PDTQ Policy Subscription resource.
      operationId: DeleteIndPDTQPolicy
      tags:
        - Individual PDTQ Policy Subscription (Document)
      responses:
        '204':
```

```
          description: >
            No Content. The Individual PDTQ Policy 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: {}

  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 parameters
            sets in a prioritized order.
        altQosRefs:
          type: array
          items:
            type: string
          minItems: 1
          description: >
            Contains the alternative QoS requirements as a list of QoS References in a
            prioritized order.
        appId:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/ApplicationId'
        aspId:
          description: Contains the identifier of the application service provider.
          type: string
        desTimeInts:
          type: array
          items:
            $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
          minItems: 1
          description: Contains the time interval(s).
        locationArea5G:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea5G'
        notifUri:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
        numberOfUEs:
          type: integer
          description: Contains 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: >
                      Contains the requested QoS requirements expressed as a QoS Reference.
                  referenceId:
                    $ref: 'TS29543_Npcf_PDTQPolicyControl.yaml#/components/schemas/PdtqReferenceId'
                  selectedPolicy:
                    type: integer
                    description: >
                      Contains the identifier of the selected PDTQ policy.
                      This attribute shall not be present during resource creation, it may be provided only in
                      a subsequent resource update.
                  warnNotifEnabled:
                    type: boolean
                    description: >
                      Indicates whether the PDTQ warning notification is enabled (true) or not (false).
                      Default value is false when this attribute is omitted.
                  suppFeat:
                    $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
                required:
                  - aspId
                  - desTimeInts
                  - numberOfUEs
                oneOf:
                  - required: [qosReference]
                  - required: [qosParamSet]

        PdtqPatch:
          description: Represents the requested modification to a PDTQ Policy Subscription.
          type: object
          properties:
            selectedPolicy:
              type: integer
              description: Contains the Identifier of the selected PDTQ policy.
            warnNotifEnabled:
              type: boolean
              description: >
                Indicates whether the PDTQ warning notification is enabled (true) or not (false).
            notifUri:
              $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'

        PdtqNotification:
          description: Represents a PDTQ Warning 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: >
                Contains 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
  description: |
    API for Member UE Selection Assistance.
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    All rights reserved.

externalDocs:
  description: >
```

```
    3GPP TS 29.522 V18.6.0; 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 5.2.4 of 3GPP TS 29.122.

security:
  - {}
  - oAuth2ClientCredentials: []

paths:
  /{afId}/subscriptions:
    parameters:
      - name: afId
        in: path
        description: Represents the identifier of the AF
        required: true
        schema:
          type: string

    get:
      summary: Retrieve all the active Member UE Selection Assistance Subscriptions  managed by the
NEF.
      operationId: GetMemberUESelectAssistSubsc
      tags:
        - Member UE Selection Assistance Subscriptions (Collection)
      responses:
        '200':
          description: >
            OK. All the Individual Member UE Selection Assistance Subscription resource(s) managed
            by the NEF are returned.
            If there are no active Individual Member UE Selection Assistance Subscription resources
            at the NEF, an empty array is returned.
          content:
            application/json:
              schema:
                type: array
                items:
                  $ref: '#/components/schemas/MemUeSelectAssistSubsc'
                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 Member UE Selection Assistance Subscription.
      operationId: CreateMemberUESelectAssist
      tags:
        - Member UE Selection Assistance Subscriptions (Collection)
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/MemUeSelectAssistSubsc'
```

ETSI

```
      responses:
        '201':
          description: >
            Created. A representation of the created Individual Member UE Selection Assistance
            Subscription resource is returned in the response body.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/MemUeSelectAssistSubsc'
          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:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'
      callbacks:
        MemberUESelectAssistNotif:
          '{$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. The notification is successfully received and 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}/subscriptions/{subscriptionId}:
    parameters:
      - name: afId
        in: path
        description: Represents the identifier of the AF.
        required: true
        schema:
          type: string
      - name: subscriptionId
        in: path
        description: >
          Represents the identifier of the Individual Member UE Selection Assistance Subscription
          resource.
        required: true
        schema:
          type: string

    get:
      summary: Retrieve an existing Individual Member UE Selection Assistance Subscription resource.
      operationId: GetIndMemberUESelectAssistSubsc
      tags:
        - Individual Member UE Selection Assistance Subscription (Document)
      responses:
        '200':
          description: >
            OK. The requested Individual Member UE Selection Assistance Subscription resource is
            successfully returned in the response body.
          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: Request the update of an existing Individual Member UE Selection Assistance
        Subscription resource.
      operationId: UpdateIndMemberUESelectAssistSubsc
      tags:
        - Individual Member UE Selection Assistance Subscription (Document)
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/MemUeSelectAssistSubsc'
      responses:
        '200':
          description: >
            OK. The Individual Member UE Selection Assistance Subscription resource is successfully
            updated and a representation of the updated resource is returned in the response body.
          content:
            application/json:
```

```
                schema:
                  $ref: '#/components/schemas/MemUeSelectAssistSubsc'
          '204':
            description: >
              No Content. The Individual Member UE Selection Assistance 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 Member UE Selection Assistance
Subscription resource.
      operationId: ModifyIndMemberUESelectAssistSubsc
      tags:
        - Individual Member UE Selection Assistance Subscription (Document)
      requestBody:
        required: true
        content:
          application/merge-patch+json:
            schema:
              $ref: '#/components/schemas/MemUeSelectAssistSubscPatch'
      responses:
        '200':
          description: >
            OK. The Individual Member UE Selection Assistance Subscription resource is successfully
            modified and a representation of the updated resource is returned in the response body.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/MemUeSelectAssistSubsc'
        '204':
          description: >
            No Content. The Individual Member UE Selection Assistance 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: Request the deletion of an existing Individual Member UE Selection Assistance
Subscription resource.
      operationId: DeleteIndMemberUESelectAssistSubsc
      tags:
        - Individual Member UE Selection Assistance Subscription (Document)
      responses:
        '204':
          description: >
            No Content. The Individual Member UE Selection Assistance 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: {}

  schemas:
    MemUeSelectAssistSubsc:
      description: Represents a Member UE Selection Assistance Subscription.
      type: object
      properties:
        afId:
          type: string
          description: Represents the identifier of the AF.
        tgtUeIds:
          type: array
          items:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
          minItems: 1
          description: >
            Contains the list of identifier(s) of the UEs for which Member UE Selection Assistance
            Reporting is requested.
        tgtUeIps:
          type: array
          items:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/IpAddr'
          minItems: 1
          description: >
            Contains 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
          description: Contains the Notification Correlation ID assigned by the AF.
```

```
          expTime:
            $ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'
          qosFilters:
            type: array
            items:
              $ref: '#/components/schemas/QoSFilterCriteria'
            minItems: 1
            description: Contains the QoS filtering criteria for Member UE selection.
          accRatTypeFilters:
            type: array
            items:
              $ref: '#/components/schemas/AccessRatTypeFilterCriteria'
            minItems: 1
            description: >
              Contains the Access types and Rat types filtering criteria for Member UE selection.
          e2eTransTimeFilters:
            type: array
            items:
              $ref: '#/components/schemas/E2ETransTimeFilterCriteria'
            minItems: 1
            description: >
              Contains 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: Contains the UE location filtering criteria for Member UE selection.
          ueHisLocFilters:
            type: array
            items:
              $ref: '#/components/schemas/UeHisLocFilterCriteria'
            minItems: 1
            description: >
              Contains the UE historical location filtering criteria for Member UE selection.
          ueDirFilters:
            type: array
            items:
              $ref: '#/components/schemas/UeDirectionFilterCriteria'
            minItems: 1
            description: Contains the UE direction filtering criteria for Member UE selection.
          ueDistanceFilters:
            type: array
            items:
              $ref: '#/components/schemas/UeDistanceFilterCriteria'
            minItems: 1
            description: Contains the UE distance filtering criteria for Member UE selection.
          serviceExpFilters:
            type: array
            items:
              $ref: '#/components/schemas/ServiceExpFilterCriteria'
            minItems: 1
            description: Contains the Service Experience filtering criteria for Member UE selection.
          dnnFilters:
            type: array
            items:
              $ref: '#/components/schemas/DnnFilterCriteria'
            minItems: 1
            description: Contains 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: Represents the QoS filtering criteria for Member UE selection.
      type: object
      properties:
        event:
          $ref: 'TS29508_Nsmf_EventExposure.yaml#/components/schemas/SmfEvent'
        appId:
          type: string
          description: Contains the identifier(s) of the 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: Represents the 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: >
            Contains 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: Contains the Access Types of the selected UE.
        ratTypes:
          type: array
          items:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/RatType'
          minItems: 1
          description: Contains the RAT Types of the selected UE.

    E2ETransTimeFilterCriteria:
      description: >
        Represents 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: Contains the identifier of the 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
          description: Indicates the geographical distribution of the UEs per location information.
        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: >
        Represents 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: >
        Represents 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: >
        Represents 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: Contains the moving directions of the UEs.

    UeDistanceFilterCriteria:
      description: >
        Represents 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: >
        Represents 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: Contains the Identifier(s) of the 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: Contains the Service Experience Types.

    DnnFilterCriteria:
      description: >
        Represents 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/CandiUeListInfo'
          minItems: 1
          description: >
            Contains the list of candidate UEs information for Member Selection Assistance
            Reporting.
        memUeSelectRpts:
          type: array
          items:
            $ref: '#/components/schemas/MemUeSeletReport'
          minItems: 1
          description: Contains the list of UEs for Member Selection Assistance Reporting.
      required:
        - notifId
        - candiUeInfos

    MemUeSeletReport:
      description: Represents a the Member UE Selection report.
      type: object
      properties:
        criterionType:
          $ref: '#/components/schemas/FilterCriterionType'
        numForCriterion:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
      required:
        - criterionType
        - numForCriterion

    CandiUeListInfo:
      description: Represents the list of candidate UEs information.
      type: object
      properties:
        candUeInfos:
          type: array
          items:
            $ref: '#/components/schemas/CandUeInfo'
          minItems: 1
        remdTimeWin:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
      required:
        - candUeInfos

    CandUeInfo:
      description: Represents the candidate UE information.
      type: object
      properties:
        candUeId:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
        candUeIp:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/IpAddr'
        qosFilter:
          $ref: '#/components/schemas/QoSFilterCriteria'
        accRatTypeFilter:
          $ref: '#/components/schemas/AccessRatTypeFilterCriteria'
        e2eTransTimeFilter:
          $ref: '#/components/schemas/E2ETransTimeFilterCriteria'
        ueLocFilter:
          $ref: '#/components/schemas/UeLocFilterCriteria'
```

```
      ueHisLocFilter:
        $ref: '#/components/schemas/UeHisLocFilterCriteria'
      ueDirFilter:
        $ref: '#/components/schemas/UeDirectionFilterCriteria'
      ueDistanceFilter:
        $ref: '#/components/schemas/UeDistanceFilterCriteria'
      serviceExpFilter:
        $ref: '#/components/schemas/ServiceExpFilterCriteria'
      dnnFilter:
        $ref: '#/components/schemas/DnnFilterCriteria'
    oneOf:
      - required: [candUeId]
      - required: [candUeIp]

  MemUeSelectAssistSubscPatch:
    description: >
      Represents the requested modifications to aMember 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: Contains the updatedQoS filtering criteria for Member UE selection.
      accRatTypeFilters:
        type: array
        items:
          $ref: '#/components/schemas/AccessRatTypeFilterCriteria'
        minItems: 1
        description: >
          Contains the updated Access types and Rat types filtering criteria for Member UE
          selection.
      e2eTransTimeFilters:
        type: array
        items:
          $ref: '#/components/schemas/E2ETransTimeFilterCriteria'
        minItems: 1
        description: >
          Contains the updated End-to-end data volume transfer time filtering criteria for
          Member UE selection.
      ueLocFilters:
        type: array
        items:
          $ref: '#/components/schemas/UeLocFilterCriteria'
        minItems: 1
        description: >
          Contains the updated UE location filtering criteria for Member UE selection.
      ueHisLocFilters:
        type: array
        items:
          $ref: '#/components/schemas/UeHisLocFilterCriteria'
        minItems: 1
        description: >
          Contains the updated UE historical location filtering criteria for Member UE
          selection.
      ueDirFilters:
        type: array
        items:
          $ref: '#/components/schemas/UeDirectionFilterCriteria'
        minItems: 1
        description: >
          Contains the updated UE direction filtering criteria for Member UE selection.
      ueDistanceFilters:
        type: array
        items:
          $ref: '#/components/schemas/UeDistanceFilterCriteria'
        minItems: 1
        description: >
          Contains the updated UE distance filtering criteria for Member UE selection.
      serviceExpFilters:
        type: array
```

```
        items:
          $ref: '#/components/schemas/ServiceExpFilterCriteria'
        minItems: 1
        description: >
          Contains the updated Service Experience filtering criteria for Member UE selection.
      dnnFilters:
        type: array
        items:
          $ref: '#/components/schemas/DnnFilterCriteria'
        minItems: 1
        description: >
          Contains the updated DNN filtering criteria for Member UE selection.
      memUpdatePeriod:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSecRm'
      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 that the type of filter criterion is Access and Rat types
          criterion.
        - E2E_DATA_VOLUME_TRANSFER_TIME: Indicates that the type of filter criterion is End-to-end
          data volume transfer time criterion.
        - UE_LOCATION: Indicates that the type of filter criterion is UE location criterion.
        - UE_HISTORICAL_LOCATION: Indicates that the type of filter criterion is UE historical
          location criterion.
        - UE_DIRECTION: Indicates that the type of filter criterion is UE direction criterion.
        - UE_DISTANCE: Indicates that the type of filter criterion is UE distance criterion.
        - SERVICE_EXPERIENCE: Indicates that the type of filter criterion is Service Experience
          criterion.
        - DNN: Indicates that the type of filter criterion is DNN criterion.
```

A.31 GroupParametersProvisioning API

```
openapi: 3.0.0

info:
  title: 3gpp-grp-pp
  version: 1.0.0
  description: |
    API for Group Parameters Provisioning.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.522 V18.6.0; 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 5.2.4 of 3GPP TS 29.122.

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 Individual Group Parameters Provisioning resources managed by the NEF are
            returned.
            If there are no existing Individual Group Parameters Provisioning resources managed at
            the NEF, an empty array is 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. A representation of the created Individual Group Parameters Provisioning
            resource is returned in the response body.
          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
```

```yaml
            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 modifications to an existing Group Parameters Provisioning data.
      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: 3gpp-slice-pp
  version: 1.0.0
  description: |
    API for Network Slice Parameters Provisioning.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.522 V18.6.0; 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-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 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: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '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 Slice Parameters Provisioning.
        tags:
          - Slice Parameters Provisionings (Collection)
        operationId: CreateSliceParamProvisioning
        requestBody:
          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 Parameters Provisioning (Document)
      responses:
        '200':
          description: >
            OK. The requested "Individual Slice Parameters Provisioning" resource is successfully
            returned in the response body.
          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.
      operationId: UpdateIndSliceParamProvisioning
      tags:
        - Individual Slice Parameters Provisioning (Document)
      requestBody:
        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.
      operationId: ModifyIndSliceParamProvisioning
      tags:
        - Individual Slice Parameters Provisioning (Document)
      requestBody:
        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.
      operationId: DeleteIndSliceParamProvisioning
      tags:
        - Individual Slice Parameters Provisioning (Document)
      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:
```

ETSI

```
      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 (that is provided within the snssai
            attribute of the corresponding map value encoded via the SliceUsageControlInfo data
            structure) to which the Network Slice Usage Control information is related.
        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 Network Slice Usage Control information to be provisioned.
            The key of the map shall be the AF dedicated S-NSSAI (that is provided within the snssai
            attribute of the corresponding map value encoded via the SliceUsageControlInfo data
            structure) to which the Network Slice Usage Control information is related.


#
# SIMPLE DATA TYPES
#

#
# ENUMERATIONS
#
```

A.33   UEAddress API

```
openapi: 3.0.0

info:
  title: 3gpp-ue-address
  version: 1.0.0
  description: |
    API for UE Address service.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: 3GPP TS 29.522 V18.6.0; 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-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: Request to retrieve UE Address information.
      operationId: RetrieveUEAddress
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/UeAddressReq'
      responses:
        '200':
          description: >
            OK. The UE Address information request is successfully processed, and UE address
            information is returned in the response body.
          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 information.
      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: 1.0.1
  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 V18.7.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'

security:
  - {}
  - oAuth2ClientCredentials: []

servers:
  - url: '{apiRoot}/3gpp-ecs-address/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in clause 5.2.4 of 3GPP TS 29.122.

paths:
  /{afId}/configurations:
    parameters:
      - name: afId
        in: path
        description: Represents the identifier of the AF.
        required: true
        schema:
          type: string

    get:
      summary: Retrieve all the active ECS Address Configuration Information Set(s).
      operationId: ReadEACIs
      tags:
        - ECS Address Configuration Information Sets (Collection)
      responses:
        '200':
          description: >
            OK. All the Individual ECS Address Configuration Information Set resource(s) managed by
            the NEF are returned.
            If there are no active Individual ECS Address Configuration Information Set resources at
            the NEF, an empty array is returned.
          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 ECS Address Configuration Information Set.
      operationId: CreateEACI
      tags:
        - ECS Address Configuration Information Sets (Collection)
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/EcsAddrInfo'
      responses:
        '201':
          description: >
            Created. A representation of the created Individual ECS Address Configuration
            Information Set resource is returned in the response body.
          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}/configurations/{configId}:
    parameters:
      - name: afId
        in: path
        description: Represents the identifier of the AF.
        required: true
        schema:
          type: string
      - name: configId
        in: path
```

```
         description: >
          Represents the identifier of the Individual ECS Address Configuration Information Set
          resource.
         required: true
         schema:
          type: string

  get:
    summary: Retrieve an existing Individual ECS Address Configuration Information Set resource.
    operationId: ReadEACI
    tags:
      - Individual ECS Address Configuration Information Set (Document)
    responses:
      '200':
       description: >
         OK. The requested Individual ECS Address Configuration Information Set resource is
         successfully returned in the response body.
       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: Update an existing Individual ECS Address Configuration Information Set resource.
    operationId: UpdateEACI
    tags:
      - Individual ECS Address Configuration Information Set (Document)
    requestBody:
     required: true
     content:
       application/json:
         schema:
           $ref: '#/components/schemas/EcsAddrInfo'
    responses:
      '200':
       description: >
         OK. The Individual ECS Address Configuration Information Set resource is successfully
         updated and a representation of the updated resource is returned in the response
         body.
       content:
         application/json:
           schema:
             $ref: '#/components/schemas/EcsAddrInfo'
      '204':
       description: >
         No Content. The Individual ECS Address Configuration Information Set 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 ECS Address Configuration
Information Set resource.
      operationId: ModifyEACI
      tags:
        - Individual Individual ECS Address Configuration Set (Document)
      requestBody:
        required: true
        content:
          application/merge-patch+json:
            schema:
              $ref: '#/components/schemas/EcsAddrInfoPatch'
      responses:
        '200':
          description: >
            OK. The Individual ECS Address Configuration Information Set resource is successfully
            modified and a representation of the updated resource is returned in the response body.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/EcsAddrInfo'
        '204':
          description: >
            No Content. The Individual ECS Address Configuration Information Set 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: Delete an existing Individual ECS Address Configuration Information Set resource
      operationId: DeleteEACI
      tags:
        - Individual ECS Address Configuration Information Set (Document)
      responses:
        '204':
          description: >
```

```
          No Content. The Individual ECS Address Configuration Information Set 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'

  /remove-ecsaddr:
    post:
      summary: Remove ECS Address Configuration information based on given criteria.
      operationId: DeleteEACIs
      tags:
       - ECS Address Configuration Information Deletion Request
      requestBody:
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/EcsAddrDeleteCriteria'
        required: true
      responses:
        '204':
         description: >
            No Content. The request to remove ECS Address Configuration Information based on given
            criteria is successfully received and processed.
        '307':
         $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
         $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
         $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
         $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
         $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
         $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '411':
         $ref: 'TS29122_CommonData.yaml#/components/responses/411'
        '413':
         $ref: 'TS29122_CommonData.yaml#/components/responses/413'
        '415':
         $ref: 'TS29122_CommonData.yaml#/components/responses/415'
        '429':
         $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '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 an ECS Address Configuration Information Set.
        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'
          dnn:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
          snssai:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
          ecsAuthMethods:
            type: array
            items:
              $ref: 'TS29503_Nudm_PP.yaml#/components/schemas/EcsAuthMethod'
            minItems: 1
          supportedPlmns:
            type: array
            items:
              $ref: 'TS29503_Nudm_PP.yaml#/components/schemas/SupportedPlmn'
            minItems: 1
          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:
            type: string
          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'
        suppFeat:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      anyOf:
        - required: [afIds]
        - required: [dnn]
        - required: [snssai]
        - required: [ecsAddrInfo]

    EcsAddrInfoPatch:
      description: >
        Represents the requested modifications to an ECS Address Configuration Information Set.
      type: object
      properties:
        ecsServerAddr:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/EcsServerAddr'
        ecsAuthMethods:
          type: array
          items:
            $ref: 'TS29503_Nudm_PP.yaml#/components/schemas/EcsAuthMethod'
          minItems: 1
        supportedPlmns:
          type: array
          items:
            $ref: 'TS29503_Nudm_PP.yaml#/components/schemas/SupportedPlmn'
          minItems: 1
        spatialValidityCond:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SpatialValidityCond'

#
# SIMPLE DATA TYPES
#

#
```

```
# ENUMERATIONS
#
```

A.35 RSLPPIParametersProvisioning API

```
openapi: 3.0.0

info:
  title: 3gpp-rslppi-pp
  version: 1.0.0
  description: |
    API for RSLPPI Parameters Provisioning.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.522 V18.6.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'

servers:
  - url: '{apiRoot}/3gpp-rslppi-pp/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in clause 5.2.4 of 3GPP TS 29.122.

security:
  - {}
  - oAuth2ClientCredentials: []

paths:
  /pp:
    get:
      summary: Request to retrieve all the active RSLPPI Parameters Provisioning resources at the
NEF.
      operationId: GetRslppiParamsProvisionings
      tags:
        - RSLPPI Parameters Provisionings (Collection)
      responses:
        '200':
          description: >
            OK. All the Individual RSLPPI Parameters Provisioning resources managed by the NEF are
            returned.
            If there are no existing Individual RSLPPI Parameters Provisioning resources managed at
            the NEF, an empty array is returned.
          content:
            application/json:
              schema:
                type: array
                items:
                  $ref: '#/components/schemas/RslppiPpData'
                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 RSLPPI Parameters Provisioning.
      tags:
        - RSLPPI Parameters Provisioning (Collection)
      operationId: CreateRslppiParamsProvisioning
      requestBody:
        description: >
          Representation of the new RSLPPI Parameters Provisioning to be created at the NEF.
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/RslppiPpData'
      responses:
        '201':
          description: >
            Created. A representation of the created Individual RSLPPI Parameters Provisioning
            resource is returned in the response body.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/RslppiPpData'
          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'

  /pp/{ppId}:
    parameters:
      - name: ppId
        in: path
        description: >
          Represents the identifier of the Individual RSLPPI Parameters Provisioning resource.
        required: true
        schema:
          type: string

    get:
      summary: Request to retrieve an existing Individual RSLPPI Parameters Provisioning resource.
      operationId: GetIndRslppiParamsProvisioning
      tags:
        - Individual RSLPPI Parameters Provisioning (Document)
      responses:
        '200':
          description: >
            OK. Successful retrieval of the requested Individual RSLPPI Parameters Provisioning.
            resource.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/RslppiPpData'
```

```
          '307':
            $ref: 'TS29122_CommonData.yaml#/components/responses/307'
          '308':
            $ref: 'TS29122_CommonData.yaml#/components/responses/308'
          '400':
            $ref: 'TS29122_CommonData.yaml#/components/responses/400'
          '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 RSLPPI Parameters Provisioning resource.
      tags:
        - Individual RSLPPI Parameters Provisioning (Document)
      operationId: UpdateIndRslppiParamsProvisioning
      requestBody:
        description: >
          Represents the updated Individual RSLPPI Parameters Provisioning resource representation.
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/RslppiPpData'
      responses:
        '200':
          description: >
            OK. The Individual RSLPPI 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/RslppiPpData'
        '204':
          description: >
            No Content. The Individual RSLPPI 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 RSLPPI Parameters Provisioning
resource.
      tags:
       - Individual RSLPPI Parameters Provisioning (Document)
      operationId: ModifyIndRslppiParamsProvisioning
      requestBody:
       description: >
         Contains the parameters to request the modification of the Individual RSLPPI Parameters
         Provisioning resource.
       required: true
       content:
         application/merge-patch+json:
           schema:
             $ref: '#/components/schemas/RslppiPpDataPatch'
      responses:
       '200':
        description: >
          OK. The Individual RSLPPI 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/RslppiPpData'
       '204':
        description: >
          No Content. The Individual RSLPPI 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 RSLPPI Parameters Provisioning
resource.
      tags:
       - Individual RSLPPI Parameters Provisioning (Document)
      operationId: DeleteIndRslppiParamsProvisioning
      responses:
       '204':
        description: >
          No Content. The Individual RSLPPI 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
#
    RslppiPpData:
      description: Represents the RSLPPI Parameters Provisioning data.
      type: object
      properties:
        afId:
          type: string
        rslppiData:
          $ref: '#/components/schemas/RslppiData'
        suppFeat:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      required:
        - afId

    RslppiPpDataPatch:
      description: >
        Represents the requested modifications to an existing RSLPPI Parameters Provisioning data.
      type: object
      properties:
        rslppiData:
          $ref: '#/components/schemas/RslppiData'

    RslppiData:
      description: Represents RSLPPI Parameters data.
      type: object
      properties:
        extGroupId:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/ExternalGroupId'
        gpsi:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
        rslppi:
          $ref: 'TS29503_Nudm_SDM.yaml#/components/schemas/Rslppi'
      required:
        - rslppi
      oneOf:
        - required: [ extGroupId ]
        - required: [ gpsi ]

#
# SIMPLE DATA TYPES
#


#
# ENUMERATIONS
#
```

Annex B (informative): Change history

Change history							
Date	**Meeting**	**TDoc**	**CR**	**Rev**	**Cat**	**Subject/Comment**	**New version**
2018-03	CT3#95					TS Skeleton	0.0.0
2018-03	CT3#95					Inclusion of C3-181332 and TS skeleton of Network Exposure Function Northbound APIs in C3-181362.	0.1.0
2018-04	CT3#96					Inclusion of C3-182407, C3-182408, C3-182504, C3-182418, C3-182505, C3-182443, C3-182421, C3-182422, C3-182501 and editorial changes from Rapporteur.	0.2.0
2018-05	CT3#97					Inclusion of C3-183187, C3-183773, C3-183774, C3-183553, C3-183826, C3-183329, C3-183776, C3-183827, C3-183778, C3-183605 and editorial changes from Rapporteur.	0.3.0
2018-06	CT#80					TS sent to plenary for approval	1.0.0
2018-06	CT#80					TS approved by plenary	15.0.0
2018-09	CT#81	CP-182015	0001	1	F	DNAI change notification type	15.1.0
2018-09	CT#81	CP-182015	0002	-	F	Corrections on NEF Northbound interface	15.1.0
2018-09	CT#81	CP-182015	0003	1	F	TrafficInfluence API OpenAPI schema	15.1.0
2018-09	CT#81	CP-182015	0004	4	F	AF influence traffic routing cleanup	15.1.0
2018-09	CT#81	CP-182031	0005	1	F	Definition of Changing the Chargeable Party procedures and API	15.1.0
2018-09	CT#81	CP-182031	0006	1	F	Definition of setting up an AS session with required QoS procedure and API	15.1.0
2018-09	CT#81	CP-182015	0007	2	F	Resource structure update	15.1.0
2018-09	CT#81	CP-182015	0008	-	F	Procedures for monitoring – Reference	15.1.0
2018-09	CT#81	CP-182015	0009	-	F	Ethernet packet filter for AF traffic influence API	15.1.0
2018-09	CT#81	CP-182015	0010	3	F	Removable attribute definition for AF traffic influence	15.1.0
2018-09	CT#81	CP-182015	0011	-	F	Supported feature for AF traffic influence	15.1.0
2018-09	CT#81	CP-182015	0012	-	F	Version numbering change	15.1.0
2018-09	CT#81	CP-182015	0013	-	F	Removal of externaldocs field	15.1.0
2018-09	CT#81	CP-182035	0014	1	F	PFD Management Service Operation	15.1.0
2018-12	CT#82	CP-183205	0015	2	F	ExternalDocs field	15.2.0
2018-12	CT#82	CP-183205	0016	3	F	Support of 5G location requirement	15.2.0
2018-12	CT#82	CP-183205	0017	3	F	Error status codes for HTTP responses	15.2.0
2018-12	CT#82	CP-183205	0019	-	F	Default value for apiRoot	15.2.0
2018-12	CT#82	CP-183205	0021	4	F	Correct traffic route and Ethernet flow data type	15.2.0
2018-12	CT#82	CP-183205	0022	1	F	Event correction for AF influence traffic routing	15.2.0
2018-12	CT#82	CP-183205	0023	2	F	Correction to the AF influence on traffic steering control	15.2.0
2018-12	CT#82	CP-183205	0024	1	F	Supporting Ethernet UE in Chargeable Party and AF session with QoS	15.2.0
2018-12	CT#82	CP-183205	0025	1	F	Add AF application ID for traffic influence	15.2.0
2018-12	CT#82	CP-183205	0026	1	F	Add BSF interaction for Chargeable Party and Required QoS	15.2.0
2018-12	CT#82	CP-183109	0027	2	F	Security adaptation for Nnef northbound APIs with CAPIF	15.2.0
2018-12	CT#82	CP-183205	0028	2	F	Security field	15.2.0
2018-12	CT#82	CP-183205	0029	1	F	Corrections on subscribed event	15.2.0
2018-12	CT#82	CP-183205	0030	1	F	Status code update for TrafficInfluence API	15.2.0
2018-12	CT#82	CP-183205	0031	3	F	UE information during notification	15.2.0
2018-12	CT#82	CP-183205	0032	-	F	Location header	15.2.0
2018-12	CT#82	CP-183205	0033	1	F	API Version Update	15.2.0
2018-12	CT#82	CP-183205	0034	1	F	Support of 5G SUPI-PEI association	15.2.0
2018-12	CT#82	CP-183205	0035	1	F	Default value for appReloInd and minItem for tempValidities	15.2.0
2019-03	CT#83	CP-190116	0037	2	F	Event notification	15.3.0
2019-03	CT#83	CP-190116	0038	1	F	Correction on MacAddr48 and RouteToLocation data type reference in the OpenAPI file	15.3.0
2019-03	CT#83	CP-190116	0040	1	F	Correction on 5G feature	15.3.0
2019-03	CT#83	CP-190116	0041	-	F	Open API version number update	15.3.0
2019-06	CT#84	CP-191080	0042	4	F	Resource structure and AF Identifier	15.4.0
2019-06	CT#84	CP-191080	0048	2	F	UDM interaction for AF influence traffic	15.4.0
2019-06	CT#84	CP-191080	0049	2	F	Correct condition for DNAI in UP path change	15.4.0
2019-06	CT#84	CP-191080	0053	1	F	Precedence of OpenAPI file	15.4.0
2019-06	CT#84	CP-191080	0059	1	F	Copyright Note in YAML file	15.4.0
2019-06	CT#84	CP-191080	0060	2	F	API version Update	15.4.0
2019-06	CT#84	CP-191070	0043	2	F	Nnef_MSISDN-less_MO_SMS service	16.0.0
2019-06	CT#84	CP-191070	0044	2	B	Application function notification of downlink data delivery status	16.0.0
2019-06	CT#84	CP-191070	0045	2	B	Availability after DDN failure notification for multiple Afs	16.0.0
2019-06	CT#84	CP-191090	0047	1	F	Support of external group Id	16.0.0
2019-06	CT#84	CP-191070	0050	2	B	Network parameter provisioning support	16.0.0
2019-06	CT#84	CP-191070	0051	3	F	NIDD configuration and delivery in 5G	16.0.0

2019-06	CT#84	CP-191229	0054	5	B	AF acknowledgement to be expected	16.0.0
2019-06	CT#84	CP-191071	0055	2	B	UE IP address preservation indication	16.0.0
2019-06	CT#84	CP-191104	0056	1	B	PFD management notification	16.0.0
2019-06	CT#84	CP-191100	0057	1	B	NEF stored exposure data	16.0.0
2019-06	CT#84	CP-191105	0058	1	B	BDT Warning Notification Support	16.0.0
2019-06	CT#84	CP-191101	0061	1	F	API version update	16.0.0
2019-09	CT#85	CP-192137	0063	1	F	Resolving EN in NIDD	16.1.0
2019-09	CT#85	CP-192156	0064	1	B	Support a set of MAC addresses in traffic filter	16.1.0
2019-09	CT#85	CP-192165	0066	1	B	Support parameter provisioning in RACS	16.1.0
2019-09	CT#85	CP-192157	0067	2	B	Accurate UE moving trajectory definition	16.1.0
2019-09	CT#85	CP-192157	0069	2	B	Procedures for Nnef_AnalyticsExposure Service	16.1.0
2019-09	CT#85	CP-192157	0070	2	B	API definition for Nnef_AnalyticsExposure Service	16.1.0
2019-09	CT#85	CP-192170	0071	1	B	Procedures for 5G LAN type sevice over northbound interface	16.1.0
2019-09	CT#85	CP-192170	0072	2	B	API definition for 5G LAN type sevice over northbound interface	16.1.0
2019-09	CT#85	CP-192169	0073	3	B	PFD management partial failure	16.1.0
2019-09	CT#85	CP-192157	0074	1	B	Cancel the BDT warning notification	16.1.0
2019-09	CT#85	CP-192219	0075	2	B	Notification of downlink data delivery status	16.1.0
2019-09	CT#85	CP-192179	0076	2	B	Applying BDT policy	16.1.0
2019-09	CT#85	CP-192152	0077	2	B	API definition for Nnef_IPTVconfiguration service	16.1.0
2019-09	CT#85	CP-192137	0079	-	B	Nnef_ECRestriction service	16.1.0
2019-09	CT#85	CP-192137	0080	-	B	Differences betwwen EPC and 5GC	16.1.0
2019-09	CT#85	CP-192158	0081	1	F	Service consumer description Corrections	16.1.0
2019-09	CT#85	CP-192138	0082	2	B	AF acknowledgement of UP path event notification	16.1.0
2019-09	CT#85	CP-192138	0083	-	B	Successul AF acknowledgement without N6 traffic routing information	16.1.0
2019-09	CT#85	CP-192173	0084	-	F	OpenAPI version update TS 29.522 R-16	16.1.0
2019-09	CT#85	CP-192251	0085	1	B	Procedures for Nnef_IPTVconfiguration service	16.1.0
2019-12	CT#86	CP-193179	0086	1	B	Nnef_APISupportCapability Service	16.2.0
2019-12	CT#86	CP-193181	0087	-	B	OpenAPI file update to support AF acknowledgement	16.2.0
2019-12	CT#86	CP-193179	0088	1	B	Scheduled communication type	16.2.0
2019-12	CT#86	CP-193181	0089	1	B	Open issue for AddrPreservation feature	16.2.0
2019-12	CT#86	CP-193222	0090	1	B	Partial update for 5GLANParameterProvision API	16.2.0
2019-12	CT#86	CP-193222	0091	2	B	OpenAPI file for 5GLANParameterProvision API	16.2.0
2019-12	CT#86	CP-193191	0092	3	F	Clarify multicast access control	16.2.0
2019-12	CT#86	CP-193222	0093	1	F	Clarify the procedure for 5GLAN parameter provisioning	16.2.0
2019-12	CT#86	CP-193223	0094	-	F	Correct resource URI for xBDT	16.2.0
2019-12	CT#86	CP-193220	0096	4	B	PFD partial failure notification	16.2.0
2019-12	CT#86	CP-193223	0097	1	F	Correction to HTTP methods used to update BDT policy	16.2.0
2019-12	CT#86	CP-193191	0099	1	B	Partial update of IPTVConfiguration API	16.2.0
2019-12	CT#86	CP-193191	0100	2	B	OpenAPI file of IPTVConfiguration API	16.2.0
2019-12	CT#86	CP-193198	0101	3	B	AnalyticsEventNotif and AnalyticsExposureSubsc Data Types	16.2.0
2019-12	CT#86	CP-193198	0102	-	B	Open issue for AnalyticsEvent data type	16.2.0
2019-12	CT#86	CP-193198	0103	1	B	Partial update of Nnef_AnalyticsExposure API	16.2.0
2019-12	CT#86	CP-193198	0104	2	B	Nnef_AnalyticsExposure_fetch service operation	16.2.0
2019-12	CT#86	CP-193181	0105	-	F	Correct the condition for AF relocation acknowledgement	16.2.0
2019-12	CT#86	CP-193199	0106	-	F	UI structure for N33 APIs	16.2.0
2019-12	CT#86	CP-193198	0107	-	B	OpenAPI file for AnalyticsExposure API	16.2.0
2019-12	CT#86	CP-193222	0108	1	D	Corrections on 5GLANParameterProvision API	16.2.0
2019-12	CT#86	CP-193181	0109	-	F	Definition of AfResultInfo in OpenAPI	16.2.0
2019-12	CT#86	CP-193212	0110	1	F	Update of API version and TS version in OpenAPI file	16.2.0
2019-12	CT#86	CP-193188	0112	1	A	make the storage of traffic influence request in the UDR mandatory	16.2.0
2019-12	CT#86	CP-193223	0113	1	F	misssing required in ApplyingBdtPolicy API file	16.2.0
2019-12	CT#86	CP-193188	0115	-	A	Correct cardinality in traffic influence	16.2.0
2019-12	CT#86	CP-193198	0116	1	F	openAPI correction for ExNotification	16.2.0
2020-03	CT#87-e	CP-200207	0118	-	B	DNN Clarification	16.3.0
2020-03	CT#87-e	CP-200198	0119	1	B	Update of the Availability after DDN Failure event	16.3.0
2020-03	CT#87-e	CP-200198	0120	1	B	Update of the DDD status event	16.3.0
2020-03	CT#87-e	CP-200212	0122	1	B	Procedure of Nnef_ServiceParameter service	16.3.0
2020-03	CT#87-e	CP-200212	0123	1	B	Resources and data types of Nnef_ServiceParameter service	16.3.0
2020-03	CT#87-e	CP-200266	0124	3	B	OpenAPI file of Nnef_ServiceParameter service	16.3.0
2020-03	CT#87-e	CP-200202	0125	1	B	QoS Monitoring Report	16.3.0
2020-03	CT#87-e	CP-200218	0126	1	B	Indication of traffic correlation	16.3.0
2020-03	CT#87-e	CP-200203	0127	1	B	Clarification of IPTV configuration	16.3.0
2020-03	CT#87-e	CP-200198	0128	-	F	Correct TS number for NEF southbound NIDD service	16.3.0
2020-03	CT#87-e	CP-200198	0129	-	B	Support PDU session status	16.3.0
2020-03	CT#87-e	CP-200137	0130	2	F	Correct UE mobility and communication	16.3.0
2020-03	CT#87-e	CP-200208	0131	1	B	Support network performance analytics	16.3.0
2020-03	CT#87-e	CP-200208	0132	1	B	Support BDT policy candidates in notification	16.3.0
2020-03	CT#87-e	CP-200212	0133	1	B	Add alternative QoS requirements	16.3.0
2020-03	CT#87-e	CP-200142	0134	2	B	Support QoS sustainability analytics	16.3.0
2020-03	CT#87-e	CP-200218	0135	-	F	Definition of 5GLanParametersProvision	16.3.0

2020-03	CT#87-e	CP-200203	0136	-	F	Definition of IptvConfigData	16.3.0
2020-03	CT#87-e	CP-200219	0137	-	F	Usage of the "bdtRefId" property	16.3.0
2020-03	CT#87-e	CP-200215	0138	-	F	Miscellaneous errors	16.3.0
2020-03	CT#87-e	CP-200199	0140	3	B	UE Location Privacy Setting in NEF	16.3.0
2020-03	CT#87-e	CP-200237	0142	2	B	AnalyticsExposure API, Analytics Event Filter associated with all events	16.3.0
2020-03	CT#87-e	CP-200208	0143	1	B	AnalyticsExposure API, support of abnormal behaviour	16.3.0
2020-03	CT#87-e	CP-200208	0144	1	B	AnalyticsExposure API, support of data congestion	16.3.0
2020-03	CT#87-e	CP-200216	0145	-	F	29.522 Rel-16 Update of OpenAPI version and TS version in externalDocs field	16.3.0
2020-03	CT#87-e	CP-200259	0146	-	F	LpiParameterProvision API update for LPI parameters provisioning	16.3.0
2020-06	CT#88-e	CP-201243	0148	1	F	Missing mapping in the overview	16.4.0
2020-06	CT#88-e	CP-201238	0149	2	F	Wrong datatypes Datatime and Plmn	16.4.0
2020-06	CT#88-e	CP-201234	0150	-	F	Wrong datatype referred in analytics exposure procedure	16.4.0
2020-06	CT#88-e	CP-201228	0151	1	B	Procedure of ACS Information Configuration	16.4.0
2020-06	CT#88-e	CP-201228	0152	1	B	Resources and data types of Nnef_ACSParameterProvision service	16.4.0
2020-06	CT#88-e	CP-201339	0153	4	B	OpenAPI file of Nnef_ACSParameterProvision service	16.4.0
2020-06	CT#88-e	CP-201235	0159	1	F	Loss of connectivity reason	16.4.0
2020-06	CT#88-e	CP-201235	0161	1	F	Any UE clarification	16.4.0
2020-06	CT#88-e	CP-201252	0162	1	F	Correction to 5GLANParameterProvision API	16.4.0
2020-06	CT#88-e	CP-201228	0163	1	F	Correction to IPTVConfiguration API	16.4.0
2020-06	CT#88-e	CP-201253	0164	1	F	Correction to ApplyingBdtPolicy API	16.4.0
2020-06	CT#88-e	CP-201252	0165	1	F	Open issue for 5GLanParametersProvisionPatch	16.4.0
2020-06	CT#88-e	CP-201195	0167	6	B	Supporting the Location Services in NEF in TS 29.522	16.4.0
2020-06	CT#88-e	CP-201235	0169	1	A	Periodic reporting by Nnef	16.4.0
2020-06	CT#88-e	CP-201252	0170	3	F	Clarify nullable attributes used in PATCH	16.4.0
2020-06	CT#88-e	CP-201244	0171	1	F	Storage of YAML files in ETSI Forge	16.4.0
2020-06	CT#88-e	CP-201178	0172	2	F	Confidence of analytics results for Nnef_AnalyticsExposure service	16.4.0
2020-06	CT#88-e	CP-201238	0173	-	B	Complete ServiceParameter API	16.4.0
2020-06	CT#88-e	CP-201276	0174	1	F	Traffic descriptor for xBDT	16.4.0
2020-06	CT#88-e	CP-201213	0175	1	F	Corrections related to URLLC	16.4.0
2020-06	CT#88-e	CP-201228	0177	-	F	Clarify unmodifiable attribute in PUT	16.4.0
2020-06	CT#88-e	CP-201234	0178	1	F	Optional target UE	16.4.0
2020-06	CT#88-e	CP-201246	0179	1	F	Move 5G specific procedure to TS 29.522	16.4.0
2020-06	CT#88-e	CP-201210	0180	1	F	Interaction with UDM for Enhanced Coverage Restriction Control	16.4.0
2020-06	CT#88-e	CP-201210	0181	1	B	Support of Enhanced Coverage Mode control	16.4.0
2020-06	CT#88-e	CP-201234	0182	-	F	Support of immediate reporting for Nnef_AnalyticsExposure service	16.4.0
2020-06	CT#88-e	CP-201246	0183	1	F	Corrections to apiVersion	16.4.0
2020-06	CT#88-e	CP-201246	0184	1	F	Corrections to error status code	16.4.0
2020-06	CT#88-e	CP-201274	0185	1	B	AF provides AAA server address	16.4.0
2020-06	CT#88-e	CP-201246	0186	1	F	Updates to IP address	16.4.0
2020-06	CT#88-e	CP-201234	0187	2	F	Update to reporting information	16.4.0
2020-06	CT#88-e	CP-201234	0188	1	F	Ratio of analytics results for Nnef_AnalyticsExposure service	16.4.0
2020-06	CT#88-e	CP-201234	0189	-	F	Supported features definition for Nnef_AnalyticsExposure service	16.4.0
2020-06	CT#88-e	CP-201234	0190	1	F	Corrections on target UE information for Nnef_AnalyticsExposure service	16.4.0
2020-06	CT#88-e	CP-201246	0191	1	F	Corrections on tags field for NEF Northbound APIs	16.4.0
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2023-09	CT#101	CP-232081	0981	1	B	Movement Behaviour analytics for AnalyticsExposure API	18.3.0
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2023-09	CT#101	CP-232090	0987	1	F	Correction to typos in Group Parameters Provisionings	18.3.0
2023-09	CT#101	CP-232256	0988	3	B	Data model for timing synchronization status and reporting	18.3.0
2023-09	CT#101	CP-232091	0990	-	F	Addition of the missing clauses for the concerned APIs	18.3.0
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2023-09	CT#101	CP-232093	1002	1	B	Network Slice Usage Control parameter provisioning resources and data model	18.3.0
2023-09	CT#101	CP-232113	1003	1	B	Network slice admission control notification update for UE with atleast one PDU session/PDN connection.	18.3.0

2023-09	CT#101	CP-232091	1004	1	F	Update the missing ProblemDetails and SupportedFeatures in the re-used data types in the data model.	18.3.0
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2023-09	CT#101	CP-232104	1007	-	F	EN resolution for A2xParamsPc5 data type	18.3.0
2023-09	CT#101	CP-232091	1008	2	F	Corrections in ServiceParameter API	18.3.0
2023-09	CT#101	CP-232102	1009	1	D	Correction on SFC abbreviation	18.3.0
2023-09	CT#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	CT#101	CP-232081	1013	1	B	Support of spatial granularity size and temporal granularity size of the analytics report	18.3.0
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2023-09	CT#101	CP-232123	1020	-	A	Incorrect description of anyUeInd attribute	18.3.0
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2023-09	CT#101	CP-232090	1026	-	F	Clarifying the boolean values meaning for the 5G VN group communication indication	18.3.0
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2023-09	CT#101	CP-232119	1030	1	B	Correction and completion to ServiceParameterData	18.3.0
2023-09	CT#101	CP-232084	1032	1	B	Subscription to Data Rate monitoring	18.3.0
2023-09	CT#101	CP-232158	1033	1	B	Support of the congestion information measurement and reporting	18.3.0
2023-09	CT#101	CP-232158	1034	1	B	Support of the Packet Delay Variation monitoring	18.3.0
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2023-09	CT#101	CP-232177	1037	3	B	Location exposure for Ranging_SL	18.3.0
2023-09	CT#101	CP-232158	1038	1	B	Support of the End of Data Burst Indication	18.3.0
2023-09	CT#101	CP-232085	1040	-	F	Update of info and externalDocs fields	18.3.0
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2023-12	CT#102	CP-233240	1123	2	B	Nnef_ECSAddress API resources and data model	18.4.0
2023-12	CT#102	CP-233239	1124	1	B	Nnef_ECSAddress API OpenAPI	18.4.0
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2024-06	CT#104	CP-241102	1247	3	F	Clean up of subscription control and ASTI status monitoring	18.6.0
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2024-06	CT#104	CP-241091	1257	1	F	Various corrections to the definition of the MemberUESelectionAssistance API	18.6.0
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2024-09	CT#105	CP-242126	1349	1	F	Corrections on ECSAddress API	18.7.0
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