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Foreword

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1 Scope

The present specification provides the stage 3 definition of the Policy Authorization Service of the 5G System.

The 5G System Architecture is defined in 3GPP TS 23.501 [2]. The stage 2 definition and related procedures for the Npcf Policy Authorization Service are specified in 3GPP TS 23.502 [3] and 3GPP TS 23.503 [4].

The 5G System stage 3 call flows are provided in 3GPP TS 29.513 [7].

The Technical Realization of the Service Based Architecture and the Principles and Guidelines for Services Definition are specified in 3GPP TS 29.500 [5] and 3GPP TS 29.501 [6].

The Policy Authorization Service is provided by the Policy Control Function (PCF). This service creates policies as requested by the authorised AF for the PDU Session to which the AF session is bound.

2 References

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- [39] 3GPP TS 23.380: "IMS Restoration Procedures".
- [40] 3GPP TS 23.167: "IP Multimedia Subsystem (IMS) emergency sessions".
- [41] 3GPP TS 24.379: "Mission Critical Push To Talk (MCPTT) call control; Protocol specification".
- [42] IETF RFC 8101: "IANA Registration of New Session Initiation Protocol (SIP), Resource-Priority Namespace for Mission Critical Push To Talk Service".
- [43] 3GPP TS 24.281: "Mission Critical Video (MCVideo) signalling control; Protocol specification".
- [44] 3GPP TS 23.316: "Wireless and wireline convergence access support for the 5G System (5GS)".
- [45] 3GPP TS 22.179: "Mission Critical Push to Talk (MCPTT) over LTE; Stage 1".
- [46] 3GPP TS 22.280: "Mission Critical (MC) services common requirements".
- [47] 3GPP TS 22.281: "Mission Critical (MC) video over LTE".

- [48] 3GPP TS 22.282: "Mission Critical (MC) data over LTE".
- [49] 3GPP TS 24.501: "Non-Access-Stratum (NAS) protocol for 5G System (5GS); Stage 3".
- [50] IETF RFC 4574: "The Session Description Protocol (SDP) Label Attribute".
- [51] 3GPP TS 26.238: "Uplink Streaming".
- [52] IETF RFC 6733: "Diameter Base Protocol".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

Application Function (AF): Element offering application(s) that use PDU session resources.

AF application session context: Application level session context established by an application level signalling protocol offered by the AF that requires a session context set-up with explicit session context description before the use of the service.

MCS session: A session for which priority treatment is applied for allocating and maintaining radio and network resources to support the Mission Critical Service (MCS). MCS is defined in 3GPP TS 22.179 [45], 3GPP TS 22.280 [46], 3GPP TS 22.281 [47], and 3GPP TS 22.282 [48].

MPS session: A session for which priority treatment is applied for allocating and maintaining radio and network resources to support the Multimedia Priority Service (MPS). MPS is defined in 3GPP TS 22.153 [23].

PCC rule: Set of information enabling the detection of a service data flow and providing parameters for policy control and/or charging control.

Service information: Set of information conveyed from the AF/NEF to the PCF by the Npcf_PolicyAuthorization service to be used as a basis for PCC decisions at the PCF, including information about the AF/NEF application session context (e.g. application identifier, type of media, bandwidth, IP address and port number).

Service data flow: An aggregate set of packet flows.

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].

5G-RG	5G Residential Gateway
AF	Application Function
ARP	Allocation and Retention Priority
ATSSS	Access Traffic Steering, Switching and Splitting
BBF	Broadband Forum
BMIC	Bridge Management Information Container
BSSID	Basic Service Set Identifier
CHEM	Coverage and Handoff Enhancements using Multimedia error robustness feature
CHF	Charging Function
DEI	Drop Eligible Indicator
DNAI	DN Access Identifier
DNN	Data Network Name
DS-TT	Device-side TSN translator
E-UTRA	Evolved Universal Terrestrial Radio Access

FLUS	Framework for Live Uplink Streaming
FN-RG	Fixed Network Residential Gateway
GPSI	Generic Public Subscription Identifier
HFC	Hybrid Fiber-Coaxial
H-PCF	PCF in the HPLMN
IMS	IP-Multimedia Subsystem
JSON	JavaScript Object Notation
MA	Multi-Access
MCPTT	Mission Critical Push to Talk Service
MCVideo	Mission Critical Video
MPS	Multimedia Priority Service
NEF	Network Exposure Function
NID	Network Identifier
NR	New Radio
NRF	Network Repository Function
NWDAF	Network Data Analytics Function
NW-TT	Network-side TSN translator
PCC	Policy and Charging Control
PCF	Policy Control Function
PCP	Priority Code Point
P-CSCF	Proxy Call Session Control Function
PEI	Permanent Equipment Identifier
PMIC	Port Management Information Container
PRA	Presence Reporting Area
QoS	Quality of Service
RFSP	RAT Frequency Selection Priority
RTCP	Real Time Control Protocol
RTP	Real Time Protocol
SDF	Service Data Flow
SDP	Session Description Protocol
SIP	Session Initiation Protocol
SMF	Session Management Function
S-NSSAI	Single Network Slice Selection Assistance Information
SNPN	Stand-alone Non-Public Network
SSID	Service Set Identifier
SUPI	Subscription Permanent Identifier
TNAP	Trusted Non-3GPP Access Point
TSC	Time Sensitive Communication
TSCAI	Time Sensitive Communication Assistance Information
TSN	Time Sensitive Networking
UDR	Unified Data Repository
UPF	User Plane Function
URSP	UE Route Selection Policy
VID	VLAN Identifier
VLAN	Virtual Local Area Network
V-PCF	PCF in the VPLMN
W-5GAN	Wireline 5G Access Network
W-5GBAN	Wireline 5G BBF Access Network
W-5GCAN	Wireline 5G Cable Access Network
W-AGF	Wireline Access Gateway Function

4 Npcf_PolicyAuthorization Service

4.1 Service Description

4.1.1 Overview

The Npcf_PolicyAuthorization Service, as defined in 3GPP TS 23.502 [3] and in 3GPP TS 23.503 [4], is provided by the Policy Control Function (PCF).

The Npcf_PolicyAuthorization service authorises an AF request and creates policies as requested by the authorised NF service consumer for the PDU session to which the AF session is bound to. This service allows the NF service consumer to subscribe/unsubscribe to the notification of events (e.g. access type change, PLMN change, usage report, access network information report).

4.1.2 Service Architecture

The 5G System Architecture is defined in 3GPP TS 23.501 [2]. The Policy and Charging control related 5G architecture is also described in 3GPP TS 23.503 [4] and 3GPP TS 29.513 [7].

The only known NF service consumers of the Npcf_PolicyAuthorization service are the Application Function (AF) and the Network Exposure Function (NEF).

The Npcf_PolicyAuthorization service is provided by the PCF and consumed by the AF and the NEF, as shown in figure 4.1.2-1 for the SBI representation model and in figure 4.1.2-2 for the reference point representation model.

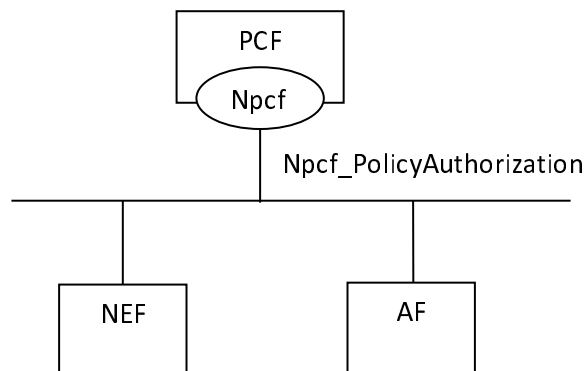


Figure 4.1.2-1: Npcf_PolicyAuthorization service Architecture, SBI representation

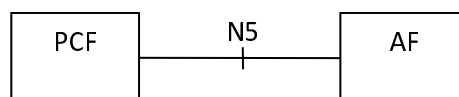


Figure 4.1.2-2: Npcf_PolicyAuthorization service Architecture, reference point representation

The NEF can act as an AF using N5 reference point.

4.1.3 Network Functions

4.1.3.1 Policy Control Function (PCF)

The PCF (Policy Control Function) is a functional element that encompasses:

- policy control decision and flow based charging control functionalities;
- access and mobility policy decisions for the control of e.g. the UE Service Area Restrictions and RAT/RFSP control; and
- UE Policy for the Access network discovery and selection policy and UE Route Selection Policy (URSP).

The policy control decision and flow based charging control functionalities enable the PCF to provide network control regarding the service data flow detection, gating, QoS and flow based charging (except credit management) towards the SMF/UPF.

The PCF receives session and media related information from the Npcf_PolicyAuthorization service consumers and notifies them of subscribed traffic plane events.

The PCF may receive from the NF service consumers the request to monitor the requested service and media information and notifies them of the UL/DL/round-trip delay of the requested flows.

The PCF may receive service routing requirements and the indication of receiving notifications about user plane path changes from the Npcf_PolicyAuthorization service consumers.

The PCF may receive from the NF service consumers the specific required QoS and a prioritized list of alternative QoS profiles and notifies them about the QoS target the access network guarantees.

The PCF checks that the service information provided by the NF service consumer is consistent with the operator defined policy rules before storing the service information.

The PCF uses the received service information and the subscription information when it applies as basis for the policy and charging control decisions.

The PCF derives PCC rules and provisions them to the SMF via the Npcf_SMPolicyControl service and subscribes to traffic plane events via policy control request triggers as described in 3GPP TS 29.512 [8].

In 5GS interworking with TSN networks, the PCF:

- notifies the TSN AF service consumer about the TSN bridge, NW-TT port and DS-TT port information corresponding to a PDU session;
- enables the TSN AF configures the TSN bridge and TSN ports by forwarding TSN bridge management containers and TSN port management containers to the SMF as described in 3GPP TS 29.512 [8];
- notifies the TSN AF about updated TSN bridge configuration and TSN port configuration by forwarding TSN bridge management containers and TSN port management containers received from the SMF; and
- uses the received QoS and TSC assistance information to derive the policy information delivered in the PCC rule to the SMF as described in 3GPP TS 29.512 [8].

4.1.3.2 NF Service Consumers

The known NF service consumers are the AF and the NEF, as defined in 3GPP TS 23.502 [3].

The AF is an element offering control to applications that require the policy and charging control of traffic plane resources; specific user plane paths for the requested traffic, the monitoring of the required service QoS, and/or specific QoS and alternative QoS profiles. The AF uses the Npcf_PolicyAuthorization service to provide service information to the PCF.

In 5GS interworking with TSN networks, the TSN AF is an element offering to TSN control functions an interface to 5GS to forward TSN bridge and TSN port management configuration, and to set the QoS policy required to forward the TSN traffic making use of the 5GS traffic plane resources.

The AFs can be deployed by the same operator offering the access services or can be provided by external third-party service provider. If the AF is not allowed by the operator to access directly the PCF, the AF uses the external exposure framework via NEF to interact with the PCF, as described in subclause 5.20 of 3GPP TS 23.501 [2].

The Network Exposure Function (NEF) supports external exposure of capabilities of network functions.

4.2 Service Operations

4.2.1 Introduction

Service operations defined for the Npcf_PolicyAuthorization Service are shown in table 4.2.1-1.

Table 4.2.1-1: Npcf_PolicyAuthorization Service Operations

Service Operation Name	Description	Initiated by
Npcf_PolicyAuthorization_Create	Determines and installs the policy according to the service information provided by an authorized NF service consumer.	AF, NEF
Npcf_PolicyAuthorization_Update	Determines and updates the policy according to the modified service information provided by an authorized NF service consumer.	AF, NEF
Npcf_PolicyAuthorization_Delete	Provides means to delete the application session context of the NF service consumer.	AF, NEF
Npcf_PolicyAuthorization_Notify	Notifies NF service consumer of the subscribed events.	PCF
Npcf_PolicyAuthorization_Subscribe	Allows NF service consumers to subscribe to the notification of events.	AF, NEF
Npcf_PolicyAuthorization_Unsubscribe	Allows NF service consumers to unsubscribe to the notification of events.	AF, NEF

NOTE: The NEF and the AF use the Npcf_PolicyAuthorization service in the same way. To improve the readability of the service procedures, only the AF is mentioned in the following subclauses.

4.2.2 Npcf_PolicyAuthorization_Create service operation

4.2.2.1 General

The Npcf_PolicyAuthorization_Create service operation authorizes the request from the NF service consumer, and optionally communicates with Npcf_SMPolicyControl service to determine and install the policy according to the information provided by the NF service consumer.

The Npcf_PolicyAuthorization_Create service operation creates an application session context in the PCF.

The following procedures using the Npcf_PolicyAuthorization_Create service operation are supported:

- Initial provisioning of service information.
- Gate control.
- Initial Background Data Transfer policy indication.
- Initial provisioning of sponsored connectivity information.
- Subscription to Service Data Flow QoS notification control.
- Subscription to Service Data Flow Deactivation.
- Initial provisioning of traffic routing information.
- Subscription to resources allocation outcome.
- Invocation of Multimedia Priority Services.
- Support of content versioning.
- Request of access network information.
- Initial provisioning of service information status.
- Provisioning of signalling flow information.
- Support of resource sharing.
- Indication of Emergency traffic.
- Invocation of MCPTT.

- Invocation of MCVideo.
- Priority sharing indication.
- Subscription to out of credit notification.
- Subscription to Service Data Flow QoS Monitoring information.
- Provisioning of TSCAI input information and TSC QoS related data.
- Provisioning of bridge management information and port management information.
- P-CSCF restoration enhancements.
- Support of CHEM feature.
- Support of FLUS feature.
- Subscription to EPS Fallback report.
- Subscription to TSN related events.
- Initial provisioning of required QoS information.
- Support of QoSHint feature.
- Subscription to reallocation of credit notification.

4.2.2.2 Initial provisioning of service information

This procedure is used to set up an AF application session context for the service as defined in 3GPP TS 23.501 [2], 3GPP TS 23.502 [3] and 3GPP TS 23.503 [4].

Figure 4.2.2.2-1 illustrates the initial provisioning of service information.

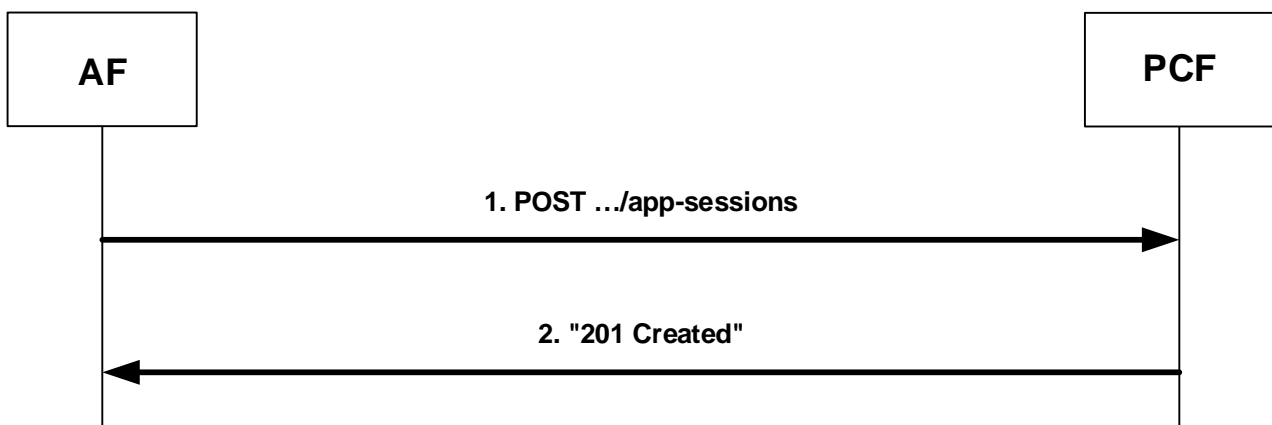


Figure 4.2.2.2-1: Initial provisioning of service information

When a new AF application session context is being established and media information for this application session context is available at the AF and the related media requires PCC control, the AF shall invoke the `Npcf_PolicyAuthorization_Create` service operation by sending the HTTP POST request to the resource URI representing the "Application Sessions" collection resource of the PCF, as shown in figure 4.2.2.2-1, step 1.

The AF shall include in the "AppSessionContext" data type in the payload body of the HTTP POST request a partial representation of the "Individual Application Session Context" resource by providing the "AppSessionContextReqData" data type. The "Individual Application Session Context" resource and the "Events Subscription" sub-resource are created as described below.

The AF shall provide in the body of the HTTP POST request:

- for IP type PDU sessions, the IP address (IPv4 or IPv6) of the UE in the "ueIpv4" or "ueIpv6" attribute; and

- for Ethernet type PDU sessions, the MAC address of the UE in the "ueMac" attribute.
- if the "TimeSensitiveNetworking" feature is supported, the "ueMac" attribute containing the MAC address of the DS-TT port as received from the PCF during the reporting of bridge information as defined in subclause 4.2.5.16.

NOTE: The determination of the DS-TT MAC address is specified in subclause 5.28.2 of 3GPP TS 23.501 [2].

The AF shall provide the corresponding service information in the "medComponents" attribute if available. The AF shall indicate to the PCF as part of the "medComponents" attribute whether the service data flow(s) (IP or Ethernet) should be enabled or disabled with the "fStatus" attribute.

If the "AuthorizationWithRequiredQoS" feature as defined in subclause 5.8 is supported, the AF may provide within the MediaComponent data structure required QoS information as specified in subclause 4.2.2.32.

The AF may include the AF application identifier in the "afAppId" attribute into the body of the HTTP POST request in order to indicate the particular service that the AF session belongs to.

The AF application identifier may be provided at both "AppSessionContextReqData" data type level, and "MediaComponent" data type level. When provided at both levels, the AF application identifier provided at "MediaComponent" data type level shall have precedence.

The AF application identifier at the "AppSessionContextReqData" data type level may be used to trigger the PCF to indicate to the SMF/UPF to perform the application detection based on the operator's policy as defined in 3GPP TS 29.512 [8].

If the "IMS_SBI" feature is supported, the AF may include the AF charging identifier in the "afChargId" attribute for charging correlation purposes.

If the "TimeSensitiveNetworking" feature is supported the AF may provide TSN information as specified in subclauses 4.2.2.24 and 4.2.2.25.

The AF may also include the "evSubsc" attribute of "EventsSubscReqData" data type to request the notification of certain user plane events. The AF shall include the events to subscribe to in the "events" attribute, and the notification URI where to address the Npcf_PolicyAuthorization_Notify service operation in the "notifUri" attribute. The events subscription is provisioned in the "Events Subscription" sub-resource.

The AF shall also include the "notifUri" attribute in the "AppSessionContextReqData" data type to indicate the URI where the PCF can request to the AF the deletion of the "Individual Application Session Context" resource.

If the PCF cannot successfully fulfil the received HTTP POST request due to the internal PCF error or due to the error in the HTTP POST request, the PCF shall send the HTTP error response as specified in subclause 5.7.

Otherwise, when the PCF receives the HTTP POST request from the AF, the PCF shall apply session binding as described in 3GPP TS 29.513 [7]. To allow the PCF to identify the PDU session for which the HTTP POST request applies, the AF shall provide in the body of the HTTP POST request:

- for IP type PDU session, either the "ueIpv4" attribute or "ueIpv6" attribute containing the IPv4 or the IPv6 address applicable to an IP flow or IP flows towards the UE; and
- for Ethernet type PDU session, the "ueMac" attribute containing the UE MAC address applicable to an Ethernet flow or Ethernet flows towards the UE.

The AF may provide DNN in the "dnn" attribute, SUPI in the "supi" attribute, GPSI in the "gpsi" attribute, the S-NSSAI in the "sliceInfo" attribute if available for session binding. The AF may also provide the domain identity in the "ipDomain" attribute.

NOTE 1: The "ipDomain" attribute is helpful in the following scenario: Within a network slice instance, there are several separate IP address domains, with SMF/UPF(s) that allocate IPv4 IP addresses out of the same private address range to UE PDU Sessions. The same IP address can thus be allocated to UE PDU sessions served by SMF/UPF(s) in different address domains. If one PCF controls several SMF/UPF(s) in different IP address domains, the UE IP address is thus not sufficient for the session binding. An AF can serve UEs in different IP address domains, either by having direct IP interfaces to those domains, or by having interconnections via NATs in the user plane between the UPF and the AF. If a NAT is used, the AF obtains the IP address allocated to the UE PDU session via application level signalling and supplies it for the session binding to the PCF in the "ueIpv4" attribute. The AF supplies an "ipDomain" attribute denoting the IP address domain behind the NAT in addition. The AF can derive the appropriate value from the source address (allocated by the NAT) of incoming user plane packets. The value provided in the "ipDomain" attribute is operator configurable.

NOTE 2: The "sliceInfo" attribute is helpful in the scenario where multiple network slice instances are deployed in the same DNN, and the same IPv4 address may be allocated to UE PDU sessions in different network slice instances. If one PCF controls several network slices, the UE IP address is not sufficient for the session binding. The AF supplies "sliceInfo" attribute denoting the network slice instance that allocated the IPv4 address of the UE PDU session. How the AF derives S-NSSAI is out of the scope of this specification.

NOTE 3: When the scenario described in NOTE 1 applies and the AF is a P-CSCF it is assumed that the P-CSCF has direct IP interfaces to the different IP address domains and that no NAT is located between the UPF and P-CSCF. How a non-IMS AF obtains the UE private IP address to be provided to the PCF is out of scope of the present release; it is unspecified how to support applications that use a protocol that does not retain the original UE's private IP address.

If the PCF fails in executing session binding, the PCF shall reject the Npcf_PolicyAuthorization_Create service operation with an HTTP "500 Internal Server Error" response including the "cause" attribute set to "PDU_SESSION_NOT_AVAILABLE".

If the request contains the "medComponents" attribute the PCF shall store the received service information. The PCF shall process the received service information according to the operator policy and may decide whether the request is accepted or not. The PCF may take the priority information within the "resPrio" attribute into account when making this decision.

If the service information provided in the body of the HTTP POST request is rejected (e.g. the subscribed guaranteed bandwidth for a particular user is exceeded), the PCF shall indicate in an HTTP "403 Forbidden" response message the cause for the rejection including the "cause" attribute set to "REQUESTED_SERVICE_NOT_AUTHORIZED".

If the service information provided in the HTTP POST request is rejected due to a temporary condition in the network (e.g. the NWDAF reported the network slice selected for the PDU session is congested), the PCF may include in the "403 Forbidden" response the "cause" attribute set to "REQUESTED_SERVICE_TEMPORARILY_NOT_AUTHORIZED". The PCF may also provide a retry interval within the "Retry-After" HTTP header field. When the AF receives the retry interval within the "Retry-After" HTTP header field, the AF shall not send the same service information to the PCF again (for the same application session context) until the retry interval has elapsed. The "Retry-After" HTTP header is described in 3GPP TS 29.500 [5] subclause 5.2.2.2.

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

To allow the PCF and SMF/UPF to perform PCC rule authorization and QoS flow binding for the described service data flows, the AF shall supply:

- for IP type PDU session, both source and destination IP addresses and port numbers in the "fDescs" attribute within the "medSubComps" attribute, if such information is available; and
- for Ethernet type PDU session, the Ethernet Packet filters in the "ethfDescs" attribute within the "medSubComps" attribute, if such information is available.

The AF may specify the ToS traffic class within the "tosTrCl" attribute for the described service data flows together with the "fDescs" attribute.

The AF may include the "resPrio" attribute at the "AppSessionContextReqData" data type level to assign a priority to the AF Session as well as include the "resPrio" attribute at the "MediaComponent" data type level to assign a priority to the service data flow. The presence of the "resPrio" attribute in both levels does not constitute a conflict as they each represent different types of priority. The reservation priority at the "AppSessionContextReqData" data type level provides the relative priority for an AF session while the reservation priority at the "MediaComponent" data type level provides the relative priority for a service data flow within a session. If the "resPrio" attribute is not specified, the requested priority is PRIO_1.

The PCF shall check whether the received service information requires PCC rules to be created and provisioned as specified in 3GPP TS 29.513 [7]. Provisioning of PCC rules to the SMF shall be carried out as specified at 3GPP TS 29.512 [8].

Based on the received subscription information from the AF, the PCF may create a subscription to event notifications for a related PDU session from the SMF, as described in 3GPP TS 29.512 [8].

If the PCF created an "Individual Application Session Context" resource, the PCF shall send to the AF a "201 Created" response to the HTTP POST request, as shown in figure 4.2.2.2-1, step 2. The PCF shall include in the "201 Created" response:

- a Location header field; and
- an "AppSessionContext" data type in the payload body.

The Location header field shall contain the URI of the created individual application session context resource i.e. "{apiRoot}/npcf-policyauthorization/v1/app-sessions/{appSessionId}".

When "Events Subscription" sub-resource is created in this procedure, the AF shall build the sub-resource URI by adding the path segment "/events-subscription" at the end of the URI path received in the Location header field.

The "AppSessionContext" data type payload body shall contain the representation of the created "Individual Application Session Context" resource and may include the "Events Subscription" sub-resource.

The PCF shall include in the "evsNotif" attribute:

- if the AF subscribed to the event "PLMN_CHG" in the HTTP POST request, the "event" attribute set to "PLMN_CHG" and the "plmnId" attribute including the PLMN identifier and, if available, the NID if the PCF has previously requested to be updated with this information in the SMF;
- if the AF subscribed to the event "ACCESS_TYPE_CHG" in the HTTP POST request, the "event" attribute set to "ACCESS_TYPE_CHG" and:
 - i. the "accessType" attribute including the access type, and the "ratType" attribute including the RAT type when applicable for the notified access type; and
 - ii. if the "ATSSS" feature is supported, the "addAccessInfo" attribute with the additional access type information if available, where the access type is encoded in the "accessType" attribute, and the RAT type is encoded in the "ratType" attribute when applicable for the notified access type; and

NOTE 4: For a MA PDU session, if the "ATSSS" feature is not supported by the AF the PCF includes the "accessType" attribute and the "ratType" attribute with a currently active combination of access type and RAT type (if applicable for the notified access type). When both 3GPP and non-3GPP accesses are available, the PCF includes the information corresponding to the 3GPP access.

iii. the "anGwAddr" attribute including access network gateway address when available,

if the PCF has previously requested to be updated with this information in the SMF; and

- if the "IMS_SBI" feature is supported and if the AF subscribed to the "CHARGING_CORRELATION" event in the HTTP POST request, the "event" attribute set to "CHARGING_CORRELATION" and may include the "anChargIds" attribute containing the access network charging identifier(s) and the "anChargAddr" attribute containing the access network charging address.

The AF subscription to other specific events using the Npcf_PolicyAuthorization_Create request is described in the related subclauses. Notification of events when the applicable information is not available in the PCF when receiving the Npcf_PolicyAuthorization_Create request is described in subclause 4.2.5.

The acknowledgement towards the AF should take place before or in parallel with any required PCC rule provisioning towards the SMF.

NOTE 5: The behaviour when the AF does not receive the HTTP response message, or when it arrives after the internal timer waiting for it has expired, or when it arrives with an indication different than a success indication, are outside the scope of this specification and based on operator policy.

4.2.2.3 Gate control

This procedure is used by an AF to instruct the PCF about when the service data flow(s) are to be enabled or disabled for a PDU session.

The AF shall include in the HTTP POST request message described in subclause 4.2.2.2 the "fStatus" attribute for the flows to be enabled or disabled within the "medComponents" or "medSubComponents" attributes.

If a "medSubComponents" attribute contains a "flowUsage" attribute with the value "RTCP", then the IP Flows described by that media subcomponent shall be enabled in both directions irrespective of the value of the "fStatus" attribute of the corresponding media component.

As result of this action, the PCF shall set the appropriate gate status for the corresponding active PCC rule(s).

The PCF shall reply to the AF as described in subclause 4.2.2.2.

4.2.2.4 Initial Background Data Transfer policy indication

This procedure is used by an AF to indicate a transfer policy negotiated for background data transfer using the Npcf_BDTPolicyControl service as described in 3GPP TS 29.554 [14].

The AF may include in the HTTP POST request message described in subclause 4.2.2.2 a reference identifier related to a transfer policy negotiated for background data transfer in the "bdtRefId" attribute.

NOTE 1: The PCF will retrieve the corresponding transfer policy from the UDR based on the reference identifier within the "bdtRefId" attribute. In case only one PCF is deployed in the network, transfer policies can be locally stored in the PCF and the interaction with the UDR is not required.

If the PCF cannot retrieve the transfer policy, the PCF shall set to TP_NOT_KNOWN the "servAuthInfo" attribute in the HTTP response message to the AF to indicate that the transfer policy is unknown.

If the time window of the received transfer policy has expired, the PCF shall set to TP_EXPIRED the "servAuthInfo" attribute in the HTTP response message to indicate to the AF that the transfer policy has expired. Otherwise, if the time window of the received transfer policy has not yet occurred, the PCF shall set to TP_NOT_YET_OCCURRED the "servAuthInfo" attribute in the HTTP response message to the AF to indicate that the time window of the transfer policy has not yet occurred.

NOTE 2: In the case that the PCF cannot retrieve the transfer policy, the transfer policy time window has not yet occurred or the transfer policy expired, the PCF makes the decision without considering the transfer policy.

The PCF shall reply to the AF as described in subclause 4.2.2.2.

4.2.2.5 Initial provisioning of sponsored connectivity information

This procedure is used by an AF to indicate sponsored data connectivity when "SponsoredConnectivity" feature is supported.

The AF shall provide in the "AppSessionContext" data type of the HTTP POST request message described in subclause 4.2.2.2 an application service provider identity and a sponsor identity within the "aspId" attribute and "sponId" attribute within the "ascReqData" attribute. Additionally, the AF may provide an indication to the PCF of sponsored data connectivity not enabled by including the "sponStatus" attribute set to "SPONSOR_DISABLED".

To support the usage monitoring of sponsored data connectivity, the AF may subscribe with the PCF to the notification of usage threshold reached. The AF shall include:

- an entry of the "AfEventSubscription" data type in the "events" attribute with the "event" attribute set to "USAGE_REPORT"; and
- the "usgThres" attribute of "UsageThreshold" data type in the "EventsSubscReqData" data type with:
 - a) the total volume in the "totalVolume" attribute; or
 - b) the uplink volume only in the "uplinkVolume" attribute; or
 - c) the downlink volume only in the "downlinkVolume"; and/or
 - d) the time in the "duration" attribute.

NOTE 1: If the AF is in the user plane, the AF can handle the usage monitoring and therefore it is not required to provide a usage threshold to the PCF as part of the sponsored connectivity functionality.

When the AF indicated to enable sponsored data connectivity, and the UE is roaming in a VPLMN, the following procedures apply:

- If the AF is located in the HPLMN, for home routed roaming case and when the operator policies do not allow accessing the sponsored data connectivity with this roaming case, the H-PCF shall reject the service request and shall include in the HTTP "403 Forbidden" response message the "cause" attribute set to "UNAUTHORIZED_SPONSORED_DATA_CONNECTIVITY".
- If the AF is located in the VPLMN, the V-PCF shall reject the service request and shall include in the HTTP "403 Forbidden" response message the "cause" attribute set to "UNAUTHORIZED_SPONSORED_DATA_CONNECTIVITY".

When the AF indicated to enable sponsored data connectivity, and the UE is non-roaming or roaming with the home routed case and the operator policies allow accessing the sponsored data connectivity with this roaming case, the following procedures apply:

- If the SMF does not support sponsored connectivity and the required reporting level for that service indicates a sponsored connectivity level according to 3GPP TS 29.512 [8], then the PCF shall reject the request and shall include in the HTTP "403 Forbidden" response message the "cause" attribute set to "REQUESTED_SERVICE_NOT_AUTHORIZED".
- If the SMF supports sponsored data connectivity feature or the required reporting level is different from sponsored connectivity level as described in 3GPP TS 29.512 [8], then the PCF, based on operator policies, shall check whether it is required to validate the sponsored connectivity data. If it is required, it shall perform the authorizations based on sponsored data connectivity profiles. If the authorization fails, the PCF shall include in the HTTP "403 Forbidden" response message the "cause" attribute set to "UNAUTHORIZED_SPONSORED_DATA_CONNECTIVITY".

NOTE 2: The PCF is not required to verify that a trust relationship exists between the operator and the sponsors.

The PCF shall reply to the AF as described in subclause 4.2.2.2.

4.2.2.6 Subscriptions to Service Data Flow QoS notification control

The subscription to Service Data Flow QoS notification control is used by an AF to subscribe to receive a notification when the GBR QoS targets for one or more service data flows can no longer (or can again) be guaranteed.

NOTE: It may happen that the GBR QoS targets for one or more PCC rules (i.e. Service Data Flows) cannot be guaranteed, either permanently or temporarily in the radio access network.

The AF shall use the "EventsSubscReqData" data type as described in subclause 4.2.2.2 and shall include in the HTTP POST request message an event within the "events" attribute with the "event" attribute set to "QOS_NOTIF".

The PCF shall reply to the AF as described in subclause 4.2.2.2.

As result of this action, the PCF shall set the appropriate subscription to QoS notification control for the corresponding PCC rule(s) as described in in 3GPP TS 29.512 [8].

4.2.2.7 Subscription to Service Data Flow Deactivation

This procedure is used by an AF to subscribe to the notification of deactivation of one or more Service Data Flows within the AF application session context.

NOTE: It may happen that one or more PCC rules (i.e. Service Data Flows) are deactivated at the SMF at certain time, either permanently or temporarily, due to e.g. release of resources or out of credit condition.

The AF shall use the "EventsSubscReqData" data type as described in subclause 4.2.2.2 and shall include in the HTTP POST request message an event within the "events" attribute with the "event" attribute set to "FAILED_RESOURCES_ALLOCATION".

The PCF shall reply to the AF as described in subclause 4.2.2.2.

As result of this action, the PCF shall set the appropriate subscription to service data flow deactivation for the corresponding PCC rule(s) as described in in 3GPP TS 29.512 [8].

4.2.2.8 Initial provisioning of traffic routing information

This procedure is used by an AF to:

- influence SMF traffic routing decisions to a local access to a Data Network identified by a DNAI; and/or
- request subscriptions to notifications about UP path management events related to the PDU session,

when "InfluenceOnTrafficRouting" feature is supported.

NOTE 1: The AF uses the Npcf_PolicyAuthorization service for requests targeting specific on-going PDU sessions of individual UE(s). The AF requests that target existing or future PDU Sessions of multiple UE(s) or any UE are sent via the NEF and may target multiple PCF(s), as described in 3GPP TS 29.513 [7].

The AF shall include in the HTTP POST request message described in subclause 4.2.2.2 the "afRoutReq" attribute of "AfRoutingRequirement" data type with specific routing requirements for the application traffic flows either within "AppSessionContextReqData" data type for the service indicated in the "afAppId" attribute, or within the "medComponents" attribute. When provided at both levels, the "afRoutReq" attribute value in the "medComponents" attribute shall have precedence over the "afRoutReq" attribute included in the "AppSessionContextReqData" data type.

The AF may include traffic routing requirements together with service information.

The AF may request to influence SMF traffic routing decisions to a DNAI. The AF shall include in the "afRoutReq" attribute:

- a) A list of routes to locations of applications in the "routeToLocs" attribute. Each element of the list shall contain:
 - a DNAI in the "dnai" attribute to indicate the location of the application towards which the traffic routing is applied; and
 - either a routing profile identifier in the "routeProfId" attribute, or the explicit routing information in the "routeInfo" attribute.

The AF may include in the "afRoutReq" attribute:

- a) Indication of application relocation possibility in the "appReloc" attribute.
- b) Temporal validity during which the AF request is valid shall be indicated with the "startTime" and "stopTime" attributes.
- c) Spatial validity during which the AF request is valid shall be indicated in terms of validity areas encoded in the "spVal" attribute of "SpatialValidity" data type. The "SpatialValidity" data type consists of a list of presence areas included in the "presenceInfoList" attribute, where each element shall include the presence reporting area identifier in the "praId" attribute and may include the elements composing a presence area encoded in the attributes: "trackingAreaList", "ecgList", "ncgList", "globalRanNodeIdList".
- d) Indication of UE IP address preservation in the "addrPreserInd" attribute if the URLLC feature is supported.

The AF may also subscribe to notifications about UP path management events. The AF shall include in the "upPathChgSub" attribute:

- notifications of early and/or late DNAI change, using the attribute "dnaiChgType" indicating whether the subscription is for "EARLY", "LATE" or "EARLY_LATE";
- the notification URI where the AF is receiving the Nsmf_EventExposure_Notify service operation in the "notificationUri" attribute; and
- the notification correlation identifier assigned by the AF in the "notifCorrelId" attribute.

If the URLLC feature is supported, the AF may include an indication of AF acknowledgement to be expected as an "afAckInd" attribute within the "upPathChgSub" attribute.

The PCF shall reply to the AF as described in subclause 4.2.2.2.

The PCF shall store the routing requirements included in the "afRoutReq" attribute.

The PCF shall check whether the received routing requirements requires PCC rules to be created or provisioned to include or modify traffic steering policies, the AF transaction identifier and the application relocation possibility as specified in 3GPP TS 29.513 [7]. Provisioning of PCC rules to the SMF shall be carried out as specified in 3GPP TS 29.512 [8].

NOTE 2: The AF receives the notification about UP path management events by the Nsmf_EventExposure_Notify service operation as defined in subclause 4.2.2.2 of 3GPP TS 29.508 [13].

4.2.2.9 Void

4.2.2.10 Subscription to resources allocation outcome

This procedure is used by an AF to subscribe to notifications when the resources associated to the corresponding service information have been allocated and/or cannot be allocated.

The AF shall use the "EventsSubscReqData" data type as described in subclause 4.2.2.2 and shall include in the HTTP POST request message:

- if the AF requests the PCF to provide a notification when the resources associated to the service information have been allocated, an event entry within the "events" attribute with the "event" attribute set to "SUCCESSFUL_RESOURCES_ALLOCATION"; and/or
- if the AF requests the PCF to provide a notification when the resources associated to the service information cannot be allocated, an event entry within the "events" attribute with the "event" attribute set to "FAILED_RESOURCES_ALLOCATION".

The PCF shall reply to the AF as described in subclause 4.2.2.2.

As a result of this action, the PCF shall set the appropriate subscription to notification of resources allocation outcome for the corresponding PCC Rule(s) as described in 3GPP TS 29.512 [8].

4.2.2.11 Void

4.2.2.12 Invocation of Multimedia Priority Services

This procedure allows an AF, as per 3GPP TS 22.153 [23], to request prioritized access to system resources in situations such as during congestion.

The AF may include the "mpsId" attribute to indicate that the new AF session relates to an MPS session.

The "mpsId" attribute shall contain the national variant for the MPS service name indicating an MPS session. The "resPrio" attribute shall include the priority value of the related priority service.

If the AF supports the SBI Message Priority mechanism for an MPS session, it shall include the "3gpp-Sbi-Message-Priority" custom HTTP header towards the PCF as described in subclause 6.8.2 of 3GPP TS 29.500 [5].

NOTE: If the AF supports the SBI Message Priority mechanism for an MPS session, the AF will include the "3gpp-Sbi-Message-Priority" custom HTTP header with a priority value equivalent to the value of the "resPrio" attribute. Highest user priority value is mapped in the corresponding lowest value of the "3gpp-Sbi-Message-Priority" custom HTTP header.

When the PCF receives the "mpsId" attribute indicating an MPS session, the PCF shall take specific actions on the corresponding PDU session to ensure that the MPS session is prioritized as specified in 3GPP TS 29.512 [8].

4.2.2.13 Support of content versioning

The support of the media component versioning is optional. When the "MediaComponentVersioning" feature is supported, the AF and the PCF shall comply with the procedures specified in this subclause.

If required by operator policies, the AF shall assign a content version to the media component related to certain service and shall provide assigned content version to the PCF in the "contVer" attribute included in the corresponding media component entry of the "medComponents" attribute.

If the PCF receives the "contVer" attribute for a certain media component, the PCF shall follow the procedures described in 3GPP TS 29.512 [8], subclause 4.2.6.2.14.

4.2.2.14 Request of access network information

This procedure is used by an AF to request the PCF to report the access network information (i.e. user location and/or user timezone information) at the creation of the "Individual Application Session Context" resource, when the "NetLoc" feature is supported.

The AF shall include in the HTTP POST request message described in subclause 4.2.2.2:

- an entry of the "AfEventSubscription" data type in the "events" attribute with:
 - a) the "event" attribute set to the value "ANI_REPORT"; and
 - b) the "notifMethod" attribute set to the value "ONE_TIME"; and
- the "reqAnis" attribute, with the required access network information, i.e. user location and/or user time zone information).

When the PCF determines that the access network does not support the access network information reporting because the SMF does not support the NetLoc feature, the PCF shall respond to the AF including in the "EventsNotification" data type the "noNetLocSupp" attribute set to "ANR_NOT_SUPPORTED" value. Otherwise, the PCF shall immediately configure the SMF to provide such access information, as specified in 3GPP TS 29.512 [8].

The PCF shall reply to the AF with an HTTP response message as described in subclause 4.2.2.2.

4.2.2.15 Initial provisioning of service information status

When the "IMS_SBI" feature is supported, the AF may provide the status of the service information.

If the AF provides service information that has been fully negotiated (e.g. based on the SDP answer), the AF may include the "servInfStatus" attribute set to "FINAL". In this case the PCF shall authorize the session and provision the corresponding PCC rules to the SMF.

The AF may additionally provide preliminary service information not fully negotiated yet (e.g. based on the SDP offer) at an earlier stage. To do so, the AF shall include the "servInfStatus" attribute set to "PRELIMINARY". Upon receipt of such preliminary service information, the PCF shall perform an early authorization check of the service information. If the AF requests the PCF to report the access network information together with preliminary service information, the PCF shall immediately configure the SMF to provide the access network information.

4.2.2.16 Provisioning of signalling flow information

This subclause is applicable when IMS restoration is supported according to the supported feature "ProvAFsignalFlow" as described in subclause 5.8.

This procedure allows an AF to provision information about the AF signalling IP flows between the UE and the AF.

The AF shall provide:

- the IP address (IPv4 or IPv6) of the UE in the "ueIPv4" or "ueIPv6" attribute; and
- a media component within the "medComponents" attribute including:
 - the "medCompN" attribute set to "0"; and
 - one or more media subcomponents within the "medSubComps" attribute representing the AF signalling IP flows, where each media subcomponent shall contain:
 - the "flowUsage" attribute set to the value "AF_SIGNALLING";
 - the "fNum" attribute set according to the rules described in Annex C;
 - the "fDesc" attribute containing the IP flows of the AF signalling flow;
 - the "fStatus" set to the value "ENABLED"; and
 - the "afSigProtocol" set to the value corresponding to the signalling protocol used between the UE and the AF.

The PCF shall perform session binding and shall reply to the AF as described in subclause 4.2.2.2.

PCC rules related to the AF signalling IP flows could have been provisioned to SMF using the corresponding procedures specified in 3GPP TS 29.512 [8] at an earlier stage (e.g. typically at the establishment of the QoS flow for AF Signalling IP Flows). The PCF shall install the corresponding dynamic PCC rule for the AF signalling IP flows.

The AF may de-provision the information about the AF signalling IP flows at any time. To do that, if the "Individual Application Session Context" resource is only used to provide information about the AF Signalling IP flows, the AF shall remove the resource by sending an Npcf_PolicyAuthorization_Delete service operation as service operation towards the PCF as defined in subclause 4.2.4.2. Otherwise, the AF shall remove the IP flows within the media component invoking the Npcf_PolicyAuthorization_Update service operation as defined in subclause 4.2.3.17.

4.2.2.17 Support of resource sharing

This procedure is used by an AF to indicate that a media component of an Individual Application Session Context resource may share resources with other media components in the related direction in other Individual Application Session Context resources when the "ResourceSharing" feature is supported.

The AF may include the "sharingKeyUI" attribute and/or "sharingKeyDI" attribute within a media component of the "medComponents" attribute to indicate that the related media of the created new Individual Application Session Context resource may share resources with other media components in the related direction that include the same value for the "sharingKeyUI" attribute and/or "sharingKeyDI" attribute.

The PCF shall reply to the AF with an HTTP response message as described in subclause 4.2.2.2.

If the "sharingKeyUI" attribute and/or "sharingKeyDI" attribute are provided within a media component of the "medComponents" attribute, the PCF may apply the mechanisms for resource sharing as described in 3GPP TS 29.512 [8], subclause 4.2.6.2.8.

4.2.2.18 Indication of Emergency traffic

When the "IMS_SBI" feature is supported, this procedure allows an AF to indicate that the new AF session context relates to emergency traffic.

The AF may include the "servUrn" attribute to indicate that the new AF session context relates to emergency traffic. Additionally, the AF may include the "afReqData" attribute to indicate the additional information requested for the AF session context.

When the PCF receives the "servUrn" attribute indicating an emergency session, the PCF may apply special policies, for instance prioritising service flows relating to the new AF session context or allowing these service flows free of charge.

If the "servUrn" attribute indicates that the new AF session context relates to emergency traffic and the "afReqData" attribute is received, the PCF shall reply to the AF as described in subclause 4.2.2.2 and shall provide the requested available user information in the "ueIds" attribute included within the "ascRespData" attribute in the HTTP "201 Created" response.

When the new AF session context does not indicate emergency traffic and the session binding function detects that the binding is to a PDU session established to the Emergency DNN, the PCF shall reject the HTTP POST request and shall indicate in an HTTP "403 Forbidden" response message the cause for the rejection including the "cause" attribute set to "UNAUTHORIZED_NON_EMERGENCY_SESSION".

4.2.2.19 Invocation of MCPTT

When the feature "MCPTT" is supported by the AF and the PCF, this procedure allows an AF to request prioritized access to system resources in situations such as an MCPTT session with priority call.

The AF may include the "mcpttId" attribute to indicate that the new "Individual Application Session Context" resource relates to an MCPTT session with priority call.

When the PCF receives the "mcpttId" attribute indicating an MCPTT session and the "resPrio" attribute, the PCF shall take specific actions on the corresponding PDU session to ensure that the MCPTT session is prioritized as specified in 3GPP TS 29.512 [8].

Additionally, when the "PrioritySharing" feature is supported, the PCF may receive the "prioSharingInd" attribute within the media component received in the "medComponents" attribute as described in subclause 4.2.2.21. In this case, and if "MCPTT-Preemption" feature is supported, the PCF may receive pre-emption information as also described in subclause 4.2.2.21.

For the handling of MCPTT session with priority call, see Annex B.13

4.2.2.20 Invocation of MCVideo

When the feature "MCVideo" is supported by the AF and the PCF, this procedure allows an AF to request prioritized access to system resources in situations such as an MCVideo session with priority call.

The AF may include the "mcVideoId" attribute to indicate that the new "Individual Application Session Context" resource relates to an MCVideo session with priority call.

When the PCF receives the "mcVideoId" attribute indicating an MCVideo session and the "resPrio" attribute, the PCF shall take specific actions on the corresponding PDU session to ensure that the MCVideo session is prioritized as specified in 3GPP TS 29.512 [8].

For the handling of MCVideo session with priority call, see Annex B.15

4.2.2.21 Priority sharing indication

When the "PrioritySharing" feature is supported, the AF may indicate to the PCF that the related media flow is allowed to use the same Allocation and Retention Priority (ARP) as media flows belonging to other "Individual Application Session Context" resources.

The AF may include the "prioSharingInd" attribute set to "ENABLED" within a media component of the "medComponents" attribute to indicate to the PCF that the related media flow is allowed to use the same Allocation and Retention Priority as media flows which:

- are assigned the same 5QI in the PCF; and

- belong to other "Individual Application Session Context" resources bound to the same PDU session that also contain the "prioSharingInd" attribute set to "ENABLED".

If the "MCPTT-Preemption" feature is supported, the AF may also include:

- within a media component of the "medComponents" attribute, the "preemptCap" attribute containing the suggested pre-emption capability value and the "preemptVuln" attribute containing the suggested pre-emption vulnerability value, for the PCF to determine ARP values;
- within the "ascReqData" attribute in the request body, the "preemptControlInfo" attribute containing the pre-emption control information for the PCF to perform pre-emption control as described in 3GPP TS 29.512 [8], subclause 4.2.6.2.9; and
- within the "evSubsc" attribute, the "event" attribute set to "FAILED_RESOURCES_ALLOCATION" to request the notification for resource allocation failure.

Upon reception of this information, the PCF shall behave as described in 3GPP TS 29.512 [8], subclause 4.2.6.2.9. For the handling of MCPTT sessions, see Annex B.10.

NOTE 1: Service data flow deactivation procedures will apply according to subclauses 4.2.2.7, 4.2.3.7, 4.2.5.5.

NOTE 2: This enhancement avoids the risk that a QoS flow establishment request is rejected if the maximum number of active QoS flows is exceeded.

The PCF shall reply to the AF with an HTTP response message as described in subclause 4.2.2.2.

4.2.2.22 Subscription to Out of Credit notification

This procedure is used by the AF if the "IMS_SBI" feature is supported to subscribe to notifications of credit not available for the Service Data Flows within the AF application session context.

NOTE: It can happen that there are one or more PCC rules (i.e. Service Data Flows) with credit not available, each one with their corresponding termination action (terminate, redirect, access restricted).

The AF shall use the "EventsSubscReqData" data type as described in subclause 4.2.2.2 and shall include in the HTTP POST request message an event within the "evSubsc" attribute with the "event" attribute set to the value "OUT_OF_CREDIT".

As result of this action, the PCF shall set the appropriate subscription to out of credit notification for the corresponding PCC rule(s) as described in 3GPP TS 29.512 [8].

The PCF shall reply to the AF with an HTTP response message as described in subclause 4.2.2.2.

4.2.2.23 Subscriptions to Service Data Flow QoS Monitoring Information

The subscription to Service Data Flow QoS monitoring information is used by an AF to receive a notification about the packet delay between UPF and RAN.

The AF shall use the "EventsSubscReqData" data type as described in subclause 4.2.2.2 and shall include:

- the requested QoS monitoring parameter(s) to be measured (i.e. DL, UL and/or round trip packet delay) within the "reqQosMonParams" attribute;
- an entry of the "AfEventSubscription" data type in the "events" attribute with:
 - a) the "event" attribute set to the value "QOS_MONITORING"; and
 - b) the "notifMethod" attribute set to the value "EVENT_DETECTION", "PERIODIC" or "PDU_SESSION_RELEASE"; and
 - c) when the "notifMethod" attribute is set to the value "PERIODIC", the reporting period within the "repPeriod" attribute; and
 - d) when the "notifMethod" attribute set to the value "EVENT_DETECTION", the minimum waiting time between subsequent reports within the "waitTime" attribute.

- when the "notifMethod" attribute set to the value "EVENT_DETECTION", the "qosMon" attribute, with the required QoS Monitoring information, i.e.:
 - the delay threshold for downlink with the "repThreshDI" attribute;
 - the delay threshold for uplink with the "repThreshUI" attribute; and/or
 - the delay threshold for round trip with the "repThreshRp" attribute.

The AF shall include more than one "AfEventSubscription" data type within the "EventsSubscReqData" data type if more than one notify method is required.

The PCF shall reply to the AF as described in subclause 4.2.2.2.

As result of this action, the PCF shall set the appropriate subscription to QoS Monitoring information for the corresponding PCC rule(s) as described in 3GPP TS 29.512 [8].

4.2.2.24 Provisioning of TSCAI input Information and QoS related data

If the "TimeSensitiveNetworking" feature is supported the TSN AF may provide TSCAI input information and QoS related data to the PCF by the Npcf_PolicyAuthorization_Create service operation to describe the TSC traffic pattern and QoS characteristics for use in the 5G System.

The TSN AF shall derive the TSCAI input information and the QoS related data for a given TSN stream or flow of aggregated TSN streams as defined in subclauses 5.27.2 and 5.28.4 of 3GPP TS 23.501 [2] respectively.

To indicate the TSCAI input information of a TSN stream or aggregated set of TSN streams, the TSN AF may include for the uplink flow direction (ingress interface of the DS-TT/UE) in the "tscAIInputUI" attribute and/or for the downlink flow direction (ingress interface of the NW-TT) the "tscAIInputDI" attribute included in a media component entry of the "medComponents" attribute:

- the time period between the start of two bursts of a TSN stream or aggregated TSN streams in reference to the TSN GM encoded in the "periodicity" attribute; and
- the arrival time of the first data burst of a TSN stream or aggregated TSN streams in reference to the TSN GM encoded in the "burstArrivalTime" attribute.

The uplink and/or downlink flow of the TSN stream or aggregated set of TSN streams shall be encoded within the corresponding "MediaSubComponent" entries of the "medSubComps" attribute, in the "ethfDescs" attribute.

To indicate the TSC QoS related data of a TSN stream or aggregated set of TSN streams, the TSN AF may include in the "tsnQos" attribute included in a media component entry of the "medComponents" attribute;

- the maximum burst size encoded in the "maxTscBurstSize" attribute;
- the maximum time a packet may be delayed encoded in the "tscPackDelay" attribute;
- the TSC traffic priority in scheduling resources among other TSN streams encoded in the "tscPrioLevel" attribute.

The TSN AF may also include the max bitrates in uplink and downlink within the "marBwUI" attribute and the "marBwDI" attribute of the "medComponents" attribute respectively.

The PCF shall reply to the TSN AF as described in subclause 4.2.2.2.

The PCF shall check whether the received TSCAI input container and TSC QoS related data require to create PCC rules to provide the SMF with derived QoS characteristics and the received TSCAI input container. Provisioning of PCC rule(s) to the SMF shall be carried out as specified in 3GPP TS 29.512 [8].

4.2.2.25 Provisioning of bridge management information and port management information

If the "TimeSensitiveNetworking" feature is supported the AF may provide a BMIC for the Bridge functionality of UPF/NW-TT and PMIC(s) for the DS-TT port and/or the NW-TT ports to configure the 5G system as a TSN bridge by invoking the Npcf_PolicyAuthorization_Create service operation to the PCF.

The AF may include in the "AppSessionContextReqData" data type:

- the DS-TT PMIC encoded in the attribute "tsnPortManContDstt" and/or the one or more NW-TT PMIC(s) encoded in the "tsnPortManContNwtts" attribute, if available, for the DS-TT port and NW-TT ports allocated for a PDU session. The PMIC(s) are encoded in the "PortManagementContainer" data type, which includes the port management information in the "portManCont" attribute and the related TSN port number in the "portNum" attribute; and/or
- the BMIC encoded in the "tsnBridgeManCont", if available, for the Bridge functionality of the UPF/NW-TT allocated for a PDU session. The BMIC is encoded in the "BridgeManagementContainer" data type.

4.2.2.26 Invocation of Mission Critical Services

This procedure allows an AF, as per 3GPP TS 22.179 [45], to request prioritized access to system resources in situations such as during congestion.

The AF may include the "mcsId" attribute to indicate that the new AF session relates to an MCS session.

The "mcsId" attribute shall contain the national variant for the MCS service name indicating an MCS session. The "resPrio" attribute shall include the priority value of the related priority service.

If the AF supports the SBI Message Priority mechanism for an MCS session, it shall include the "3gpp-Sbi-Message-Priority" custom HTTP header towards the PCF as described in subclause 6.8.2 of 3GPP TS 29.500 [5].

NOTE: If the AF supports the SBI Message Priority mechanism for an MCS session, the AF will include the "3gpp-Sbi-Message-Priority" custom HTTP header with a priority value equivalent to the value of the "resPrio" attribute. Highest user priority value is mapped in the corresponding lowest value of the "3gpp-Sbi-Message-Priority" custom HTTP header.

When the PCF receives the "mcsId" attribute indicating an MCS session, the PCF shall take specific actions on the corresponding PDU session to ensure that the MCS session is prioritised as specified in 3GPP TS 29.512 [8].

4.2.2.27 P-CSCF restoration enhancements

The P-CSCF restoration custom operation is applicable when the PCF based Restoration Enhancement, as defined in 3GPP TS 23.380 [39], represented by the supported feature "PCSCF-Restoration-Enhancement" is supported by both P-CSCF and PCF.

Figure 4.2.2.27-1 illustrates the P-CSCF restoration enhancements.

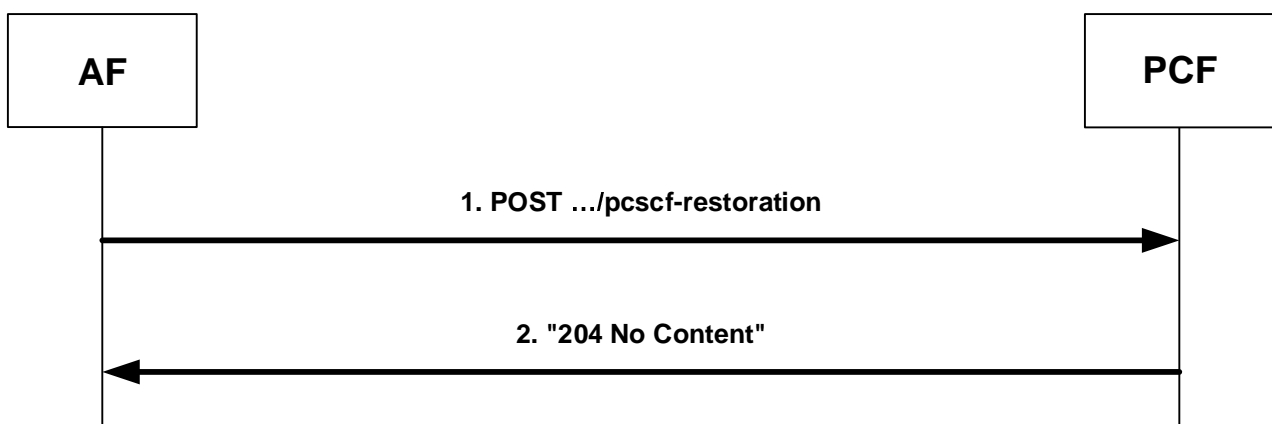


Figure 4.2.2.27-1: P-CSCF restoration enhancements

The P-CSCF acting as an AF shall invoke the "P-CSCF restoration" custom operation sending an HTTP POST request to the resource URI representing the custom operation (POST .../pcscf-restoration) as shown in figure 4.2.2.27-1, step 1, in case P-CSCF restoration needs to be performed.

The P-CSCF shall include in the "PcscfRestorationRequestData" data type in the payload body of the HTTP POST request:

- the IP address (IPv4 or IPv6) of the UE in the "ueIpv4" or "ueIpv6" attribute, and if the IP address is not unique (e.g. private IPv4 case), the "ipDomain" attribute or the "sliceInfo" attribute if available; or
- if the IP address is not available or if the IP address is not unique and the "ipDomain" attribute and the "sliceInfo" attribute are not available, the SUPI in the "supi" attribute and the DNN in the "dnn" attribute.

The PCF shall identify the PDU session for which the HTTP POST request applies. If the PCF fails in identifying the PDU session, the PCF shall reject the "P-CSCF restoration" custom operation with an HTTP "500 Internal Server Error" response including the "cause" attribute set to "PDU_SESSION_NOT_AVAILABLE".

Otherwise, the PCF shall acknowledge the request and shall send to the AF a "204 No content" response to the HTTP POST request, as shown in figure 4.2.2.27-1, step 2.

The PCF shall send a request for P-CSCF restoration to the SMF for the corresponding PDU session as described in 3GPP TS 29.512 [8], subclause 4.2.3.18.

4.2.2.28 Support of CHEM feature

When CHEM feature is supported, the AF may include the value of Maximum Packet Loss Rate for UL within the "maxPacketLossRateUl" attribute and/or the value of Maximum Packet Loss Rate for DL within the "maxPacketLossRateDl" attribute in "medComponents" attribute. For CHEM feature, see Annex B.14.

4.2.2.29 Support of FLUS feature

When "FLUS" feature is supported by the AF, the AF may include the "flusId" attribute within a media component of the "medComponents" attribute to indicate that the related media of the created new Individual Application Session Context resource corresponds to a FLUS media stream. Additional QoS information for the treatment of FLUS media may be provided within "desMaxLatency" attribute and/or "desMaxLoss" attribute.

4.2.2.30 Subscription to EPS Fallback report

When the "EPSFallbackReport" feature is supported, the AF subscribes to EPS Fallback report to be notified of the rejection in 5GS of the requested resources associated to service information for voice media type and the subsequent fallback to EPS of the resources associated to the voice media and other medias requested by this AF.

The AF shall use the "EventsSubscReqData" data type as described in subclause 4.2.2.2 and shall include in the HTTP POST request message an event within the "events" attribute with the "event" attribute set to "EPS_FALLBACK". The AF shall request to the PCF to report EPS Fallback in conjunction with providing the PCF with AF service information for voice media type as described in subclause 4.2.2.2.

The PCF shall reply to the AF as described in subclause 4.2.2.2.

As result of this action, the PCF shall set the appropriate subscription to EPS Fallback report for the corresponding PCC rule(s) as described in in 3GPP TS 29.512 [8].

4.2.2.31 Subscription to TSN related events

This procedure is used by the TSN AF if the "TimeSensitiveNetworking" feature is supported to subscribe to notifications of new 5GS Bridge information, e.g., new TSN port detected and/or DS-TT PMIC and/or NW-TT PMIC(s) and/or BMIC availability within the Individual Application Session Context resource created to handle the TSN Bridge in the context of a PDU session.

The AF shall use the "EventsSubscReqData" data type as described in subclause 4.2.2.2 and shall include in the HTTP POST request message within the "evSubsc" attribute an event within "events" attribute with the "event" attribute set to the value "TSN_BRIDGE_INFO" to subscribe to the reception of 5GS Bridge information

The PCF shall reply to the AF with an HTTP response message as described in subclause 4.2.2.2.

4.2.2.32 Initial provisioning of required QoS information

This procedure is used by an AF to request that a data session to a UE is set up with a specific QoS (e.g. low latency or jitter) and priority handling when the "AuthorizationWithRequiredQoS" feature is supported.

The AF may provide within one or more entries of the "medComponents" attribute included in the "ascReqData" attribute of the HTTP POST request message described in subclause 4.2.2.2 a reference to pre-defined QoS information within the "qosReference" attribute.

Additionally, if the AF supports adjustment to different QoS parameter combinations, the AF may provide a prioritized list of one or more QoS references within the "altSerReqs" attribute, where the lower the index of the array for a given entry, the higher the priority.

When the AF provides the "altSerReqs" attribute, the AF shall also subscribe to receive notifications when the GBR QoS targets for one or more service data flows can no longer (or can again) be guaranteed, as described in subclause 4.2.2.6.

Due to the received QoS information, the PCF may need to provision or modify the related PCC rules as specified in 3GPP TS 29.513 [7] and provide the related information towards the SMF following the corresponding procedures specified in 3GPP TS 29.512 [8].

The PCF shall reply to the AF as described in subclause 4.2.2.2.

4.2.2.33 Support of QoSHint feature

If the QoSHint feature is supported by the AF, the AF may include the "desMaxLatency" attribute and/or "desMaxLoss" attribute within a media component of the "medComponents" attribute to indicate that the related media of the created Individual Application Session Context resource has specific latency and/or loss demands.

4.2.2.34 Subscription to Reallocation of Credit notification

This procedure is used by the AF if the "IMS_SBI" and the "ReallocationOfCredit" features are supported to subscribe to notifications of reallocation of credit for the Service Data Flows within the AF application session context.

The AF shall use the "EventsSubscReqData" data type as described in subclause 4.2.2.2 and shall include in the HTTP POST request message an event within the "evSubsc" attribute with the "event" attribute set to the value "REALLOCATION_OF_CREDIT".

As result of this action, the PCF shall set the appropriate subscription to reallocation of credit notification for the corresponding PCC rule(s) as described in 3GPP TS 29.512 [8].

The PCF shall reply to the AF with an HTTP response message as described in subclause 4.2.2.2.

4.2.3 Npcf_PolicyAuthorization_Update service operation

4.2.3.1 General

The Npcf_PolicyAuthorization_Update service operation provides updated application level information from the NF service consumer and optionally communicates with the Npcf_SMPolicyControl service to determine and install the policy according to the information provided by the NF service consumer.

The Npcf_PolicyAuthorization_Update service operation updates an application session context in the PCF.

The following procedures using the Npcf_PolicyAuthorization_Update service operation are supported:

- Modification of service information.
- Gate control.
- Background Data Transfer policy indication at policy authorization update.
- Modification of sponsored connectivity information.
- Modification of Subscription to Service Data Flow QoS notification control.
- Modification of Subscription to Service Data Flow Deactivation.
- Update of traffic routing information.

- Modification of subscription to resources allocation outcome.
- Modification of Multimedia Priority Services.
- Support of content versioning.
- Request of access network information.
- Modification of service information status.
- Support of SIP forking.
- Provisioning of signalling flow information.
- Support of resource sharing.
- Modification of MCPTT.
- Modification of MCVideo.
- Priority sharing indication.
- Modification of subscription to out of credit notification.
- Modification of Subscription to Service Data Flow QoS Monitoring Information.
- Update of TSCAI Input Information and TSC QoS related data.
- Provisioning of bridge management information and port management information.
- Support of CHEM feature.
- Support of FLUS feature.
- Subscription to EPS Fallback report.
- Modification of required QoS information.
- Support of QoSHint feature.
- Modification of subscription to reallocation of credit notification.

4.2.3.2 Modification of service information

This procedure is used to modify an existing application session context as defined in 3GPP TS 23.501 [2], 3GPP TS 23.502 [3] and 3GPP TS 23.503 [4].

Figure 4.2.3.2-1 illustrates the modification of service information using HTTP PATCH method.

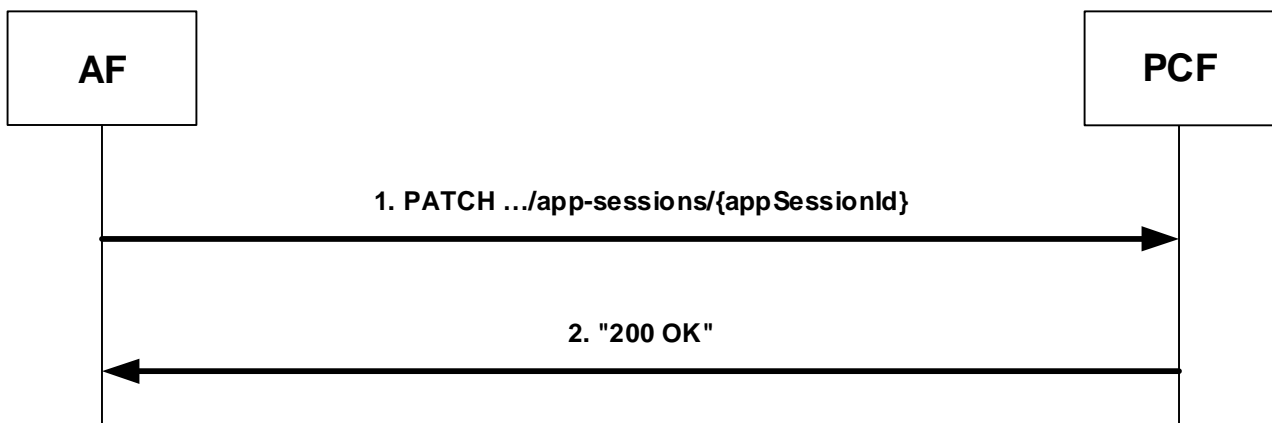


Figure 4.2.3.2-1: Modification of service information using HTTP PATCH

The AF may modify the application session context information at any time (e.g. due to an AF session modification or internal AF trigger) and invoke the `Npcf_PolicyAuthorization_Update` service operation by sending the HTTP PATCH request message to the resource URI representing the "Individual Application Session Context" resource, as shown in figure 4.2.3.2-1, step 1, with the modifications to apply.

The JSON body within the PATCH request shall include the "AppSessionContextUpdateData" data type and shall be encoded according to "JSON Merge Patch", as defined in IETF RFC 7396 [21].

The AF may include the updated service information in the "medComponents" attribute.

If the "AuthorizationWithRequiredQoS" feature as defined in subclause 5.8 is supported, the AF may provide within the `MediaComponentRm` data structure an update of the required QoS information as specified in subclause 4.2.3.32.

The AF may include in the "AppSessionContextUpdateData" data type an AF application identifier in the "afAppId" attribute to trigger the PCF to indicate to the SMF/UPF to perform the application detection based on the operator's policy as defined in 3GPP TS 29.512 [8].

If the "TimeSensitiveNetworking" feature is supported the AF may provide TSN information as specified in subclauses 4.2.3.24 and 4.2.3.25.

The AF may also create, modify or remove events subscription information by sending the HTTP PATCH request message to the resource URI representing the "Individual Application Session Context" resource.

The AF shall create event subscription information by including in the "AppSessionContextUpdateData" data type the "evSubsc" attribute of "EventsSubscReqDataRm" data type with the corresponding list of events to subscribe to; and the "notifUri" attribute with the notification URI where the PCF shall send the notifications.

The AF shall update existing event subscription information by including in the "AppSessionContextUpdateData" data type and updated value of the "evSubsc" attribute of the "EventsSubscReqDataRm" data type as follows:

- The "events" attribute shall include the new complete list of subscribed events.
- When the AF requests to update the additional information related to an event (e.g. the AF needs to provide new thresholds to the PCF in the "usgThres" attribute related to the "USAGE_REPORT" event) the AF shall include the additional information, which shall completely replace the previously provided one.

NOTE 1: Note that when the AF requests to remove an event, this event is not included in the "events" attribute.

NOTE 2: When an event is included in the "events" attribute and its related additional information is set to null, the PCF considers the subscription to this event is active, but the related procedures stop applying.

NOTE 3: When an event is removed from the "events" attribute but its related information is not set to null, the PCF considers the subscription to this event is terminated, the related additional information is removed, and the related procedures stop applying.

The AF shall remove existing event subscription information by setting to null the "evSubsc" attribute included in the "AppSessionContextUpdateData" data type.

Events with "notifMethod" set to "ONE_TIME" shall only apply at the time the AF requests their subscription. Once the event report is performed, the subscription to this event is automatically terminated in the PCF and the related information is removed. The presence of a one-time event, together with its related additional information when applicable, during an update procedure shall represent the recreation of the subscription to this event in the PCF.

If the PCF cannot successfully fulfil the received HTTP PATCH request due to the internal PCF error or due to the error in the HTTP PATCH request, the PCF shall send the HTTP error response as specified in subclause 5.7.

Otherwise, the PCF shall process the received service information according the operator policy and may decide whether the HTTP request message is accepted or not.

If the updated service information is not acceptable (e.g. the subscribed guaranteed bandwidth for a particular user is exceeded), the PCF shall include in an HTTP "403 Forbidden" response message the "cause" attribute set to "REQUESTED_SERVICE_NOT_AUTHORIZED".

If the service information provided in the HTTP PATCH request is rejected due to a temporary condition in the network (e.g. the NWDAF reported the network slice selected for the PDU session is congested), the PCF may include in the "403 Forbidden" response the "cause" attribute set to

"REQUESTED_SERVICE_TEMPORARILY_NOT_AUTHORIZED". The PCF may also provide a retry interval within the "Retry-After" HTTP header field. When the AF receives the retry interval within the "Retry-After" HTTP header field, the AF shall not send the same service information to the PCF again (for the same application session context) until the retry interval has elapsed. The "Retry-After" HTTP header is described in 3GPP TS 29.500 [5] subclause 5.2.2.2.

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

If the request is accepted, the PCF shall update the service information with the new information received. Due to the updated service information, the PCF may need to create, modify or delete the related PCC rules as specified in 3GPP TS 29.513 [7] and provide the updated information towards the SMF following the corresponding procedures specified in 3GPP TS 29.512 [8].

Based on the received subscription information from the AF, the PCF may create a subscription to event notifications or may modify the existing subscription to event notifications, for a related PDU session from the SMF, as described in 3GPP TS 29.512 [8].

The PCF shall reply with the HTTP response message to the AF and may include the "AppSessionContext" data type payload body with the representation of the modified "Individual Application Session Context" resource and may include the "Events Subscription" sub-resource.

The PCF shall include in the "evsNotif" attribute:

- if the AF subscribed to the "PLMN_CHG" event in the HTTP PATCH request, the "event" attribute set to "PLMN_CHG" and the "plmnId" attribute including the PLMN identifier and, if available, the NID if the PCF has previously requested to be updated with this information in the SMF;
- if the AF subscribed to the event "ACCESS_TYPE_CHG" event in the HTTP PATCH request, the "event" attribute set to "ACCESS_TYPE_CHG" and:
 - i. the "accessType" attribute including the access type, and the "ratType" attribute including the RAT type when applicable for the notified access type; and
 - ii. if the "ATSSS" feature is supported, the "addAccessInfo" attribute with the additional access type information if available, where the access type is encoded in the "accessType" attribute, and the RAT type is encoded in the "ratType" attribute when applicable for the notified access type; and

NOTE 4: For a MA PDU session, if the "ATSSS" feature is not supported by the AF the PCF includes the "accessType" attribute and the "ratType" attribute with a currently active combination of access type and RAT type (if applicable for the notified access type). When both 3GPP and non-3GPP accesses are available, the PCF includes the information corresponding to the 3GPP access.

iii. the "anGwAddr" attribute including access network gateway address when available,

if the PCF has previously requested to be updated with this information in the SMF; and

- if the "IMS_SBI" feature is supported and if the AF subscribed to the "CHARGING_CORRELATION" event in the HTTP PATCH request, the "event" attribute set to "CHARGING_CORRELATION" and may include the "anChargIds" attribute containing the access network charging identifier(s) and the "anChargAddr" attribute containing the access network charging address.

The AF subscription to other specific events using the Npcf_PolicyAuthorization_Update request is described in the related subclauses. Notification of events when the applicable information is not available in the PCF when receiving the Npcf_PolicyAuthorization_Update request is described in subclause 4.2.5.

The HTTP response message towards the AF should take place before or in parallel with any required PCC rule provisioning towards the SMF.

If the PCF does not have an existing application session context for the application session context being modified (such as after a PCF failure), the PCF shall reject the HTTP request message with the HTTP response message with the applicable rejection cause.

4.2.3.3 Gate control

This procedure is used by an AF to modify in the PCF the service data flow(s) that are to be enabled or disabled to pass through the PDU session.

The AF shall use the HTTP PATCH method to modify the gate control information.

The AF shall include in the HTTP PATCH request message described in subclause 4.2.3.2 the "fStatus" attribute for the flows to be enabled or disabled with the appropriate value.

If a "medSubComponents" attribute contains a "flowUsage" attribute with the value "RTCP", then the IP Flows described by that media subcomponent shall be enabled in both directions irrespective of the value of the "fStatus" attribute of the corresponding media component.

As result of this action, the PCF shall set the appropriate gate status for the corresponding active PCC rule(s).

The PCF shall reply to the AF as described in subclause 4.2.3.2.

4.2.3.4 Background Data Transfer policy indication at policy authorization update

This procedure is used by an AF to indicate at policy authorization update a transfer policy negotiated for background data transfer using the Npcf_BDTPolicyControl service as described in 3GPP TS 29.554 [14].

The AF may include in the HTTP PATCH request message described in subclause 4.2.3.2 a new reference id in the "bdtRefId" attribute.

NOTE 1: The PCF will retrieve the corresponding transfer policy from the UDR based on the reference identifier within the "bdtRefId" attribute. In case only one PCF is deployed in the network, transfer policies can be locally stored in the PCF and the interaction with the UDR is not required.

If the PCF cannot retrieve the transfer policy, the PCF shall set to TP_NOT_KNOWN the "servAuthInfo" attribute in the HTTP response message to the AF to indicate that the transfer policy is unknown.

If the time window of the received transfer policy has expired, the PCF shall set to TP_EXPIRED the "servAuthInfo" attribute in the HTTP response message to indicate to the AF that the transfer policy has expired. Otherwise, if the time window of the received transfer policy has not yet occurred, the PCF shall set to TP_NOT_YET_OCCURRED the "servAuthInfo" attribute in the HTTP response message to the AF to indicate that the time window of the transfer policy has not yet occurred.

NOTE 2: In the case that the PCF cannot retrieve the transfer policy, the transfer policy time window has not yet occurred or the transfer policy expired, the PCF makes the decision without considering the transfer policy.

The PCF shall reply to the AF as described in subclause 4.2.3.2.

4.2.3.5 Modification of sponsored connectivity information

This procedure is used by an AF to modify sponsored data connectivity when "SponsoredConnectivity" feature is supported.

The AF shall use the HTTP PATCH method to modify the sponsored connectivity information.

The AF shall include in the HTTP PATCH request message described in subclause 4.2.3.2 an application service provider identity and a sponsor identity within the "aspId" attribute and "sponId" attribute, and optionally an indication of whether to enable or disable sponsored data connectivity within the "sponStatus" attribute set to the applicable value to provide sponsored connectivity information or to update existing sponsored connectivity information.

If the AF requests to enable sponsored data connectivity the AF shall change the "sponStatus" attribute value to "SPONSOR_ENABLED".

If the AF requests to disable sponsored data connectivity the AF shall provide an indication to disable sponsored data connectivity to the PCF by setting the "sponStatus" attribute to "SPONSOR_DISABLED".

To support the usage monitoring of sponsored data connectivity, the AF may also include in the HTTP PATCH a new or modified "evSubsc" attribute of "EventsSubscReqDataRm" data type with:

- the usage thresholds to apply in the "usgThres" attribute; and
- the subscription to usage monitoring for sponsored data connectivity in an entry of the "events" attribute of the "AfEventSubscription" data type with the "event" attribute set to "USAGE_REPORT".

NOTE 1: If the AF is in the user plane, the AF can handle the usage monitoring and therefore it is not required to provide a usage threshold to the PCF as part of the sponsored data connectivity information.

When the AF indicated to enable sponsored data connectivity, and the UE is roaming with the visited access case, the following procedures apply:

- If the AF is located in the HPLMN, for home routed roaming case and when operator policies do not allow accessing the sponsored data connectivity with this roaming case, the H-PCF shall reject the service request and shall include in the HTTP "403 Forbidden" response message the "cause" attribute set to "UNAUTHORIZED_SPONSORED_DATA_CONNECTIVITY".
- If the AF is located in the VPLMN, the V-PCF shall reject the service request and shall include in the HTTP "403 Forbidden" response message the "cause" attribute set to "UNAUTHORIZED_SPONSORED_DATA_CONNECTIVITY".

When the AF indicated to enable sponsored data connectivity, and the UE is in the non-roaming case or roaming with the home routed case and the operator policies allow accessing the sponsored data connectivity with this roaming case, the following procedures apply:

- If the SMF does not support sponsored connectivity and the required reporting level for that service indicates a sponsored connectivity level according to 3GPP TS 29.512 [8], then the PCF shall reject the request and shall include in the HTTP "403 Forbidden" response message the "cause" attribute set to "REQUESTED_SERVICE_NOT_AUTHORIZED".
- If the SMF supports sponsored data connectivity feature or the required reporting level is different from sponsored connectivity level as described in 3GPP TS 29.512 [8], then the PCF, based on operator policies, shall check whether it is required to validate the sponsored connectivity data. If it is required, it shall perform the authorizations based on sponsored data connectivity profiles. If the authorization fails, the PCF shall include in the HTTP "403 Forbidden" response message the "cause" attribute set to "UNAUTHORIZED_SPONSORED_DATA_CONNECTIVITY".

NOTE 2: The PCF is not required to verify that a trust relationship exists between the operator and the sponsors.

The PCF shall reply to the AF as described in subclause 4.2.3.2.

4.2.3.6 Modification of Subscription to Service Data Flow QoS notification control

This procedure is used in the AF to modify in the PCF the subscription to notification about whether the GBR QoS targets can no longer (or can again) be guaranteed.

The AF shall use the HTTP PATCH method to update the "Events Subscription" sub-resource together with the modifications to the "Individual Application Session" sub-resource.

The AF shall include in the HTTP PATCH request message described in subclause 4.2.3.2 the updated values of the "EventsSubscReqDataRm" data type, which either shall include in the "events" attribute a new element with the "event" attribute set to "QOS_NOTIF" to indicate the subscription to QoS notification control, or shall not include in the "events" attribute an existing element with the "event" attribute set to "QOS_NOTIF" to indicate the termination of the subscription to QoS notification control.

As result of this action, the PCF shall set the appropriate subscription to QoS notification control for the corresponding active PCC rule(s) as described in 3GPP TS 29.512 [8].

The PCF shall reply to the AF as described in subclause 4.2.3.2.

4.2.3.7 Modification of Subscription to Service Data Flow Deactivation

This procedure is used by an AF to modify in the PCF the subscription to the notification of deactivation of one or more Service Data Flows within the AF application session context.

The AF shall use the HTTP PATCH method to update the "Events Subscription" sub-resource together with the modifications to the "Individual Application Session" sub-resource.

The AF shall include in the HTTP PATCH request message described in subclause 4.2.3.2 the updated values of the "EventsSubscReqDataRm" data type, which either shall include in the "events" attribute a new element with the "event" attribute set to "FAILED_RESOURCES_ALLOCATION" to indicate the subscription to service data flow deactivation, or shall not include in the "events" attribute an existing element with the "event" attribute set to "FAILED_RESOURCES_ALLOCATION".

The PCF shall reply to the AF as described in subclause 4.2.3.2.

As result of this action, the PCF shall set the appropriate subscription to service data flow deactivation for the corresponding PCC rule(s) as described in in 3GPP TS 29.512 [8].

4.2.3.8 Update of traffic routing information

This procedure is used by an AF to modify in the PCF the traffic routing information to a local access to a DNN, and/or to modify the subscription to notifications about UP path management when "InfluenceOnTrafficRouting" feature is supported.

The AF shall use the HTTP PATCH method.

To modify traffic routing information, the AF shall include in the HTTP PATCH request message described in subclause 4.2.3.2 an updated "afRoutReq" attribute(s) with the modified traffic routing information.

To modify the subscription to notifications about UP path management events (create, delete or modify), the AF shall include in the HTTP PATCH request message described in subclause 4.2.3.2 the updated values of the "upPathChgSub" attribute with the modified subscription to UP path management events.

The PCF shall reply to the AF as described in subclause 4.2.3.2.

The PCF shall store the application routing requirements included in the "afRoutReq" attribute.

The PCF shall check whether the updated application routing requirements require PCC rules to be created or modified to include updated traffic steering policies, or the AF transaction identifier, or to update the application relocation possibility as specified in 3GPP TS 29.513 [7]. Provisioning of PCC rules to the SMF shall be carried out as specified at 3GPP TS 29.512 [8].

4.2.3.9 Void

4.2.3.10 Modification of subscription to resources allocation outcome

This procedure is used in the AF to modify in the PCF the subscription to notification about resources allocation outcome.

The AF shall use the HTTP PATCH method to update the "Events Subscription" sub-resource together with the modifications to the "Individual Application Session" sub-resource.

The AF shall include in the HTTP PATCH request message described in subclause 4.2.3.2 the updated values of the "EventsSubscReqData" data type, which either include in the "events" attribute a new element with the "event" attribute set to "SUCCESSFUL_RESOURCES_ALLOCATION" and/or "FAILED_RESOURCES_ALLOCATION" or remove in the "events" attribute an existing element with the "event" attribute set to "SUCCESSFUL_RESOURCES_ALLOCATION" and/or "FAILED_RESOURCES_ALLOCATION".

As a result of this action, the PCF shall set the appropriate subscription to notification of resources allocation outcome in the corresponding PCC Rule(s) as described in 3GPP TS 29.512 [8].

4.2.3.11 Void

4.2.3.12 Modification of Multimedia Priority Services

The AF may include the "mpsId" attribute if it was not previously provided in order to indicate that the modified AF session relates to an MPS session.

If the AF supports the SBI message priority mechanism for an MPS session, the AF shall include the "3gpp-Sbi-Message-Priority" custom HTTP header towards the PCF as described in subclause 4.2.2.12.

If the PCF receives the "mpsId" attribute, the PCF shall take specific actions on the corresponding PDU session to ensure that the MPS session is prioritized as defined in 3GPP TS 29.512 [8].

4.2.3.13 Support of content versioning

The support of the media component versioning is optional. When the "MediaComponentVersioning" feature is supported, the AF and the PCF shall comply with the procedures specified in this subclause.

Upon each media component modification, if the content version was previously assigned to a media component, the AF shall assign a new content version. All the content related to that media component shall be included and the content version shall be unique for the lifetime of the media component.

NOTE: The AF will include all the content of the media component in each media component modification in order to ensure that the media component is installed with the proper information regardless of the outcome of the QoS flow procedure related to previous interactions that are not reported to the PCF yet.

If the PCF receives the "contVer" attribute for a certain media component, the PCF shall follow the procedures described in 3GPP TS 29.512 [8], subclause 4.2.6.2.14.

4.2.3.14 Request of access network information

This procedure is used by an AF to request access network information for an existing "Individual Application Session Context" resource at service information modification when the "NetLoc" feature is supported.

NOTE 1: Subclause 4.2.6.6 describes the AF request of access network information without providing service information.

The AF shall create event subscription information by including in the "AppSessionContextUpdateData" data type the "evSubsc" attribute of "EventsSubscReqData" data type with the corresponding list of events to subscribe to.

The AF shall include in the HTTP PATCH request message described in subclause 4.2.3.2:

- an entry of the "AfEventSubscription" data type in the "events" attribute with:
 - a) the "event" attribute set to the value "ANI_REPORT"; and
 - b) the "notifMethod" attribute set to the value "ONE_TIME"; and
- the "reqAnis" attribute, with the required access network information, i.e. user location and/or user time zone information).

When the PCF determines that the access network does not support the access network information reporting because the SMF does not support the NetLoc feature, the PCF shall respond to the AF including in the "EventsNotification" data type the "noNetLocSupp" attribute set to "ANR_NOT_SUPPORTED" value. Otherwise, the PCF shall immediately configure the SMF to provide such access information, as specified in 3GPP TS 29.512 [8].

The PCF shall reply to the AF with an HTTP response message as described in subclause 4.2.3.2.

NOTE 2: The AF does not invoke the Npcf_PolicyAuthorization_Update service operation to remove subscription to access network information report since the "Access Network Information Notification" is the one-time reported event. Once the access network information is reported to the AF the subscription to the access network information report is automatically terminated in the PCF and the related information is removed.

4.2.3.15 Modification of service information status

When the "IMS_SBI" feature is supported, the AF may update the status of the service information. If the AF provides service information that has been fully negotiated (e.g. based on the SDP answer), the AF may include the "servInfStatus" attribute set to "FINAL". In this case the PCF shall authorize the session and provision the corresponding PCC rules to the SMF.

The AF may additionally provide preliminary service information not fully negotiated yet (e.g. based on the SDP offer) at an earlier stage. To do so, the AF shall include the "servInfStatus" attribute set to "PRELIMINARY". Upon receipt of such preliminary service information, the PCF shall perform an early authorization check of the service information. If the AF requests the PCF to report the access network information together with preliminary service information, the PCF shall immediately configure the SMF to provide the access network information.

4.2.3.16 Support of SIP forking

When the "IMS_SBI" feature is supported, this procedure is used by an AF to indicate that an existing "Individual Application Session Context" resource comprises service information about several SIP dialogues.

The AF shall use the HTTP PATCH method to modify the service information.

The AF may include in the HTTP PATCH request message described in subclause 4.2.3.2 the "sipForkInd" attribute and include the updated service information.

The PCF shall reply to the AF as described in subclause 4.2.3.2.

When the "sipForkInd" attribute gets the value:

- "SEVERAL_DIALOGUES", the PCF shall send additional PCC rules or individual data flow filters to already provided PCC rules as described in Annex B.3.1.
- "SINGLE_DIALOGUE", the PCF shall update installed PCC rules and Authorized-QoS information as described in Annex B.3.2.

4.2.3.17 Provisioning of signalling flow information

This procedure is used by an AF to provision or de-provision information about the AF signalling IP flows between the UE and the AF.

The AF shall include in the HTTP PATCH request message described in subclause 4.2.3.2:

- when the procedure is used to provision information about the AF signalling IP flows, a media component within the "medComponents" attribute including the attributes described in subclause 4.2.2.16;
- when the procedure is used to de-provision information about the AF signalling IP flows, for the media subcomponents containing the AF signalling IP flows, the "fStatus" attribute set to the value "REMOVED".

The PCF shall reply to the AF as described in subclause 4.2.3.2.

4.2.3.18 Support of resource sharing

When the "ResourceSharing" is supported by the AF and the PCF, the AF may include the "sharingKeyUI" attribute and/or "sharingKeyDI" attribute within a media component of the "medComponents" attribute to indicate to the PCF that the related media of the modified Individual Application Session Context resource may share resources with other media components in the related direction that include the same value in the "sharingKeyUI" attribute and/or "sharingKeyDI" attribute.

The AF may modify the conditions for resource sharing by including the media component within the "medComponents" attribute with a new value for the "sharingKeyUI" attribute and/or "sharingKeyDI" attribute. The AF may indicate that the related media of the modified Individual Application Session resource is not sharing resources with other media components in the related direction setting the "sharingKeyUI" attribute and/or "sharingKeyDI" attribute to "null".

The AF shall use the HTTP PATCH method to update the "Individual Application Session Context resource" as described in subclause 4.2.3.2.

If the "sharingKeyUI" attribute and/or "sharingKeyDI" attribute are provided within a media component of the "medComponents" attribute, the PCF may apply the mechanisms for resource sharing as described in 3GPP TS 29.512 [8], subclause 4.2.6.2.8.

4.2.3.19 Modification of MCPTT

The AF may include the "mcpttId" attribute in order to indicate that the modified "Individual Application Session Context" resource relates to the priority adjustment of an MCPTT session. When the PCF receives the "mcpttId" attribute related to that MCPTT session, the PCF may take specific actions on the corresponding PDU session to ensure that the MCPTT session is prioritized. For the handling of MCPTT session with priority call, see Annex B.13.

Additionally, when the "PrioritySharing" feature is supported, the PCF may receive the "prioSharingInd" attribute within the media component received in the "medComponents" attribute as described in subclause 4.2.2.21. In this case, and if "MCPTT-Preemption" feature is supported, the PCF may receive pre-emption information as also described in subclause 4.2.3.21.

4.2.3.20 Modification of MCVideo

The AF may include the "mcVideoId" attribute in order to indicate that the modified "Individual Application Session Context" resource relates to the priority adjustment of an MCVideo session. When the PCF receives the "mcVideoId" attribute related to that MCVideo session, the PCF may take specific actions on the corresponding PDU session to ensure that the MCVideo session is prioritized. For the handling of MCVideo session with priority call, see Annex B.15.

4.2.3.21 Priority sharing indication

When the "PrioritySharing" feature is supported, the AF may include the "prioSharingInd" attribute set to "ENABLED" within a media component of the "medComponents" attribute to indicate to the PCF that the related media flow is allowed to use the same Allocation and Retention Priority (ARP) as media flows belonging to other "Individual Application Session Context" resources as described in subclause 4.2.2.21. In this case, if the "MCPTT-Preemption" feature is supported, the AF may also include the "preemptCap", "preemptVuln" and "preemptControlInfo" attributes as described in subclause 4.2.2.21.

When the "preemptControlInfo" attribute is modified, the latest provided value shall be applied to all potential media flow candidates.

If the AF earlier has indicated a media flow priority sharing to the PCF by setting the "prioSharingInd" attribute to "ENABLED", the AF may include the Priority-Sharing-Indicator AVP set to "DISABLED" within a media component of the "medComponents" attribute to indicate to the PCF that the related media flow shall not be part of the mechanism for sharing the Allocation and Retention Priority with other media flows any longer.

If this media flow was in priority sharing with other media flows the PCF should readjust the Allocation and Retention Priority for the remaining services sharing priority as described in 3GPP TS 29.512 [8], subclause 4.2.6.2.9 and handle the media flow excluded from priority sharing according to normal PCC/QoS rule provisioning procedures described in 3GPP TS 29.512 [8], subclause 4.2.6.2.

If the AF earlier has indicated a media flow priority sharing to the PCF by setting the "prioSharingInd" attribute to "ENABLED" for media flows and the AF indicates to remove one or more of the media flows in priority sharing with other media flows, the PCF should readjust the Allocation and Retention Priority for the remaining services sharing priority as described in 3GPP TS 29.512 [8], subclause 4.2.6.2.9 and handle the media flow removed according to normal PCC/QoS rule provisioning procedures described in 3GPP TS 29.212 [8], subclause 4.2.6.2.

4.2.3.22 Modification of Subscription to Out of Credit notification

This procedure is used by the AF if the "IMS_SBI" feature is supported to modify in the PCF the subscription to notification about credit unavailability for the Service Data Flows within the AF application session context.

The AF shall use the HTTP PATCH method to update the "Events Subscription" sub-resource together with the modifications to the "Individual Application Session" sub-resource.

The AF shall include in the HTTP PATCH request message described in subclause 4.2.3.2 the updated values of the "EventsSubscReqDataRm" data type, which either include in the "events" attribute a new element with the "event"

attribute set to the value "OUT_OF_CREDIT" or remove from the "events" attribute the existing element with the "event" attribute set to the value "OUT_OF_CREDIT".

As a result of this action, the PCF shall set the appropriate subscription to out of credit notification for the corresponding PCC Rule(s) as described in 3GPP TS 29.512 [8].

The PCF shall reply to the AF with an HTTP response message as described in subclause 4.2.3.2.

4.2.3.23 Modification of Subscription to Service Data Flow QoS Monitoring Information

This procedure is used by AF to modify the PCF subscription for notification about packet delay between UPF and RAN.

The AF shall use the HTTP PATCH method to update the "Events Subscription" sub-resource together with the modifications to the "Individual Application Session" sub-resource.

The AF shall include in the HTTP PATCH request message described in subclause 4.2.3.2 the updated values of the "evSubsc" attribute of "EventsSubscReqDataRm" data type, as follows:

- to create a subscription to QoS monitoring information:
 - a) shall include the "events" array with an array that contains a new entry with the "event" attribute set to "QOS_MONITORING", and notification related information as described in subclause 4.2.2.23; and
 - b) when the "notifMethod" of the new entry is "EVENT_DETECTION", shall include a "qosMon" attribute with the QoS monitoring information as described in subclause 4.2.2.23.
- to remove a subscription to QoS monitoring information:
 - a) shall include the "events" array containing an array that shall omit the corresponding entry with the "event" attribute value "QOS_MONITORING"; and
 - b) when the "notifMethod" of the removed entry is "EVENT_DETECTION", it shall contain the "qosMon" attribute set to null.
 - c) shall include the new requested QoS monitoring parameter(s) to be measured (i.e. DL, UL and/or round trip packet delay) within the "reqQosMonParams" attribute;

As result of this action, the PCF shall set the appropriate subscription to QoS notification control for the corresponding active PCC rule(s) as described in 3GPP TS 29.512 [8].

The PCF shall reply to the AF as described in subclause 4.2.3.2.

4.2.3.24 Update of TSCAI Input Information and TSC QoS related data

If the "TimeSensitiveNetworking" feature is supported the AF may update the TSCAI Input container and the TSC QoS related data held in an "Individual Application Session Context" resource using the Npcf_PolicyAuthorization_Update service operation to modify the TSCAI input information and QoS characteristics delivered to the SMF for use in the 5G System.

The AF shall use the HTTP PATCH method as described in subclause 4.2.3.2 to modify TSCAI input container and the TSC QoS related information.

The AF may indicate TSCAI input information and/or TSC QoS related information for new TSN streams by adding one or more media component entries within the "medComponents" attribute including the "tsnQos" attribute and including the "tscaiInputUI" attribute and/or the "tscaiInputDI" attribute as described in subclause 4.2.2.24.

The AF may update the TSCAI input information and/or the TSC QoS related information for existing TSC traffic by including the updated values in the "tscaiInputUI" attribute and/or "tscaiInputDI" attribute and/or updated values in the "tsnQos" attribute included in a media component entry of the "medComponents" attribute.

The AF may delete the TSCAI input information and TSC QoS related information of removed TSC traffic by removing the corresponding media component entries within the "medComponents" attribute.

The PCF shall reply to the AF as described in subclause 4.2.3.2.

The PCF shall check whether the received TSCAI input information and TSC QoS related information require to modify or to remove PCC rules in the SMF. Provisioning of PCC rule(s) to the SMF shall be carried out as specified in 3GPP TS 29.512 [8].

4.2.3.25 Provisioning of bridge management information and port management information

If the "TimeSensitiveNetworking" feature is supported the AF may provide a BMIC for the Bridge functionality of the UPF/NW-TT and/or a PMIC for the DS-TT port and/or PMIC(s) for the NW-TT ports to update the configuration of the 5G system as a TSN bridge by invoking the Npcf_PolicyAuthorization_Update service operation to the PCF.

The AF shall use the HTTP PATCH method as described in subclause 4.2.3.2 to modify the "Individual Application Session Context" resource holding the BMIC and/or the DS-TT PMIC and/or NW-TT PMIC(s).

The AF may include in the "AppSessionContextUpdateData" data type:

- the DS-TT PMIC encoded in the "tsnPortManContDstt" and/or the one or more NW-TT PMIC(s) encoded in the "tsnPortManContNwttts", if available; and/or
- the BMIC encoded in the "tsnBridgeManCont", if available.

4.2.3.26 Modification of Mission Critical Services

The AF may include the "mcsId" attribute if it was not previously provided in order to indicate that the modified AF session relates to an MCS session.

If the AF supports the SBI message priority mechanism for an MCS session, the AF shall include the "3gpp-Sbi-Message-Priority" custom HTTP header towards the PCF as described in subclause 4.2.2.12.

If the PCF receives the "mcsId" attribute, the PCF shall take specific actions on the corresponding PDU session to ensure that the MCS session is prioritised as defined in 3GPP TS 29.512 [8].

4.2.3.27 Support of CHEM feature

When CHEM feature is supported, the AF may include the value of Maximum Packet Loss Rate for UL within the "maxPacketLossRateUl" attribute and/or the value of Maximum Packet Loss Rate for DL within the "maxPacketLossRateDl" attribute in "medComponents" attribute. For CHEM feature, see Annex B.14.

4.2.3.28 Support of FLUS feature

If the "FLUS" feature is supported by the AF, the AF may include the "flusId" attribute within a media component of the "medComponents" attribute to indicate that the related media of the modified Individual Application Session Context resource corresponds to a FLUS media stream. Additional QoS information for the treatment of FLUS media may be provided within "desMaxLatency" attribute and/or "desMaxLoss" attribute.

4.2.3.29 Subscription to EPS Fallback report

When the "EPSFallbackReport" feature is supported, this procedure is used in the AF to subscribe to the notification of EPS Fallback events, if this event was not previously provisioned.

The AF shall use the HTTP PATCH method to update the "Events Subscription" sub-resource together with the modifications to the "Individual Application Session" sub-resource.

The AF shall include in the HTTP PATCH request message described in subclause 4.2.3.2 the updated values of the "EventsSubscReqDataRm" data type, which shall include in the "events" attribute a new element with the "event" attribute set to "EPS_FALLBACK". The AF shall request to the PCF to report EPS Fallback in conjunction with providing the PCF with AF service information for voice media type as described in subclause 4.2.3.2.

As result of this action, the PCF shall set the appropriate subscription to EPS Fallback for the corresponding active PCC rule(s) as described in 3GPP TS 29.512 [8].

The PCF shall reply to the AF as described in subclause 4.2.3.2.

4.2.3.30 Modification of required QoS information

When the "AuthorizationWithRequiredQoS" feature is supported, this procedure is used by an AF to modify the required QoS by providing a different QoS reference(s) parameter while the AF session is ongoing.

The AF shall use the HTTP PATCH method to modify the required QoS information.

The AF may include in the HTTP PATCH request message described in subclause 4.2.3.2, within one or more entries of the "medComponents" attribute included in the AppSessionContextUpdateData data type:

- a "qosReference" attribute, which may contain:
 - i. a QoS reference, that replaces an existing QoS reference value if the "qosReference" attribute was previously provisioned, or creates a new one if no "qosReference" attribute was previously provisioned;
 - ii. a "null" value, that removes a previously provisioned "qosReference" attribute value; and/or
- an "altSerReqs" attribute, which may contain:
 - i. a prioritized list of alternative QoS references, that replaces an existing alternative QoS references list if the "altSerReqs" attribute was previously provisioned, or creates a new one if no "altSerReqs" attribute was previously provisioned;
 - ii. a "null" value, that removes a previously provisioned alternative QoS references list.

When the AF provides the "altSerReqs" attribute containing a prioritized list of alternative QoS references, the AF shall subscribe to receive notifications when the GBR QoS targets for one or more service data flows can no longer (or can again) be guaranteed, as described in subclause 4.2.3.6, if not previously subscribed.

Due to the updated required QoS information, the PCF may need to modify the related PCC rules as specified in 3GPP TS 29.513 [7] and provide the updated information towards the SMF following the corresponding procedures specified in 3GPP TS 29.512 [8].

The PCF shall reply to the AF as described in subclause 4.2.3.2.

4.2.3.31 Support of QoSHint feature

If the QoSHint feature is supported by the AF, the AF may include the "desMaxLatency" attribute and/or "desMaxLoss" attribute within a media component of the "medComponents" attribute to indicate that the related media of the modified Individual Application Session Context resource has specific latency and/or loss demands.

4.2.3.32 Modification of Subscription to Reallocation of Credit notification

This procedure is used by the AF if the "IMS_SBI" and the "ReallocationOfCredit" features are supported to modify in the PCF the subscription to notification about reallocation of credit for the Service Data Flows within the AF application session context.

The AF shall use the HTTP PATCH method to update the "Events Subscription" sub-resource together with the modifications to the "Individual Application Session" sub-resource.

The AF shall include in the HTTP PATCH request message described in subclause 4.2.3.2 the updated values of the "EventsSubscReqDataRm" data type, which either include in the "events" attribute a new element with the "event" attribute set to the value "REALLOCATION_OF_CREDIT" or remove from the "events" attribute the existing element with the "event" attribute set to the value "REALLOCATION_OF_CREDIT".

As a result of this action, the PCF shall set the appropriate subscription to reallocation of credit notification for the corresponding PCC Rule(s) as described in 3GPP TS 29.512 [8].

The PCF shall reply to the AF with an HTTP response message as described in subclause 4.2.3.2.

4.2.4 Npcf_PolicyAuthorization_Delete service operation

4.2.4.1 General

The Npcf_PolicyAuthorization_Delete service operation provides means for the NF service consumer to delete the context of application session information.

The following procedures using the Npcf_PolicyAuthorization_Delete service operation are supported:

- AF application session context termination.
- Reporting usage for sponsored data connectivity.
- Termination of Multimedia Priority Services.
- Request and report of access network information.
- Termination of MCPTT.
- Termination of MCVideo.
- Priority sharing indication.
- Report of RAN-NAS release cause.

4.2.4.2 AF application session context termination

This procedure is used to terminate an AF application session context for the service as defined in 3GPP TS 23.501 [2], 3GPP TS 23.502 [3] and 3GPP TS 23.503 [4].

Figure 4.2.4.2-1 illustrates the application session context termination.

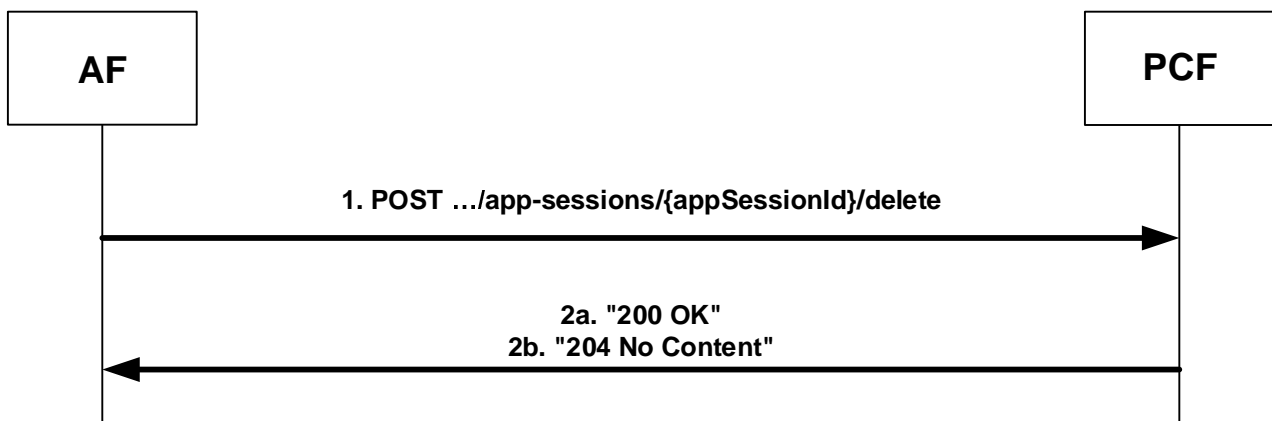


Figure 4.2.4.2-1: Application session context termination

When an AF session is terminated, and if the AF application session context was created as described in subclause 4.2.2 or in subclause 4.2.6.3, the AF shall invoke the Npcf_PolicyAuthorization_Delete service operation to the PCF using an HTTP POST request, as shown in figure 4.2.4.2-1, step 1.

The AF shall set the request URI to "{apiRoot}/npcf-policyauthorization/v1/app-sessions/{appSessionId}/delete".

The AF may include in the body of the HTTP POST the "EventsSubscReqData" data type with the "evSubsc" attribute indicating the corresponding list of events to subscribe to.

When the PCF receives the HTTP POST request from the AF, indicating the termination of the AF application session context information, the PCF shall acknowledge that request by sending an HTTP response message with the corresponding status code.

If the HTTP POST request from the AF is accepted, the PCF shall send to the AF:

- a) if event information is reported, a "200 OK" response to HTTP POST request, as shown in figure 4.2.4.2-1, step 2a, including in the "AppSessionContext" data type the "evsNotifs" attribute, which encodes within "evNotifs" attribute the event to report to the AF, if available, as described in subclause 4.2.5.2. If the event information is not available at the PCF the PCF shall defer sending the response to the AF and shall immediately configure the SMF to provide such information, as specified in 3GPP TS 29.512 [8];
- b) otherwise, the PCF shall send to the AF a "204 No Content".

Afterwards, the PCF shall free the network resources allocated for the Service Data Flow(s) corresponding to the deleted AF application session context information. In order to do that, the PCF shall initiate the request for the removal of any related PCC rules from the SMF, if not previously done, following the corresponding procedures specified in 3GPP TS 29.512 [8].

If the HTTP POST request from the AF is rejected, the PCF shall indicate in the response to HTTP POST request the cause for the rejection as specified in subclause 5.7.

4.2.4.3 Reporting usage for sponsored data connectivity

When "SponsoredConnectivity" is supported, and the AF indicated to enable sponsored data connectivity and the AF provided usage thresholds for such sponsor to the PCF, the PCF shall report accumulated usage to the AF using the response of the Npcf_PolicyAuthorization_Delete service operation.

This procedure is initiated when:

- the "Individual Application Session Context" is deleted by the AF; or
- the PCF requests the deletion of the "Individual Application Session Context" to the AF, as described in subclause 4.2.5.3, due to PDU session termination, the termination of all the service data flows of the AF session or the home operator policy disallowing the UE accessing the sponsored data connectivity in the roaming case.

To report the accumulated usage, the PCF shall immediately configure the SMF to retrieve the accumulated usage as specified in 3GPP TS 29.512 [8]. When the PCF receives the usage information from the SMF, the PCF shall notify the AF by including the "EventsNotification" data type in the response of the HTTP POST request as described in subclause 4.2.4.2.

The PCF shall include:

- an event of the "AfEventNotification" data type in the "evNotifs" attribute with the matched event "USAGE_REPORT" in the "event" attribute; and
- the usage encoded in the "usgRep" attribute.

4.2.4.4 Void

4.2.4.5 Termination of Multimedia Priority Services

If the AF session being terminated corresponds to an MPS session, the PCF shall delete the PCC rules corresponding to the MPS session and the PCF shall revoke the actions related to the prioritization of the MPS session in the corresponding PDU Session as defined in 3GPP TS 29.512 [8].

4.2.4.6 Request and report of access network information

This procedure is used by an AF to request the PCF to report the access network information (i.e. user location and/or user timezone information) at the deletion of the "Individual Application Session Context" resource when the "NetLoc" feature is supported.

This procedure is initiated when:

- the "Individual Application Session Context" is deleted by the AF; or

- the PCF requests the deletion of the "Individual Application Session Context" from the AF, as described in subclause 4.2.5.3, due to PDU session termination or the termination of all the service data flows of the AF session.

The AF shall include in the HTTP POST request message described in subclause 4.2.4.2:

- an entry of the "AfEventSubscription" data type in the "events" attribute with:
 - a) the "event" attribute set to the value "ANI_REPORT"; and
 - b) the "notifMethod" attribute set to the value "ONE_TIME"; and
- the "reqAnis" attribute, with the required access network information, i.e. user location and/or user time zone information).

When the PCF determines that the access network does not support the access network information reporting because the SMF does not support the NetLoc feature, the PCF shall respond to the AF including in the "EventsNotification" data type the "noNetLocSupp" attribute set to "ANR_NOT_SUPPORTED" value. Otherwise, the PCF shall immediately configure the SMF to provide such access information, as specified in 3GPP TS 29.512 [8].

When the PCF receives the access network information from the SMF, the PCF shall provide the corresponding access network information to the AF by including the "EventsNotification" data type in the "200 OK" response to the HTTP POST request. The PCF shall include:

- in case of 3GPP access, the user location information in the "eutraLocation" or in the "nrLocation" attribute in the "ueLoc" attribute, if available and required;
- in case of untrusted non-3GPP access, the user location information in the "n3gaLocation" attribute in the "ueLoc" attribute, if required, as follows:
 - a) the user local IP address in the "ueIpv4Addr" or "ueIpv6Addr" attribute, if available; and
 - b) the UDP source port or the TCP source port in the "portNumber" attribute if available;
- in case of trusted non-3GPP access, the user location information in the "n3gaLocation" attribute in the "ueLoc" attribute, if required, as follows:
 - a) the user local IP address in the "ueIpv4Addr" or "ueIpv6Addr" attribute, if available;
 - b) the UDP source port or the TCP source port in the "portNumber" attribute if available; and
 - c) either the TNAP identifier encoded in the "tnapId" attribute or the TWAP identifier encoded in the "twapId" attribute. The TNAP identifier and the TWAP identifier shall consist of:
 - i. the SSID in the "ssid" attribute;
 - ii. the BSSID the "bssid" attribute if available; and
 - iii. the civic address in the "civicAddress" attribute if available;
- the serving network identity (PLMN network code and country code and, if available, the NID) in the "plmnId" attribute, if user location information is required but not available in any access; and/or
- the UE timezone in the "ueTimezone" attribute if required and available.

When the PCF receives from the SMF that the access network does not support access network information report, the PCF shall include the "noNetLocSupp" attribute set to "ANR_NOT_SUPPORTED", "TZR_NOT_SUPPORTED" or "LOC_NOT_SUPPORTED" value received from the SMF in the "EventsNotification" data type in the "200 OK" response to the HTTP POST request.

The PCF shall also include an event of the "AfEventNotification" data type in the "evNotifs" attribute with the "event" attribute set to the value "ANI_REPORT".

4.2.4.7 Termination of MCPTT

If the "Individual Application Session Context" resource being removed corresponds to an MCPTT session, the PCF shall delete the PCC rules corresponding to the MCPTT session and the PCF shall revoke the actions related to the prioritization of the MCPTT session in the corresponding PDU Session as defined in 3GPP TS 29.512 [8].

4.2.4.8 Termination of MCVideo

If the "Individual Application Session Context" resource being removed corresponds to an MCVideo session, the PCF shall delete the PCC rules corresponding to the MCVideo session and the PCF shall revoke the actions related to the prioritization of the MCVideo session in the corresponding PDU Session as defined in 3GPP TS 29.512 [8].

4.2.4.9 Priority sharing indication

If the "Individual Application Session Context" resource being removed included the "prioSharingInd" attribute set to "ENABLED" within a media component of the "medComponents" attribute, if the related media flow(s) was in priority sharing with other media flows the PCF should readjust the Allocation and Retention Priority for the remaining services sharing Allocation and Retention Priority as described in 3GPP TS 29.512 [8], subclause 4.2.6.2.9 and handle the media flow removed according to normal PCC/QoS rule provisioning procedures described in 3GPP TS 29.512 [8], subclause 4.2.6.2.

4.2.4.10 Report of RAN-NAS release cause

This procedure is used by a PCF to report about the RAN-NAS release cause together with access network information (i.e. user location and/or user timezone information) at the deletion of the "Individual Application Session Context" resource when the "RAN-NAS-Cause" feature is supported.

This procedure is initiated when:

- the "Individual Application Session Context" is deleted by the AF; or
- the PCF requests the deletion of the "Individual Application Session Context" from the AF, as described in subclause 4.2.5.3, due to PDU session termination or the termination of all the service data flows of the AF session.

The PCF shall immediately configure the SMF to provide such RAN-NAS release cause together with access information, as specified in 3GPP TS 29.512 [8].

When the PCF receives the RAN-NAS release cause and access network information from the SMF, the PCF shall provide the corresponding access network information and RAN-NAS release cause to the AF by including the "EventsNotification" data type in the "200 OK" response to the HTTP POST request. The PCF shall include:

- in case of 3GPP access, the user location information in the "eutraLocation" or in the "nrLocation" attribute in the "ueLoc" attribute, if available;
- in case of untrusted non-3GPP access, the user location information in the "n3gaLocation" attribute in the "ueLoc" attribute, if available, as follows:
 - a) the user local IP address in the "ueIpv4Addr" or "ueIpv6Addr" attribute; and
 - b) the UDP source port or the TCP source port in the "portNumber" attribute, if available;
- in case of trusted non-3GPP access, the user location information in the "n3gaLocation" attribute in the "ueLoc" attribute, if available, as follows:
 - a) the user local IP address in the "ueIpv4Addr" or "ueIpv6Addr" attribute, if available;
 - b) the UDP source port or the TCP source port in the "portNumber" attribute if available; and
 - c) either the TNAP identifier encoded in the "tnapId" attribute or the TWAP identifier encoded in the "twapId" attribute. The TNAP identifier and the TWAP identifier shall consist of:
 - i. the SSID in the "ssid" attribute;

- ii. the BSSID the "bssId" attribute if available; and
- iii. the civic address in the "civicAddress" attribute if available;
- the serving network identity (PLMN network code and country code and, if available, the NID) in the "plmnId" attribute, if user location information is not available in any access;
- the UE timezone in the "ueTimeZone" attribute if available; and
- the RAN and/or NAS release cause in the "ranNasRelCauses" attribute, if available.

The PCF shall also include an event of the "AfEventNotification" data type in the "evNotifs" attribute with the "event" attribute set to the value "RAN_NAS_CAUSE".

4.2.4.11 Termination of Mission Critical Services

If the AF session being terminated corresponds to an MCS session, the PCF shall delete the PCC rules corresponding to the MCS session and the PCF shall revoke the actions related to the prioritisation of the MCS session in the corresponding PDU Session as defined in 3GPP TS 29.512 [8].

4.2.5 Npcf_PolicyAuthorization_Notify service operation

4.2.5.1 General

The Npcf_PolicyAuthorization_Notify service operation enables notification to NF service consumers that the previously subscribed event for the existing application session context occurred or that the application session context is no longer valid.

The following procedures using the Npcf_PolicyAuthorization_Notify service operation are supported:

- Notification about application session context event.
- Notification about application session context termination.
- Notification about Service Data Flow QoS notification control.
- Notification about service data flow deactivation.
- Reporting usage for sponsored data connectivity.
- Notification of resources allocation outcome.
- Reporting access network information.
- Notification of signalling path status.
- Notification about out of credit.
- Notification about TSN port detection and/or bridge management information and/or port management information, Individual Application Session Context exists.
- Report of EPS Fallback.
- Notification about 5GS Bridge Information, no Individual Application Session Context exists.
- Notification about reallocation of credit.

4.2.5.2 Notification about application session context event

This procedure is invoked by the PCF to notify the AF when a certain, previously subscribed, application session context event occurs, as defined in 3GPP TS 23.501 [2], 3GPP TS 23.502 [3] and 3GPP TS 23.503 [4].

Figure 4.2.5.2-1 illustrates the notification about application session context event.

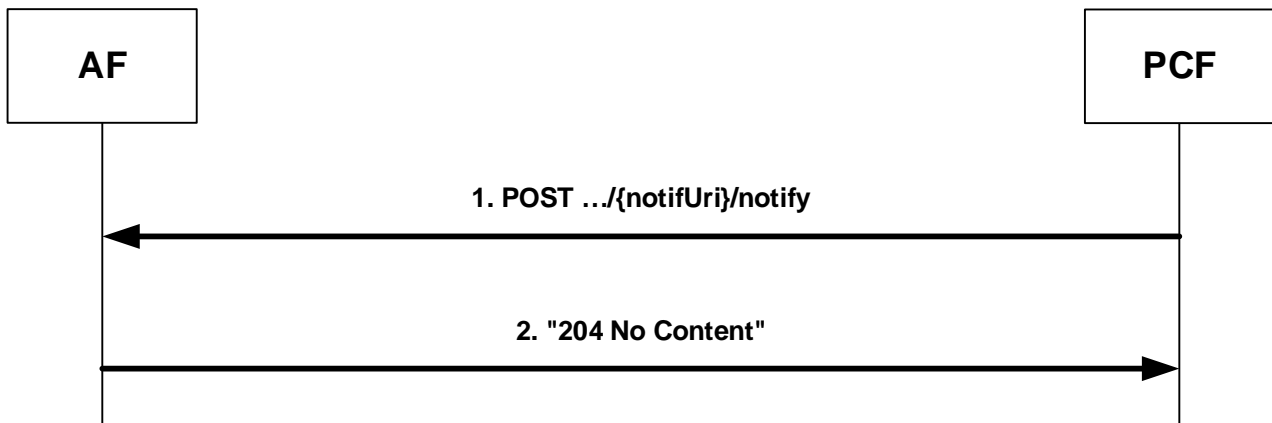


Figure 4.2.5.2-1: Notification about application session context event

When the PCF determines that the event for the existing AF application session context, to which the AF has subscribed to, occurred e.g. upon reception of an event notification for a PDU session from the SMF as described in 3GPP TS 29.512 [8], the PCF shall invoke the `Npcf_PolicyAuthorization_Notify` service operation by sending the HTTP POST request (as shown in figure 4.2.5.2-1, step 1) to the AF using the notification URI received in the subscription creation (or modification), as specified in subclause 4.2.6, and appending the "notify" segment path at the end of the URI. The PCF shall provide in the body of the HTTP POST request the "EventsNotification" data type including:

- the Events Subscription resource identifier in the "evSubsUri" attribute; and
- the list of the reported events in the "evNotifs" attribute. For each reported event, the "AfEventNotification" data type shall include the event identifier and may include additional event information.

The PCF shall include:

- if the AF subscribed to the "PLMN_CHG" event, the "event" attribute set to "PLMN_CHG" and the "plmnId" attribute including the PLMN identifier and, if available, the NID if the PCF has requested to be updated with this information in the SMF;
- if the AF subscribed to the event "ACCESS_TYPE_CHG" in the HTTP POST request, the "event" attribute set to "ACCESS_TYPE_CHG" and:
 - i. the "accessType" attribute including the access type, and the "ratType" attribute including the RAT type when applicable for the notified access type; and/or
 - ii. if the "ATSSS" feature is supported and the PDU session is a MA PDU session:
 - a. if it is the first access type report, and both, 3GPP and non-3GPP access information is available, the "addAccessInfo" attribute. The "addAccessInfo" attribute contains the additional access type information, where the access type is encoded in the "accessType" attribute, and the RAT type is encoded in the "ratType" attribute when applicable for the notified access type;
 - b. if it is a subsequent access type change report:
 - if a new access type is added to the MA PDU session, the "addAccessInfo" attribute with the added access type encoded in the "accessType" attribute, and the RAT type encoded in the "ratType" attribute when applicable for the notified access type;
 - if an access type is released to the MA PDU session, the "relAccessInfo" attribute with the released access type encoded in the "accessType" attribute, and the RAT type encoded in the "ratType" attribute when applicable for the notified access type; and

NOTE: For a MA PDU session, if the "ATSSS" feature is not supported by the AF the PCF shall include the "accessType" attribute and the "ratType" attribute with a currently active combination of access type and RAT type. When both 3GPP and non-3GPP accesses are available, the PCF includes the information corresponding to the 3GPP access and only changes on activation and deactivation of 3GPP access are reported.

- iii. the "anGwAddr" attribute including access network gateway address when available; and
- if the "IMS_SBI" feature is supported and if the AF subscribed to the "CHARGING_CORRELATION" event, the "event" attribute set to "CHARGING_CORRELATION" and may include the "anChargIds" attribute containing the access network charging identifier(s) and the "anChargAddr" attribute containing the access network charging address.

The AF notification of other specific events using the Npcf_PolicyAuthorization_Notify request is described in the related subclauses.

Upon the reception of the HTTP POST request from the PCF indicating that the PDU session and/or service related event occurred, the AF shall acknowledge that request by sending an HTTP response message with the corresponding status code.

If the HTTP POST request from the PCF is accepted, the AF shall acknowledge the receipt of the event notification with a "204 No Content" response to HTTP POST request, as shown in figure 4.2.5.2-1, step 2.

If the HTTP POST request from the PCF is not accepted, the AF shall indicate in the response to HTTP POST request the cause for the rejection as specified in subclause 5.7.

4.2.5.3 Notification about application session context termination

This procedure is invoked by the PCF to notify the AF that the application session context is no longer valid, as defined in 3GPP TS 23.501 [2], 3GPP TS 23.502 [3] and 3GPP TS 23.503 [4].

Figure 4.2.5.3-1 illustrates the notification about application session context termination.

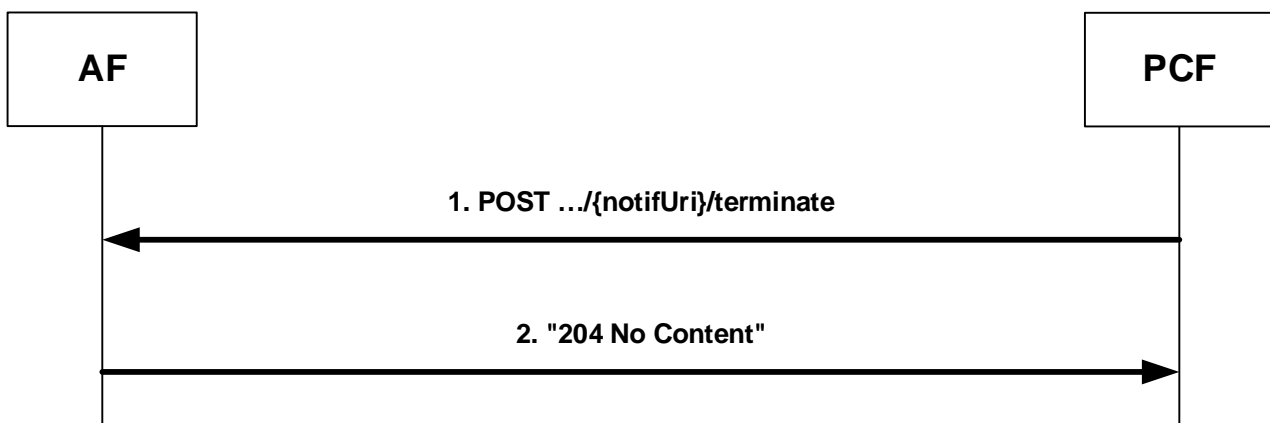


Figure 4.2.5.3-1: Notification about application session context termination

When the PCF determines that the AF application session context is no longer valid, the PCF shall invoke the Npcf_PolicyAuthorization_Notify service operation by sending the HTTP POST request (as shown in figure 4.2.5.3-1, step 1) using the notification URI received in the "Individual Application Session Context" context creation, as specified in subclause 4.2.2 and subclause 4.2.6.3, and appending the "termination" segment path at the end of the URI, to trigger the AF to request the application session context termination (see subclause 4.2.4.2). The PCF shall provide in the body of the HTTP POST request the "TerminationInfo" data type including:

- the application session context identifier in the "resUri" attribute; and
- the application session context termination cause in the "termCause" attribute of the "TerminationCause" data type, indicating:
 - i) "PDU_SESSION_TERMINATION" when the PCF received from the SMF the indication of SM Policy Context termination without a specific PDU session release cause value;
 - ii) "ALL_SDF_DEACTIVATION" when the PCF received from the SMF the indication that all the SDFs of the Individual Application Session Context resource are deactivated because other reasons than "PS_TO_CS_HAN";
 - iii) "PS_TO_CS_HO" if the "IMS_SBI" feature is supported and the PCF received from the SMF:

- a) the PDU session release cause value "PS_TO_CS_HO"; or
- b) the failure code value "PS_TO_CS_HAN" for all the SDFs of the Individual Application Session Context resource.

Upon the reception of the HTTP POST request from the PCF requesting the application session context termination, the AF shall acknowledge that request by sending an HTTP response message with the corresponding status code.

If the HTTP POST request from the PCF is accepted, the AF shall acknowledge the receipt of the application session context termination request with a "204 No Content" response to HTTP POST request (as shown in figure 4.2.5.3-1, step 2) and shall invoke the Npcf_PolicyAuthorization_Delete service operation to the PCF as described in subclause 4.2.4.

If the HTTP POST request from the PCF is not accepted, the AF shall indicate in the response to HTTP POST request the cause for the rejection as specified in subclause 5.7.

4.2.5.4 Notification about Service Data Flow QoS notification control

When the PCF gets the knowledge that one or more SDFs:

- cannot guarantee the GBR QoS targets; or
- can guarantee again the GBR QoS targets;

the PCF shall inform the AF accordingly if the AF has previously subscribed as described in subclauses 4.2.2.6 and 4.2.3.6.

The PCF shall notify the AF by including the "EventsNotification" data type in the body of the HTTP POST request as described in subclause 4.2.5.2.

The PCF shall include:

- within the "evNotifs" attribute an event entry of the "AfEventNotification" data type with the matched event "QOS_NOTIF" in the "event" attribute; and
- the "qncReports" array with:
 - a) the "notifType" attribute to indicate whether the GBR targets for the indicated SDFs are "NOT_GUARANTEED" or "GUARANTEED" again;
 - b) the identification of the affected service flows (if not all the flows are affected) encoded in the "flows" attribute if applicable; and
 - c) if the "AuthorizationWithRequiredQoS" feature as defined in subclause 5.8 is supported, the reference to the Alternative Service Requirement corresponding alternative QoS parameter set if received within the "altSerReq" attribute.

If "MediaComponentVersioning" feature is supported, and if the content version was included when the corresponding media component was provisioned, the "flows" attribute shall also contain the "contVers" attribute including the content version(s) of the media components. The PCF shall include more than one entry in the "contVers" attribute for the same media component if the PCF has received multiple content versions as described in subclause 4.2.6.2.14 in 3GPP TS 29.512 [8].

When the AF receives the HTTP POST request, it shall acknowledge the request by sending a "204 No Content" response to the PCF. The AF may also update the AF application session context information by sending an HTTP PATCH request to the PCF.

Signalling flows for Service Data Flow QoS notification control are presented in 3GPP TS 29.513 [7].

4.2.5.5 Notification about Service Data Flow Deactivation

When the PCF gets the knowledge that one or more SDFs have been deactivated, the PCF shall inform the AF accordingly if the AF has previously subscribed as described in subclauses 4.2.2.7 and 4.2.3.7.

When not all the service data flows within the AF application session context are affected, the PCF shall notify the AF by including the "EventsNotification" data type in the body of the HTTP POST request as described in subclause 4.2.5.2.

The PCF shall include within the "evNotifs" attribute an event of "AfEventNotification" data type indicating the matched event "FAILED_RESOURCES_ALLOCATION" in the "event" attribute and the deactivated service data flows (if not all the flows are affected) encoded in the "flows" attribute.

If the "MediaComponentVersioning" feature is supported, and if the content version was included when the corresponding media component was provisioned as described in subclause 4.2.5.8, the PCF shall also include in the "flows" attribute the "contVers" attribute with the content version(s) of the media components.

If the "RAN-NAS-Cause" feature is supported and the PCF received the RAN-NAS release cause and access network information from the SMF, the PCF shall provide in the "EventsNotification" data type of the HTTP POST request:

- in case of 3GPP access, the user location information in the "eutraLocation" or in the "nrLocation" attribute in the "ueLoc" attribute, if available;
- in case of untrusted non-3GPP access, the user location information in the "n3gaLocation" attribute in the "ueLoc" attribute, if available, as follows:
 - a) the user local IP address in the "ueIpv4Addr" or "ueIpv6Addr" attribute; and
 - b) the UDP source port or the TCP source port in the "portNumber" attribute, if available;
- in case of trusted non-3GPP access, the user location information in the "n3gaLocation" attribute in the "ueLoc" attribute, if available, as follows:
 - a) the user local IP address in the "ueIpv4Addr" or "ueIpv6Addr" attribute, if available;
 - b) the UDP source port or the TCP source port in the "portNumber" attribute if available; and
 - c) either the TNAP identifier encoded in the "tnapId" attribute or the TWAP identifier encoded in the "twapId" attribute. The TNAP identifier and the TWAP identifier shall consist of:
 - i. the SSID in the "ssid" attribute;
 - ii. the BSSID the "bssid" attribute if available; and
 - iii. the civic address in the "civicAddress" attribute if available;
- the serving network identity (PLMN network code and country code and, if available, the NID) in the "plmnId" attribute, if user location information is not available in any access;
- the UE timezone in the "ueTimeZone" attribute if available; and
- the RAN and/or NAS release cause in the "ranNasRelCauses" attribute, if available.

The PCF shall include in the "evNotifs" attribute, together with the event "FAILED_RESOURCES_ALLOCATION", an event of the "AfEventNotification" data type with the "event" attribute set to the value "RAN_NAS_CAUSE".

The PCF shall include more than one entry in the "contVers" attribute for the same media component if the PCF has received multiple content versions as described in subclause 4.2.6.2.14 in 3GPP TS 29.512 [8].

When the AF receives the HTTP POST request, it shall acknowledge the request by sending a "204 No Content" response to the PCF. The AF may also update the AF application session context information by sending an HTTP PATCH request to the PCF.

When all the service data flows within the AF session are affected, the PCF shall inform the AF by sending a notification about application session context termination as defined in subclause 4.2.5.3.

Signalling flows for Service Data Flow Deactivation cases are presented in 3GPP TS 29.513 [7].

4.2.5.6 Reporting usage for sponsored data connectivity

When "SponsoredConnectivity" is supported, the AF enabled sponsored data connectivity and the AF provided usage thresholds for such sponsor to the PCF, the PCF shall report accumulated usage to the AF using the Npcf_PolicyAuthorization_Notify service operation when:

- the PCF detects that the usage threshold provided by the AF has been reached; or
- the AF disables the sponsored data connectivity.

The PCF shall notify the AF of the accumulated usage by including the "EventsNotification" data type in the body of the HTTP POST request as described in subclause 4.2.5.2.

The PCF shall include:

- an event of the "AfEventNotification" data type in the "evNotifs" attribute with the matched event "USAGE_REPORT" in the "event" attribute; and
- the accumulated usage, corresponding to the usage since the last report to the AF, encoded in the "usgRep" attribute.

When the AF receives the HTTP POST request, it shall acknowledge the request by sending a "204 No Content" response to the PCF. The AF may terminate the AF session sending an HTTP POST as described in subclause 4.2.4.2 or update the AF application session context information by providing a new usage threshold sending an HTTP PATCH request to the PCF as described in subclause 4.2.3.5 or an HTTP PUT request to the PCF as described in subclause 4.2.6.4.

NOTE: After the PCF reports the accumulated usage to the AF, the AF can provide a new usage threshold to the PCF. The monitoring will not start until the PCF receives the new threshold from the AF and provides it to the SMF.

4.2.5.7 Void

4.2.5.8 Notification about resources allocation outcome

When the PCF becomes aware that the resources associated to service information for one or more SDFs have been allocated, the PCF shall inform the AF accordingly if the AF has previously subscribed to the "SUCCESSFUL_RESOURCES_ALLOCATION" event as described in subclauses 4.2.2.10 and 4.2.3.10. The PCF shall notify the AF by including the "EventsNotification" data type in the body of the HTTP POST request as described in subclause 4.2.5.2. The PCF shall include in the "evNotifs" attribute an entry with the "event" attribute set to "SUCCESSFUL_RESOURCES_ALLOCATION" and (if not all the flows are affected) the identification of the related media components in the "flows" attribute. If the "MediaComponentVersioning" feature is supported, the PCF shall also include in the "flows" attribute the "contVers" attribute with the content version(s) of the media components if the content version was included when the corresponding media component was provisioned.

When the PCF becomes aware that the resources associated to service information for one or more SDFs cannot be allocated, the PCF shall inform the AF accordingly if the AF has previously subscribed to the "FAILED_RESOURCES_ALLOCATION" event as described in subclauses 4.2.2.10 and 4.2.3.10. The PCF shall notify the AF by including the "EventsNotification" data type in the body of the HTTP POST request as described in subclause 4.2.5.2. The PCF shall include:

- an entry in the "evNotifs" attribute with the "event" attribute set to "FAILED_RESOURCES_ALLOCATION"; and
- the "failedResourAllocReports" attribute with the active/inactive status of the PCC rules related to certain media components encoded in the "mcResourceStatus" attribute, and (if not all the flows are affected) the identification of the related media components in the "flows" attribute. If the "MediaComponentVersioning" feature is supported, the PCF shall also include in the "flows" attribute the "contVers" attribute with the content version(s) of the media components if the content version was included when the corresponding media component was provisioned.

The PCF shall include more than one entry in the "contVers" attribute for the same media component if the PCF has received multiple content versions as described in subclause 4.2.6.2.14 in 3GPP TS 29.512 [8].

NOTE: The AF will use the content version to identify the media component version that failed or succeeded when multiple provisions of the same media component occur in a short period of time. How the AF handles such situations is out of scope of this specification.

When the AF receives the HTTP POST request, it shall acknowledge the request by sending a "204 No Content" response to the PCF.

Signalling flows for resource allocation outcome are presented in 3GPP TS 29.513 [7].

4.2.5.9 Void

4.2.5.10 Notification of signalling path status

When the PCF is notified of the loss or release of resources associated to the PCC rules corresponding with AF signalling IP flows, the PCF shall inform the AF about the loss of the signalling transmission path if the AF has previously subscribed as described in subclause 4.2.6.7.

The PCF shall notify the AF by including the "EventsNotification" data type in the body of the HTTP POST request as described in subclause 4.2.5.2.

The PCF shall include within the "evNotifs" attribute an event of "AfEventNotification" data type indicating the matched event "FAILED_RESOURCES_ALLOCATION" in the "event" attribute and the deactivated IP flow encoded in the "flows" attribute.

If the "RAN-NAS-Cause" feature is supported and the PCF received the RAN-NAS release cause and/or access network information from the SMF, the PCF shall provide in the "EventsNotification" data type in the "200 OK" response to the HTTP POST request:

- in case of 3GPP access, the user location information in the "eutraLocation" or in the "nrLocation" attribute in the "ueLoc" attribute, if available;
- in case of untrusted non-3GPP access, the user location information in the "n3gaLocation" attribute in the "ueLoc" attribute, if available, as follows:
 - a) the user local IP address in the "ueIpv4Addr" or "ueIpv6Addr" attribute; and
 - b) the UDP source port or the TCP source port in the "portNumber" attribute, if available;
- in case of trusted non-3GPP access, the user location information in the "n3gaLocation" attribute in the "ueLoc" attribute, if available, as follows:
 - a) the user local IP address in the "ueIpv4Addr" or "ueIpv6Addr" attribute, if available;
 - b) the UDP source port or the TCP source port in the "portNumber" attribute if available; and
 - c) either the TNAP identifier encoded in the "tnapId" attribute or the TWAP identifier encoded in the "twapId" attribute. The TNAP identifier and the TWAP identifier shall consist of:
 - i. the SSID in the "ssid" attribute;
 - ii. the BSSID the "bssid" attribute if available; and
 - iii. the civic address in the "civicAddress" attribute if available;
- the serving network identity (PLMN network code and country code and, if available, the NID) in the "plmnId" attribute, if user location information is not available in any access;
- the UE timezone in the "ueTimezone" attribute if available; and
- the RAN and/or NAS release cause in the "ranNasRelCauses" attribute, if available.

The PCF shall include in the "evNotifs" attribute, together with the event "FAILED_RESOURCES_ALLOCATION", an event of the "AfEventNotification" data type with the "event" attribute set to the value "RAN_NAS_CAUSE".

When the AF receives the HTTP POST request, it shall acknowledge the request by sending a "204 No Content" response to the PCF.

4.2.5.11 Reporting access network information

This procedure is used by the PCF to report the access network information (i.e. user location and/or user timezone information) to the AF when the "NetLoc" feature is supported.

When the PCF receives the access network information from the SMF, the PCF shall include the "EventsNotification" data type in the body of the HTTP POST request message sent to the AF as described in subclause 4.2.5.2. The PCF shall include in the "EventsNotification" data type:

- in case of 3GPP access, the user location information in the "eutraLocation" or in the "nrLocation" attribute in the "ueLoc" attribute, if available and required;
- in case of untrusted non-3GPP access, the user location information in the "n3gaLocation" attribute in the "ueLoc" attribute, if required, as follows:
 - a) the user local IP address in the "ueIpv4Addr" or "ueIpv6Addr" attribute, if available; and
 - b) the UDP source port or the TCP source port in the "portNumber" attribute if available;
- in case of trusted non-3GPP access, the user location information in the "n3gaLocation" attribute in the "ueLoc" attribute, if required, as follows:
 - a) the user local IP address in the "ueIpv4Addr" or "ueIpv6Addr" attribute, if available;
 - b) the UDP source port or the TCP source port in the "portNumber" attribute if available; and
 - c) either the TNAP identifier encoded in the "tnapId" attribute or the TWAP identifier encoded in the "twapId" attribute. The TNAP identifier and the TWAP identifier shall consist of:
 - i. the SSID in the "ssid" attribute;
 - ii. the BSSID the "bssid" attribute if available; and
 - iii. the civic address in the "civicAddress" attribute if available;
- the serving network identity (PLMN network code and country code and, if available, the NID) in the "plmnId" attribute, if user location information is required but not available in any access; and/or
- the UE timezone in the "ueTimezone" attribute if required and available.

When the PCF receives from the SMF that the access network does not support access network information report, the PCF shall include the "noNetLocSupp" attribute set to "ANR_NOT_SUPPORTED", "TZR_NOT_SUPPORTED" or "LOC_NOT_SUPPORTED" value received from the SMF in the "EventsNotification" data type in the "200 OK" response to the HTTP POST request.

The PCF shall also include an event of the "AfEventNotification" data type in the "evNotifs" attribute with the "event" attribute set to the value "ANI_REPORT".

NOTE: The PCF receives the access network information from the SMF if it is previously requested by the AF or at PDU session termination or at the termination of all the service data flows of the AF session.

The PCF shall not invoke the Npcf_PolicyAuthorization_Notify service operation with the "event" attribute set to the value "ANI_REPORT" to report to the AF any subsequently received access network information, unless the AF sends a new request for access network information.

4.2.5.12 Notification about Out of Credit

If the "IMS_SBI" feature is supported and if the PCF becomes aware that there is no credit available in the CHF for one or more SDFs, the PCF shall inform the AF accordingly if the AF has previously subscribed to the "OUT_OF_CREDIT" event as described in subclauses 4.2.2.22 and 4.2.3.22.

The PCF shall notify the AF by including the "EventsNotification" data type in the body of the HTTP POST request as described in subclause 4.2.5.2.

The PCF shall include:

- in the "evNotifs" attribute an entry with the "event" attribute set to the value "OUT_OF_CREDIT"; and
- the "outOfCredReports" attribute containing in each entry of the "OutOfCreditInformation" data type the credit information for one or more service data flows. The "OutOfCreditInformation" data type shall contain the termination action in the "finUnitAct" attribute, and the identification of the affected service data flows (if not all the flows are affected) encoded in the "flows" attribute.

Upon the reception of the HTTP POST request from the PCF, the AF shall acknowledge that request by sending an HTTP response message as described in subclause 4.2.5.2.

4.2.5.13 Notification about TSN port detection and/or bridge management information and/or port management information, Individual Application Session Context exists

If the "TimeSensitiveNetworking" feature is supported and if the PCF becomes aware that, for an existing Individual Application Session Context resource, new 5GS Bridge information is available, e.g., new TSN ports are available and/or a BMIC and/or a DS-TT PMIC and/or one or more NW-TT PMIC(s) are available, the PCF shall inform the AF accordingly, if the AF has previously subscribed as described in subclause 4.2.2.31.

The PCF shall notify the AF by including the "EventsNotification" data type in the body of the HTTP POST request as described in subclause 4.2.5.2.

The PCF shall include in the "evNotifs" attribute an entry with the "event" attribute set to the value "TSN_BRIDGE_INFO", and:

- if the PCF is aware that new TSN ports are available or existing TSN ports are removed, the "tsnBridgeInfo" attribute as received from the SMF; and/or
- if the PCF is aware that a BMIC and/or a DS-TT PMIC and/or one or more NW-TT PMIC(s) are available, the "tsnBridgeManCont" attribute and/or the "tsnPortManContDst" attribute and/or the "tsnPortManContNwttts" attribute as received from the SMF.

Upon the reception of the HTTP POST request from the PCF, the AF shall acknowledge that request as specified in subclause 4.2.5.2.

The TSN AF may use the received TSN bridge information and/or the received BMIC and/or the received DS-TT PMIC and/or NW-TT PMIC(s) and the local configuration to construct the DS-TT port and or NW-TT port management information required to interwork with the TSN network.

If port management information shall be sent as a response of the received notification, the AF triggers the Npcf_PolicyAuthorization_Update service operation to send the port management information to the PCF as specified in subclause 4.2.3. The TSN AF delivers to the PCF the derived port management information containers as described in subclause 4.2.3.25.

And/or if bridge management information shall be sent as a response of the received notification, the AF includes the BMIC in the Npcf_PolicyAuthorization_Update service operation as described in subclause 4.2.3.25.

4.2.5.14 Notification about Service Data Flow QoS Monitoring control

When the PCF gets the information about any one of the following items for one or more SDFs from the SMF:

- uplink packet delay(s); or

- downlink packet delay(s); or
- round trip delay(s);

the PCF shall inform the AF accordingly if the AF has previously subscribed as described in subclauses 4.2.2.6 and 4.2.3.6.

The PCF shall notify the AF by including the "EventsNotification" data type in the body of the HTTP POST request as described in subclause 4.2.5.2.

The PCF shall include:

- within the "evNotifs" attribute an event entry of the "AfEventNotification" data type with the matched event "QOS_MONITORING" in the "event" attribute; and
- the "qosMonReports" array with:
 - a) the identification of the affected service flows (if not all the flows are affected) encoded in the "flows" attribute if applicable; and
 - b) one or two uplink packet delays within the "ulDelays" attribute; or
 - c) one or two downlink packet delays within the "dlDelays" attribute; or
 - d) one or two round trip packet delays within the "rtDelays" attribute.

4.2.5.15 Report of EPS Fallback

When "EPSFallbackReport" feature is supported and the PCF becomes aware of the EPS Fallback for the resources requested for a particular service information (voice media type), the PCF shall inform the AF if the AF has previously subscribed as described in subclauses 4.2.2.30 and 4.2.3.29.

The PCF shall notify the AF by including the "EventsNotification" data type in the body of the HTTP POST request as described in subclause 4.2.5.2.

The PCF shall include within the "evNotifs" attribute an event entry of the "AfEventNotification" data type with the matched event "EPS_FALLBACK" in the "event" attribute.

When the AF receives the HTTP POST request, it shall acknowledge the request by sending a "204 No Content" response to the PCF.

4.2.5.16 Notification about 5GS Bridge Information, no Individual Application Session Context exists

If the "TimeSensitiveNetworking" feature is supported and if the PCF becomes aware that 5GS Bridge information for a TSN network is available, but there is no "Individual Application Session Context" resource bound to the SM Policy Association updated with 5GS Bridge related information, the PCF shall inform the TSN AF about the detection of a 5GS Bridge Information in the context of a PDU session by sending a notification request to the request URI locally configured in the PCF for this TSN network.

NOTE: PCF configuration of TSN AF URI needs to ensure that the notification is addressed to a TSN AF that belongs to the same TSN network the UPF/NW-TT connects to. How it is achieved is implementation specific. It can be based e.g. on dedicated DNN/S-NSSAI combinations or on the received Bridge information.

Figure 4.2.5.16-1 illustrates the notification about ethernet port detection when there is no Individual Application Session Context bound to the SM Policy Association.

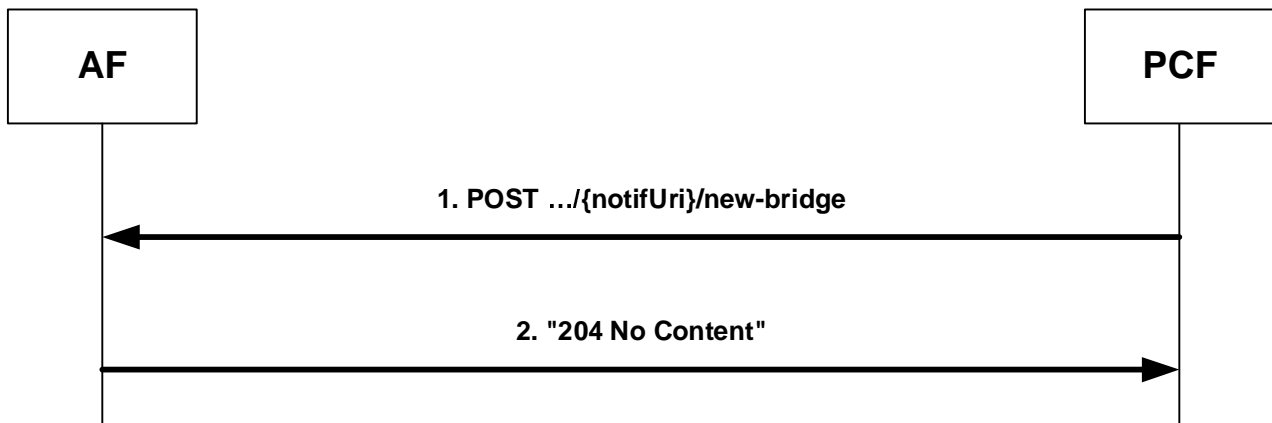


Figure 4.2.5.16-1: Notification about 5GS Bridge Information, no AF session context exists

When the PCF determines that the AF application session context does not exist for the SM Policy Association that detected new TSN port information, the PCF shall invoke the `Npcf_PolicyAuthorization_Notify` service operation by sending the HTTP POST request (as shown in figure 4.2.5.16-1, step 1) using the notification URI locally configured in the PCF for this TSN network, and appending the "new-bridge" segment path at the end of the URI, to trigger the TSN AF to request the creation of an Individual Application Session Context resource to handle the 5GS Bridge detected in the context of a PDU session, configuring TSN ports and bridge port management information, and providing the corresponding TSCAI input containers and TSC traffic QoS related data (see subclauses 4.2.2.2, 4.2.2.24, 4.2.2.25 and 4.2.2.31).

The PCF shall provide in the body of the HTTP POST request the "PduSessionTsnBridge" data type including TSN Bridge information as follows:

- the "tsnBridgeInfo" attribute as received from the SMF;
- the "tsnBridgeManCont" attribute as received from the SMF, if available; and
- the "tsnPortManContDstt" attribute and/or "tsnPortManContNwttt" attribute as received from the SMF, if available.

Upon the reception of the HTTP POST request from the PCF, the AF shall acknowledge that request.

With the received information, the TSN AF shall immediately trigger the creation of an Individual Application Session Context resource to handle in this association the configuration of the new 5GS Bridge in the context of this PDU session, as described in subclauses 4.2.2.2, 4.2.2.24, 4.2.2.25 and 4.2.2.31.

The TSN AF may use the received TSN bridge information and/or the received DS-TT port management information container and/or NW-TT port management information containers and the local configuration to construct the DS-TT port and or NW-TT port management information required to interwork with the TSN network.

4.2.5.17 Notification about Reallocation of Credit

If the "IMS_SBI" and the "ReallocationOfCredit" features are supported and if the PCF becomes aware that there is credit reallocated for one or more SDFs after a former out of credit indication, the PCF shall inform the AF accordingly if the AF has previously subscribed to the "REALLOCATION_OF_CREDIT" event as described in subclauses 4.2.2.34 and 4.2.3.32.

The PCF shall notify the AF by including the "EventsNotification" data type in the body of the HTTP POST request as described in subclause 4.2.5.2.

The PCF shall include in the "evNotifs" attribute an entry with:

- the "event" attribute set to the value "REALLOCATION_OF_CREDIT"; and
- the SDFs that are impacted as consequence of the reallocation of credit condition encoded in the "flows" attribute.

Upon the reception of the HTTP POST request from the PCF, the AF shall acknowledge that request by sending an HTTP response message as described in subclause 4.2.5.2.

4.2.6 Npcf_PolicyAuthorization_Subscribe service operation

4.2.6.1 General

The Npcf_PolicyAuthorization_Subscribe service operation enables NF service consumers handling of subscription to events for the existing application session context. Subscription to events shall be created:

- within the application session context establishment procedure by invoking the Npcf_PolicyAuthorization_Create service operation, as described in subclause 4.2.2; or
- within the application session context modification procedure by invoking the Npcf_PolicyAuthorization_Update service operation, as described in subclause 4.2.3; or
- by invoking the Npcf_PolicyAuthorization_Subscribe service operation for the existing application session context, as described in subclause 4.2.6.2.

The following procedures using the Npcf_PolicyAuthorization_Subscribe service operation is supported:

- Handling of subscription to events for the existing application session context.
- Initial subscription to events without provisioning of service information.
- Subscription to usage monitoring of sponsored data connectivity.
- Request of access network information.
- Subscription to notification of signalling path status.
- Modification of Subscription to Service Data Flow QoS Monitoring Information.

4.2.6.2 Handling of subscription to events for the existing application session context

This procedure is used to create a subscription to events for the existing AF application session context bound to the corresponding PDU session or to modify an existing subscription, as defined in 3GPP TS 23.501 [2], 3GPP TS 23.502 [3] and 3GPP TS 23.503 [4].

Figure 4.2.6.2-1 illustrates the creation of events subscription information using HTTP PUT method.

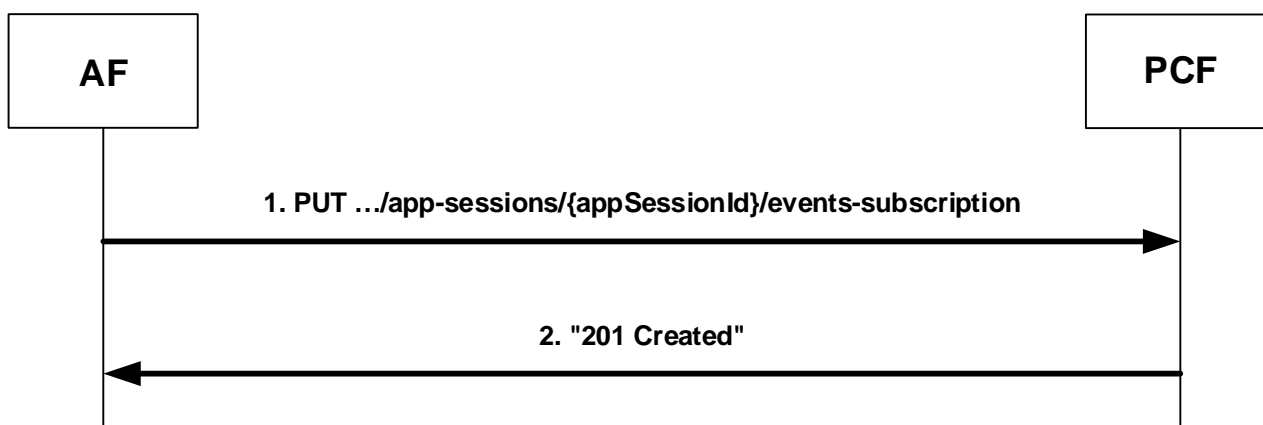


Figure 4.2.6.2-1: Creation of events subscription information using HTTP PUT

Figure 4.2.6.2-2 illustrates the modification of events subscription information using HTTP PUT method.

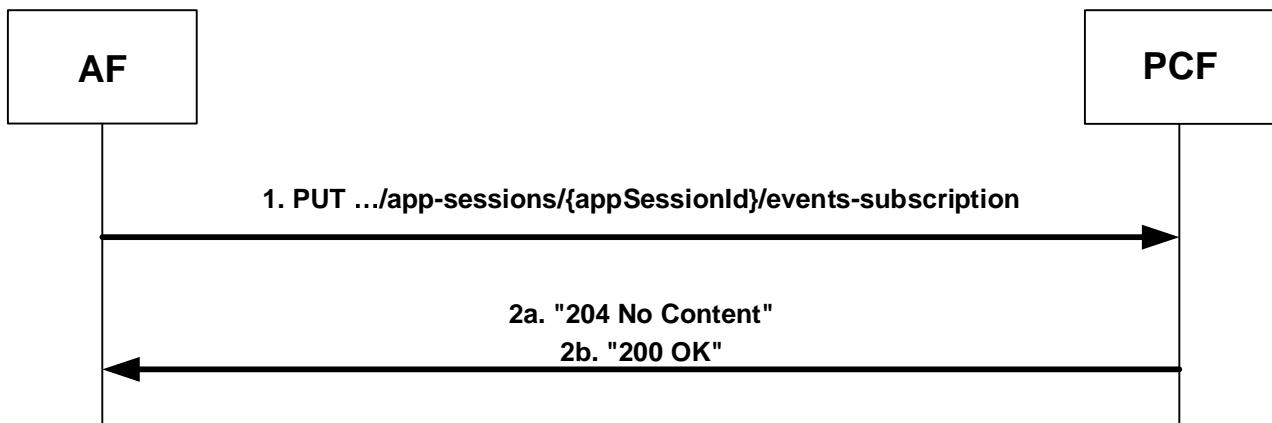


Figure 4.2.6.2-2: Modification of events subscription information using HTTP PUT

When the AF decides to create a subscription to one or more events for the existing application session context or to modify an existing subscription previously created by itself at the PCF, the AF shall invoke the `Npcf_PolicyAuthorization_Subscribe` service operation by sending the HTTP PUT request to the resource URI representing the "Events Subscription" sub-resource in the PCF, as shown in figure 4.2.6.2-1, step 1 and figure 4.2.6.2-2, step 1. The AF shall provide in the "EventsSubscReqData" data type of the body of the HTTP PUT request:

- the "evSubsc" attribute with the list of events to be subscribed; and
- the "notifUri" attribute that includes the Notification URI to indicate to the PCF where to send the notification of the subscribed events if not provided before.

Upon the reception of the HTTP PUT request from the AF, the PCF shall decide whether the received HTTP PUT request is accepted.

If the HTTP PUT request from the AF is rejected, the PCF shall indicate in the HTTP response the cause for the rejection as specified in subclause 5.7.

If the PCF accepted the HTTP PUT request to create a subscription to events, the PCF shall create the "Events Subscription" sub-resource and shall send the HTTP response message to the AF as shown in figure 4.2.6.2-1, step 2. The PCF shall include in the "201 Created" response:

- a Location header field that shall contain the URI of the created "Events Subscription" sub-resource i.e. `"{apiRoot}/npcf-policyauthorization/v1/app-sessions/{appSessionId}/events-subscription"`; and
- a response body with the "EventsSubscPutData" data type, that contains the attributes of the "EventsSubscReqData" data type, representing the created "Events Subscription" sub-resource.

If the PCF determines that one or more of the subscribed events are already met in the PCF, the PCF may also include the attributes of the "EventsNotification" data type within the "EventsSubscPutData" data type to notify about the already met events in the PCF.

If the PCF accepted the HTTP PUT request to modify the events subscription, the PCF shall modify the "Events Subscription" sub-resource and shall send to the AF:

- the HTTP "204 No Content" response (as shown in figure 4.2.6.2-2, step 2a); or
- the HTTP "200 OK" response (as shown in figure 4.2.6.2-2, step 2b) including in the "EventsSubscPutData" data type the updated representation of the "Events Subscription" sub-resource encoded within the attributes of the "EventsSubscReqData" data type and, if one or more of the updated subscribed events are already met in the PCF, the notification of these events by including the attributes of the "EventsNotification" data type.

The PCF shall include in the "evsNotif" attribute:

- if the AF subscribed to the "PLMN_CHG" event in the HTTP PUT request, the "event" attribute set to "PLMN_CHG" and the "plmnId" attribute including the PLMN identifier and, if available, the NID if the PCF has previously requested to be updated with this information in the SMF; and

- if the AF subscribed to the "ACCESS_TYPE_CHG" event in the HTTP PUT request, the "event" attribute set to "ACCESS_TYPE_CHG" and:
 - i. the "accessType" attribute including the access type, and the "ratType" attribute including the RAT type when applicable for the notified access type; and
 - ii. if the "ATSSS" feature is supported, the "addAccessInfo" attribute with the additional access type information if available, where the access type is encoded in the "accessType" attribute, and the RAT type is encoded in the "ratType" attribute when applicable for the notified access type; and

NOTE: For a MA PDU session, if the "ATSSS" feature is not supported by the AF the PCF includes the "accessType" attribute and the "ratType" attribute with a currently active combination of access type and RAT type (when applicable for the notified access type). When both 3GPP and non-3GPP accesses are available, the PCF includes the information corresponding to the 3GPP access.

iii. the "anGwAddr" attribute including access network gateway address when available,

if the PCF has previously requested to be updated with this information in the SMF.

Based on the received subscription information from the AF, the PCF may create a subscription to event notifications or may modify the existing subscription to event notifications, for a related PDU session from the SMF, as described in 3GPP TS 29.512 [8].

4.2.6.3 Initial subscription to events without provisioning of service information

The AF may subscribe with the PCF to events notification without providing service information.

NOTE 1: This service operation is intended to create a resource that enables to handle subscription to events without provisioning service information. For the scenarios where it is known the AF, after creating a subscription without service information, could require an application session context with the PCF with required service information, the AF needs to create an Individual Application Session context as described in subclause 4.2.2.2.

Figure 4.2.6.3-1 illustrates the initial subscription to events without provisioning of service information.

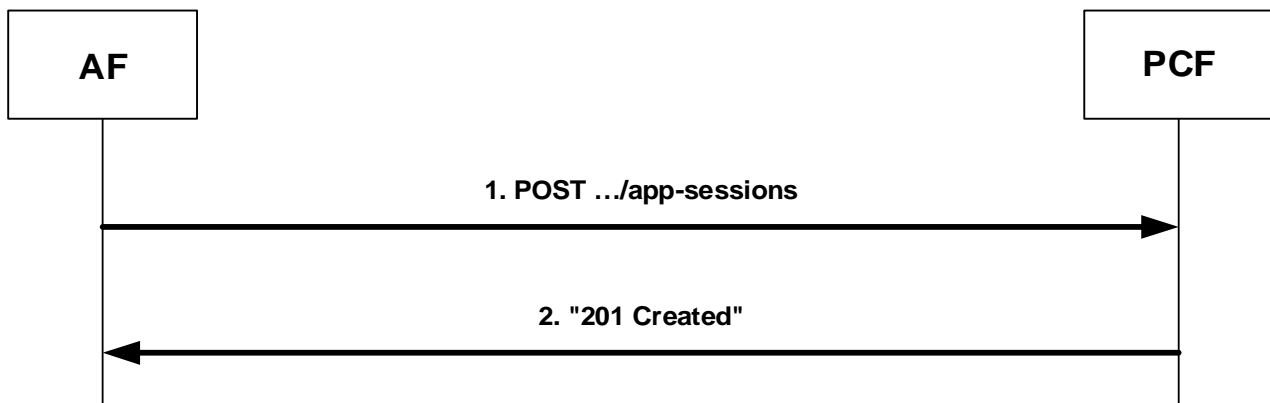


Figure 4.2.6.3-1: Initial Subscription to events without provisioning of service information

When an AF establishes an application session context with the PCF to subscribe to events and does not require PCC control for the related media, the AF shall invoke the `Npcf_PolicyAuthorization_Subscribe` service operation by sending the HTTP POST request to the resource URI representing the "Application Sessions" collection resource of the PCF, as shown in figure 4.2.6.3-1, step 1.

The AF shall include in the "ascReqData" attribute of the "AppSessionContext" data type in the payload body of the HTTP POST request:

- either the "ueMac" attribute containing the UE MAC address, or the "ueIpv4" attribute or "ueIpv6" attribute containing the UE IPv4 or the IPv6 address;
- the "notifUri" attribute containing the URI where the PCF shall request to the AF the deletion of the "Individual Application Session Context" resource"; and

- the "evSubsc" attribute of "EventsSubscReqData" data type to request the notification of certain user plane events. The AF shall include:
 - a. the events to subscribe to in the "events" attribute; and
 - b. the notification URI where to address the notification of the met events within the "notifUri" attribute.

The AF may provide in the "AppSessionContext" data type the DNN in the "dnn" attribute, SUPI in the "supi" attribute or other information if available.

If the PCF cannot successfully fulfil the received HTTP POST request due to the internal PCF error or due to the error in the HTTP POST request, the PCF shall send the HTTP error response as specified in subclause 5.7.

Otherwise, when the PCF receives the HTTP POST request from the AF, the PCF shall apply session binding as described in 3GPP TS 29.513 [7]. The PCF identifies the PDU session for which the HTTP POST request applies as described in subclause 4.2.2.2.

The information required for session binding (UE MAC address, or UE Ipv4 or IPv6 address, DNN, SUPI and other available information, such as S-NSSAI and/or IPv4 address domain identifier) is provisioned in the "Individual Application Session Context" resource. The events subscription is provisioned in the "Events Subscription" sub-resource.

Based on the received subscription information from the AF, the PCF may create a subscription to event notifications for a related PDU session from the SMF, as described in 3GPP TS 29.512 [8].

If the PCF created the "Events Subscription" sub-resource within the "Individual Application Session Context" resource, the PCF shall send to the AF a "201 Created" response to the HTTP POST request, as shown in figure 4.2.6.3-1, step 2. The PCF shall include in the "201 Created" response:

- a Location header field; and
- an "AppSessionContext" data type in the payload body.

The Location header field shall contain the URI of the created events subscription sub-resource i.e. "{apiRoot}/npcf-policyauthorization/v1/app-sessions/{appSessionId}/events-subscription".

The "AppSessionContext" data type payload body shall contain the representation of the created "Individual Application Session Context" resource and "Events Subscription" sub-resource.

The PCF shall include in the "evsNotif" attribute:

- if the AF subscribed to the event "PLMN_CHG" in the HTTP POST request, the "event" attribute set to "PLMN_CHG" and the "plmnId" attribute including the PLMN identifier and, if available, the NID if the PCF has previously requested to be updated with this information in the SMF;
- if the AF subscribed to the event "ACCESS_TYPE_CHG" in the HTTP POST request, the "event" attribute set to "ACCESS_TYPE_CHG" and:
 - i. the "accessType" attribute including the access type, and the "ratType" attribute including the RAT type when applicable for the notified access type; and
 - ii. if the "ATSSS" feature is supported, the "addAccessInfo" attribute with the additional access type information if available, where the access type is encoded in the "accessType" attribute, and the RAT type is encoded in the "ratType" attribute when applicable for the notified access type; and

NOTE 2: For a MA PDU session, if the "ATSSS" feature is not supported by the AF the PCF includes the "accessType" attribute and the "ratType" attribute with a currently active combination of access type and RAT type (if applicable for the notified access type). When both 3GPP and non-3GPP accesses are available, the PCF includes the information corresponding to the 3GPP access.

- iii. the "anGwAddress" attribute including access network gateway address when available,

if the PCF has previously requested to be updated with this information in the SMF; and

- if the "IMS_SBI" feature is supported and if the AF subscribed to the event "CHARGING_CORRELATION" in the HTTP POST request, the "event" attribute set to "CHARGING_CORRELATION" and may include the "anChargIds" attribute containing the access network charging identifier(s) and the "anChargAddr" attribute containing the access network charging address.

NOTE 3: Due to the resource structure, as result of the Npcf_PolicyAuthorization_Subscribe service operation using POST methods, the PCF creates an Individual Application Session context resource which can only be deleted via Npcf_PolicyAuthorization_Delete service operation.

4.2.6.4 Subscription to usage monitoring of sponsored data connectivity

This procedure is used by an AF to subscribe with the PCF to usage monitoring of sponsored data connectivity or to provide updated usage thresholds for the existing application session context, when the "Sponsored Connectivity" feature is supported.

The AF shall include in the HTTP PUT request message described in subclause 4.2.6.2 the "EventsSubscReqData" data type, that shall contain:

- the "events" attribute with a new entry of the "AfEventSubscription" data type with the "event" attribute set to "USAGE_REPORT"; and
- the "usgThres" attribute with the usage thresholds to apply.

The PCF shall reply to the AF as described in subclause 4.2.6.2.

4.2.6.5 Void

4.2.6.6 Request of access network information

This procedure is used by an AF to request the PCF to report the access network information (i.e. user location and/or user timezone information) without providing service information when the "NetLoc" feature is supported.

The AF can request access network information without providing service information:

- at initial subscription to events, using the HTTP POST request message as described in subclause 4.2.6.3; and
- at modification of the subscription to events, using the HTTP PUT request message as described in subclause 4.2.6.2.

The AF shall include in the HTTP request message:

- an entry of the "AfEventSubscription" data type in the "events" attribute with:
 - a) the "event" attribute set to the value "ANI_REPORT"; and
 - b) the "notifMethod" attribute set to the value "ONE_TIME"; and
- the "reqAnis" attribute, with the required access network information, i.e. user location and/or user time zone information).

When the PCF determines that the access network does not support the access network information reporting because the SMF does not support the NetLoc feature, the PCF shall respond to the AF including in the "EventsNotification" data type the "noNetLocSupp" attribute set to "ANR_NOT_SUPPORTED" value. Otherwise, the PCF shall immediately configure the SMF to provide such access information, as specified in 3GPP TS 29.512 [8].

The PCF shall reply to the AF with the HTTP POST response as described in subclause 4.2.6.3 and with the HTTP PUT response as described in subclause 4.2.6.2.

4.2.6.7 Subscription to notification of signalling path status

When the feature "IMS_SBI" is supported, this procedure is used by an AF to subscribe to notifications of the status of the AF signalling transmission path.

The AF shall create a new "Individual Application Session Context" resource with the PCF for the AF signalling using the Npcf_PolicyAuthorization_Create service operation.

The AF shall provide:

- the IP address (IPv4 or IPv6) of the UE in the "ueIpv4" or "ueIpv6" attribute;
- within the "evSubsc" attribute, the "event" attribute set to "FAILED_RESOURCES_ALLOCATION"; and
- a media component within the "medComponents" attribute including:
 - the "medCompN" attribute set to "0"; and
 - a single media subcomponent within the "medSubComps" attribute with:
 - the "flowUsage" attribute set to the value "AF_SIGNALLING"; and
 - if the procedures for AF provisioning of AF signalling flow information do not apply, the "fNum" attribute set to "0".

When the "fNum" attribute is set to "0", the rest of attributes within the related media component and media subcomponent shall not be used.

The PCF shall perform session binding as described in 3GPP TS 29.513 [7] and shall reply to the AF as described in subclause 4.2.6.3.

PCC rules related to AF signalling IP flows should be provisioned to SMF using the corresponding procedures specified at 3GPP TS 29.512 [8] at an earlier stage (e.g. typically at the establishment of the QoS flow dedicated for AF signalling IP flows). The PCF may install the corresponding dynamic PCC rules for the AF signalling IP flows if none has been installed before.

NOTE 1: Well-known ports (e.g. 3GPP TS 24.229 [32] for SIP) or wildcard ports can be used by PCF to derive the dynamic PCC for the AF signalling IP flows.

If the "Individual Application Session Context" resource is only used for subscription to notification of AF signalling path status, the AF may cancel the subscription to notifications of the status of the AF signalling transmission path removing the resource as described in subclause 4.2.4.2.

NOTE 2: The "Individual Application Session Context" resource created for the AF signalling can also be used when the AF requests notifications of access type change, and/or when the AF provisions AF Signalling Flow Information.

4.2.6.8 Subscription to Service Data Flow QoS Monitoring Information

This procedure is used by AF to subscribe and/or modify the PCF subscription for notification about packet delay between UPF and RAN.

The AF shall include in the HTTP PUT request message described in subclause 4.2.6.2 the "EventsSubscReqData" data type, that shall contain:

- to create a subscription to QoS monitoring information:
 - a) shall include the "events" array with an array that contains a new entry with the "event" attribute set to "QOS_MONITORING", and notification related information as described in subclause 4.2.2.23; and
 - b) when the "notifMethod" of the new entry is "EVENT_DETECTION", shall include a "qosMon" attribute with the QoS monitoring information as described in subclause 4.2.2.23.
 - c) shall include the new requested QoS monitoring parameter(s) to be measured (i.e. DL, UL and/or round trip packet delay) within the "reqQosMonParams" attribute;
- to remove a subscription to QoS monitoring information:
 - a) shall include the "events" array containing an array that shall omit the corresponding entry with the "event" attribute value "QOS_MONITORING"; and

- b) when the "notifMethod" of the removed entry is "EVENT_DETECTION", it shall omit the "qosMon".

The AF shall include other events related information that shall remain unchanged.

As result of this action, the PCF shall set the appropriate subscription to QoS notification control for the corresponding active PCC rule(s) as described in 3GPP TS 29.512 [8].

The PCF shall reply to the AF as described in subclause 4.2.6.2.

4.2.7 Npcf_PolicyAuthorization_Unsubscribe service operation

4.2.7.1 General

The Npcf_PolicyAuthorization_Unsubscribe service operation enables NF service consumers to remove subscription to all subscribed events for the existing application session context. Subscription to events shall be removed:

- by invoking the Npcf_PolicyAuthorization_Unsubscribe service operation for the existing application session context, as described in subclause 4.2.7.2; or
- within the application session context modification procedure by invoking the Npcf_PolicyAuthorization_Update service operation, as described in subclause 4.2.3; or
- within the application session context termination procedure by invoking the Npcf_PolicyAuthorization_Delete service operation, as described in subclause 4.2.4.

The following procedure using the Npcf_PolicyAuthorization_Unsubscribe service operation is supported:

- Unsubscription to events.

4.2.7.2 Unsubscription to events

This procedure is used to unsubscribe to all subscribed events for the existing AF application session context, as defined in 3GPP TS 23.501 [2], 3GPP TS 23.502 [3] and 3GPP TS 23.503 [4].

Figure 4.2.7.2-1 illustrates the unsubscription to events using the HTTP DELETE method.

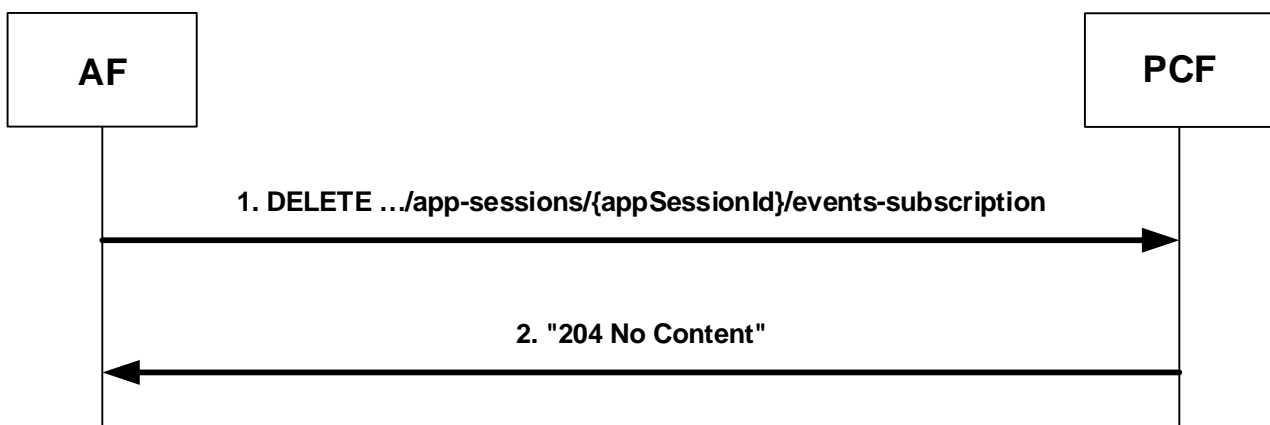


Figure 4.2.7.2-1: Removal of events subscription information using HTTP DELETE

When the AF decides to unsubscribe to all subscribed events for the existing application session context, the AF shall invoke the Npcf_PolicyAuthorization_Unsubscribe service operation by sending the HTTP DELETE request message to the resource URI representing the "Events Subscription" sub-resource in the PCF, as shown in figure 4.2.7.2-1, step 1.

Upon the reception of the HTTP DELETE request message from the AF, the PCF shall decide whether the received HTTP request message is accepted.

If the HTTP DELETE request message from the AF is accepted, the PCF shall delete "Events Subscription" sub-resource and shall send to the AF a HTTP "204 No Content" response message. The PCF may delete the existing subscription to event notifications for the related PDU session from the SMF as described in 3GPP TS 29.512 [8].

If the HTTP DELETE request message from the AF is rejected, the PCF shall indicate in the HTTP response message the cause for the rejection as specified in subclause 5.7.

5 Npcf_PolicyAuthorization Service API

5.1 Introduction

The Npcf_PolicyAuthorization Service shall use the Npcf_PolicyAuthorization API.

The API URI of the Npcf_PolicyAuthorization API shall be:

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

The request URIs used in each HTTP requests from the NF service consumer towards the PCF shall have the Resource URI structure defined in subclause 4.4.1 of 3GPP TS 29.501 [6], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in 3GPP TS 29.501 [6].
- The <apiName> shall be "npcf-policyauthorization".
- The <apiVersion> shall be "v1".
- The <apiSpecificResourceUriPart> shall be set as described in subclause 5.3.

5.2 Usage of HTTP

5.2.1 General

HTTP/2, IETF RFC 7540 [9], shall be used as specified in subclause 5.2 of 3GPP TS 29.500 [5].

HTTP/2 shall be transported as specified in subclause 5.3 of 3GPP TS 29.500 [5].

The OpenAPI [11] specification of HTTP messages and content bodies for the Npcf_PolicyAuthorization service is contained in Annex A.

5.2.2 HTTP standard headers

5.2.2.1 General

See subclause 5.2.2 of 3GPP TS 29.500 [5] for the usage of HTTP standard headers.

5.2.2.2 Content type

JSON, IETF RFC 8259 [10], shall be used as content type of the HTTP bodies specified in the present specification, as specified in subclause 5.4 of 3GPP TS 29.500 [5]. The use of the JSON format shall be signalled by the content type "application/json".

JSON object used in the HTTP PATCH request shall be encoded according to "JSON Merge Patch" and shall be signalled by the content type "application/merge-patch+json", as defined in IETF RFC 7396 [21].

"Problem Details" JSON object shall be used to indicate additional details of the error in a HTTP response body and shall be signalled by the content type "application/problem+json", as defined in IETF RFC 7807 [24].

5.2.3 HTTP custom headers

The Npcf_PolicyAuthorization API shall support HTTP custom header fields specified in subclause 5.2.3.2 of 3GPP TS 29.500 [5].

In this Release of the specification, no specific custom headers are defined for the Npcf_PolicyAuthorization API.

5.3 Resources

5.3.1 Resource Structure

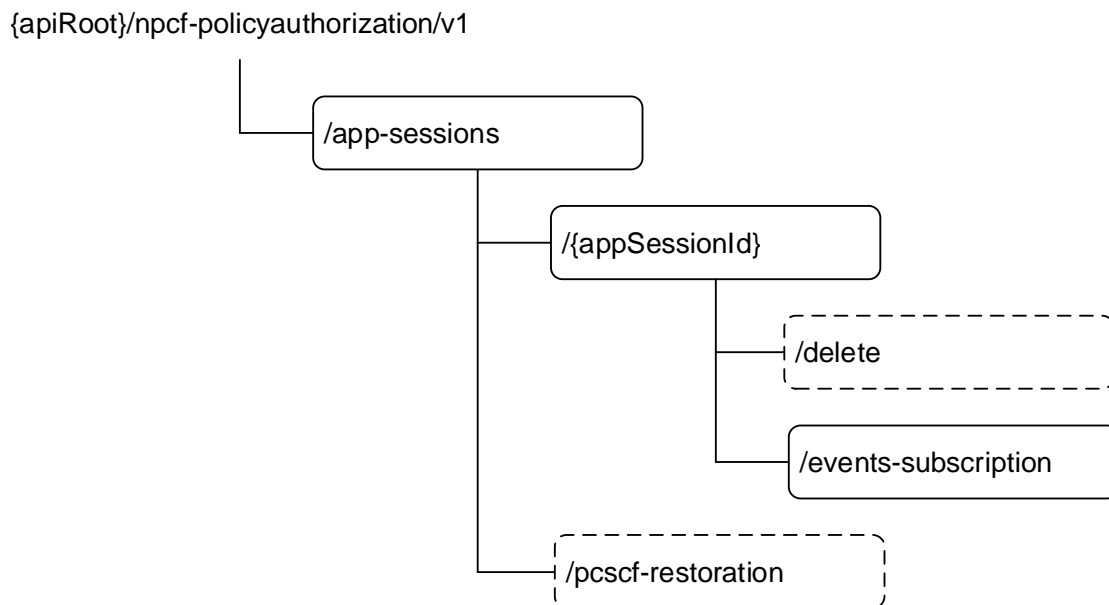


Figure 5.3.1-1: Resource URI structure of the Npcf_PolicyAuthorization API

Table 5.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 5.3.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method or custom operation	Description
Application Sessions	{apiRoot}/npcf-policyauthorization/v1/app-sessions	POST	Npcf_PolicyAuthorization_Create. Creates a new Individual Application Session Context resource and may create the child Events Subscription sub-resource.
	{apiRoot}/npcf-policyauthorization/v1/app-sessions/pcscf-restoration	PcscfRestoration (POST)	P-CSCF restoration. It indicates that P-CSCF restoration needs to be performed.
Individual Application Session Context	{apiRoot}/npcf-policyauthorization/v1/app-sessions/{appSessionId}	PATCH	Npcf_PolicyAuthorization_Update. Updates an existing Individual Application Session Context resource. It can also update an Events Subscription sub-resource.
		GET	Reads an existing Individual Application Session Context resource.
	{apiRoot}/npcf-policyauthorization/v1/app-sessions/{appSessionId}/delete	Delete (POST)	Npcf_PolicyAuthorization_Delete. Deletes an existing Individual Application Session Context resource and the child Events Subscription sub-resource.
Events Subscription	{apiRoot}/npcf-policyauthorization/v1/app-sessions/{appSessionId}/events-subscription	PUT	Npcf_PolicyAuthorization_Subscribe. Creates a new Events Subscription sub-resource or modifies an existing Events Subscription sub-resource.
		DELETE	Npcf_PolicyAuthorization_Unsubscribe. Deletes an Events Subscription sub-resource.

5.3.2 Resource: Application Sessions (Collection)

5.3.2.1 Description

The Application Sessions resource represents all application session contexts that exist in the Npcf_PolicyAuthorization service at a given PCF instance.

5.3.2.2 Resource definition

Resource URI: {apiRoot}/npcf-policyauthorization/v1/app-sessions

This resource shall support the resource URI variables defined in table 5.3.2.2-1.

Table 5.3.2.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See subclause 5.1

5.3.2.3 Resource Standard Methods

5.3.2.3.1 POST

This method shall support the URI query parameters specified in table 5.3.2.3.1-1.

Table 5.3.2.3.1-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 5.3.2.3.1-2 and the response data structures and response codes specified in table 5.3.2.3.1-3.

Table 5.3.2.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
AppSessionContext	M	1	Contains the information for the creation of a new Individual Application Session Context resource.

Table 5.3.2.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
AppSessionContext	M	1	201 Created	Successful case. The creation of an Individual Application Session Context resource is confirmed and a representation of that resource is returned.
n/a			303 See Other	The result of the HTTP POST request would be equivalent to the existing Application Session Context. The HTTP response shall contain a Location header field set to the URI of the existing individual Application Session Context resource.
ExtendedProblemDetails	O	0..1	403 Forbidden	(NOTE 2)
ProblemDetails	O	0..1	500 Internal Server Error	(NOTE 2)
NOTE 1: In addition, the HTTP status codes which are specified as mandatory in table 5.2.7.1-1 of 3GPP TS 29.500 [5] for the POST method shall also apply.				
NOTE 2: Failure cases are described in subclause 5.7.				

Table 5.3.2.3.1-4: 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}/npcf-policyauthorization/v1/app-sessions/{appSessionId}

Table 5.3.2.3.1-5: Headers supported by the 303 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains the URI of the existing individual Application Session Context resource.

Table 5.3.2.3.1-6: Headers supported by the 403 Response Code on this resource

Name	Data type	P	Cardinality	Description
Retry-After	string or integer	M	1	Indicates the time the AF has to wait before making a new request.

5.3.2.4 Resource Custom Operations

5.3.2.4.1 Overview

Table 5.3.2.4.1-1: Custom operations

Operation name	Custom operation URI	Mapped HTTP method	Description
PcscfRestoration	{apiRoot}/ npcf- policyauthorization/v1 /app-sessions/pcscf- restoration	POST	PCSCF Restoration custom operation invokes P-CSCF restoration. It does not create an Individual Application Session Context resource.

5.3.2.4.2 Operation: PcscfRestoration

5.3.2.4.2.1 Description

5.3.2.4.2.2 Operation Definition

This custom operation invokes P-CSCF restoration in the PCF and does not create an Individual Application Session Context resource.

This operation shall support the request data structure specified in table 5.3.2.4.2.2-1 and the response data structure and response codes specified in table 5.3.2.4.2.2-2.

Table 5.3.2.4.2.2-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
PcscfRestorationRequest Data	O	0..1	P-CSCF restoration data to be sent by the AF to request the P-CSCF restoration to the PCF.

Table 5.3.2.4.2.2-2: 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 P-CSCF restoration has been successfully invoked.
ProblemDetails	O	0..1	500 Internal Server Error	(NOTE 2)
NOTE: In addition, the HTTP status codes which are specified as mandatory in table 5.2.7.1-1 of 3GPP TS 29.500 [5] for the POST method shall also apply.				

5.3.3 Resource: Individual Application Session Context (Document)

5.3.3.1 Description

The Individual Application Session Context resource represents a single application session context that exists in the Npcf_PolicyAuthorization service.

5.3.3.2 Resource definition

Resource URI: {apiRoot}/npcf-policyauthorization/v1/app-sessions/{appSessionId}

This resource shall support the resource URI variables defined in table 5.3.2.2-1.

Table 5.3.3.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See subclause 5.1
appSessionId	string	Identifies an application session context formatted according to IETF RFC 3986 [19].

5.3.3.3 Resource Standard Methods

5.3.3.3.1 GET

This method shall support the URI query parameters specified in table 5.3.3.3.1-1.

Table 5.3.3.3.1-1: 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 5.3.3.3.1-2 and the response data structures and response codes specified in table 5.3.3.3.1-3.

Table 5.3.3.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 5.3.3.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
AppSessionContext	M	1	200 OK	A representation of an Individual Application Session Context resource is returned.
ProblemDetails	O	0..1	404 Not Found	(NOTE 2)
NOTE 1: In addition, the HTTP status codes which are specified as mandatory in table 5.2.7.1-1 of 3GPP TS 29.500 [5] for the GET method shall also apply.				
NOTE 2: Failure cases are described in subclause 5.7.				

5.3.3.3.2 PATCH

This method shall support the URI query parameters specified in table 5.3.3.3.2-1.

Table 5.3.3.3.2-1: URI query parameters supported by the PATCH method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 5.3.3.3.2-2 and the response data structures and response codes specified in table 5.3.3.3.2-3.

Table 5.3.3.3.2-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
AppSessionContextUpdateData	M	1	Contains the modification(s) to apply to the Individual Application Session Context resource.

Table 5.3.3.3.2-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
AppSessionContext	M	1	200 OK	Successful case. The Individual Application Session Context resource was modified and a representation of that resource is returned.
n/a			204 No Content	Successful case. The Individual Application session context resource was modified.
ExtendedProblemDetails	M	1	403 Forbidden	(NOTE 2)
ProblemDetails	O	0..1	404 Not Found	(NOTE 2)
NOTE 1: In addition, the HTTP status codes which are specified as mandatory in table 5.2.7.1-1 of 3GPP TS 29.500 [5] for the PATCH method shall also apply.				
NOTE 2: Failure cases are described in subclause 5.7.				

Table 5.3.3.3.1-4: Headers supported by the 403 Response Code on this resource

Name	Data type	P	Cardinality	Description
Retry-After	string or integer	M	1	Indicates the time the AF has to wait before making a new request.

5.3.3.4 Resource Custom Operations

5.3.3.4.1 Overview

Table 5.3.3.4.1-1: Custom operations

Operation name	Custom operation URI	Mapped HTTP method	Description
delete	{apiRoot}/ npcf-policyauthorization/v1 /app- sessions/{appSessionId}/delete	POST	Npcf_PolicyAuthorization_Delete. Deletes an existing Individual Application Session Context resource and the child Events Subscription sub-resource.

5.3.3.4.2 Operation: delete

5.3.3.4.2.1 Description

5.3.3.4.2.2 Operation Definition

This custom operation deletes an existing Individual Application Session Context resource and the child Events Subscription sub-resource in the PCF.

This operation shall support the request data structures specified in table 5.3.3.4.2.2-1 and the response data structure and response codes specified in table 5.3.3.4.2.2-2.

Table 5.3.3.4.2.2-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
EventsSubscReqData	O	0..1	Events subscription information to be sent by the AF to request event notification when the Individual Application Session Context resource is deleted.

Table 5.3.3.4.2.2-2: 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 Individual Application session context resource was deleted.
AppSessionContext	M	1	200 OK	Successful case. The Individual Application Session Context resource was deleted and a partial representation of that resource containing event notification information is returned.

NOTE 1: In addition, the HTTP status codes which are specified as mandatory in table 5.2.7.1-1 of 3GPP TS 29.500 [5] for the POST method shall also apply.

5.3.4 Resource: Events Subscription (Document)

5.3.4.1 Description

The Events Subscription sub-resource represents a subscription to events for an application session context that exists in the Npcf_PolicyAuthorization service.

5.3.4.2 Resource definition

Resource URI: **{apiRoot}/npcf-policyauthorization/v1/app-sessions/{appSessionId}/events-subscription**

This resource shall support the resource URI variables defined in table 5.3.4.2-1.

Table 5.3.4.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See subclause 5.1
appSessionId	string	Identifies an application session context formatted according to IETF RFC 3986 [19].

5.3.4.3 Resource Standard Methods

5.3.4.3.1 PUT

This method shall support the URI query parameters specified in table 5.3.4.3.1-1.

Table 5.3.4.3.1-1: 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 5.3.4.3.1-2 and the response data structures and response codes specified in table 5.3.4.3.1-3.

Table 5.3.4.3.1-2: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
EventsSubscReqData	M	1	Contains information for the modification of the Events Subscription sub-resource.

Table 5.3.4.3.1-3: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description
EventsSubscPutData	M	1	201 Created	Successful case. The Events Subscription sub-resource was created. The properties of the EventsSubscReqData data type shall be included. The properties of the EventsNotification data type shall be included when the notification for one or more created events is already available in the PCF.
EventsSubscPutData	M	1	200 OK	Successful case. The Events Subscription sub-resource was modified and a representation of that sub-resource is returned. The properties of the EventsSubscReqData data type shall be included. The properties of the EventsNotification data type shall be included when the notification for one or more updated events is already available in the PCF.
n/a			204 No Content	Successful case. The Events Subscription sub-resource was modified.
ProblemDetails	O	0..1	403 Forbidden	(NOTE 2)
ProblemDetails	O	0..1	404 Not Found	(NOTE 2)
NOTE 1: In addition, the HTTP status codes which are specified as mandatory in table 5.2.7.1-1 of 3GPP TS 29.500 [5] for the PUT method shall also apply.				
NOTE 2: Failure cases are described in subclause 5.7.				

Table 5.3.4.3.1-4: 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}/npcf-policyauthorization/v1/app-sessions/{appSessionId}/events-subscription

5.3.4.3.2 DELETE

This method shall support the URI query parameters specified in table 5.3.4.3.2-1.

Table 5.3.4.3.2-1: 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 5.3.4.3.2-2 and the response data structures and response codes specified in table 5.3.4.3.2-3.

Table 5.3.4.3.2-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 5.3.4.3.2-3: 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 Events Subscription sub-resource was deleted.
ProblemDetails	O	0..1	404 Not Found	(NOTE 2)
NOTE 1: In addition, the HTTP status codes which are specified as mandatory in table 5.2.7.1-1 of 3GPP TS 29.500 [5] for the DELETE method shall also apply.				
NOTE 2: Failure cases are described in subclause 5.7.				

5.3.3.4 Resource Custom Operations

None.

5.4 Custom Operations without associated resources

No custom operation is defined in this Release of the specification.

5.5 Notifications

5.5.1 General

Notifications shall comply to subclause 6.2 of 3GPP TS 29.500 [5] and subclause 4.6.2.3 of 3GPP TS 29.501 [6].

Table 5.5.1-1: Notifications overview

Notification	Custom operation URI	Mapped HTTP method	Description
Event Notification	{notifUri}/notify	POST	PCF event notification.
Termination Request	{notifUri}/terminate	POST	Request for termination of the Individual Application Session Context.
Notification about new 5GS Bridge	{notifUri}/new-bridge	POST	Notification about new 5GS Bridge

5.5.2 Event Notification

5.5.2.1 Description

The Event Notification is used by the PCF to report one or several observed application session context events to the NF service consumer that has subscribed to such notifications via the Events Subscription sub-resource.

5.5.2.2 Target URI

The Notification URI "{notifUri}/notify" shall be used with the URI variables defined in table 5.5.2.2-1.

Table 5.5.2.2-1: URI variables

Name	Data type	Definition
notifUri	Uri	The Notification Uri as assigned within the Events Subscription sub-resource and described within the EventsSubscReqData type (see table 5.6.2.6-1).

5.5.2.3 Standard Methods

5.5.2.3.1 POST

This method shall support the URI query parameters specified in table 5.5.2.3.1-1.

Table 5.5.2.3.1-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 5.5.2.3.1-2 and the response data structures and response codes specified in table 5.5.2.3.1-3.

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

Data type	P	Cardinality	Description
EventsNotification	M	1	Provides Information about observed events.

Table 5.5.2.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	The receipt of the Notification is acknowledged.
NOTE: In addition, the HTTP status codes which are specified as mandatory in table 5.2.7.1-1 of 3GPP TS 29.500 [5] for the POST method shall also apply.				

5.5.3 Termination Request

5.5.3.1 Description

The Termination Request is used by the PCF to request the NF service consumer the deletion of the Individual Application Session Context resource.

5.5.3.2 Target URI

The Notification URI "{notifUri}/terminate" shall be used with the URI variables defined in table 5.5.3.2-1.

Table 5.5.3.2-1: URI variables

Name	Data type	Definition
notifUri	Uri	The Notification Uri as assigned within the Individual Application Session Context resource and described within the AppSessionContextReqData Data type (see table 5.6.2.3-1).

5.5.3.3 Standard Methods

5.5.3.3.1 POST

This method shall support the URI query parameters specified in table 5.5.3.3.1-1.

Table 5.5.3.3.1-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 5.5.3.3.1-2 and the response data structures and response codes specified in table 5.5.3.3.1-3.

Table 5.5.3.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
TerminationInfo	M	1	Provides information about the deletion of the resource.

Table 5.5.3.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	The receipt of the Notification is acknowledged.
NOTE: In addition, the HTTP status codes which are specified as mandatory in table 5.2.7.1-1 of 3GPP TS 29.500 [5] for the POST method shall also apply.				

5.5.4 Detected 5GS Bridge for a PDU session

5.5.4.1 Description

The Detected 5GS Bridge for a PDU session operation is used by the PCF to notify the NF service consumer about the detection of 5GS Bridge information in the context of a PDU session and to trigger in the TSN AF the creation of a new Individual Application Session Context to associate it with the detected 5GS Bridge for the PDU session.

The PCF shall use the locally configured notification URI of the TSN AF as request URI of the notification request. The "callback" definition in the OpenAPI specification is associated to the "ApplicationSessions" resource.

5.5.4.2 Target URI

The Notification URI "{notifUri}/new-bridge" shall be used with the URI variables defined in table 5.5.4.2-1.

Table 5.5.4.2-1: URI variables

Name	Data type	Definition
notifUri	Uri	It is locally configured in the PCF.

5.5.4.3 Standard Methods

5.5.4.3.1 POST

This method shall support the URI query parameters specified in table 5.5.4.3.1-1.

Table 5.5.4.3.1-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 5.5.4.3.1-2 and the response data structures and response codes specified in table 5.5.4.3.1-3.

Table 5.5.4.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
PduSessionTsnBridge	M	1	Provides information about the deletion of the resource.

Table 5.5.4.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	The receipt of the Notification is acknowledged.
NOTE: In addition, the HTTP status codes which are specified as mandatory in table 5.2.7.1-1 of 3GPP TS 29.500 [5] for the POST method shall also apply.				

5.6 Data Model

5.6.1 General

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

Table 5.6.1-1 specifies the data types defined for the Npcf_PolicyAuthorization service based interface protocol.

Table 5.6.1-1: Npcf_PolicyAuthorization specific Data Types

Data type	Section defined	Description	Applicability
AcceptableServiceInfo	5.6.2.30	Acceptable maximum requested bandwidth.	
AccessNetChargingIdentifier	5.6.2.32	Contains the access network charging identifier.	IMS_SBI
AfApplId	5.6.3.2	Contains an AF application identifier.	
AfEvent	5.6.3.7	Represents an event to notify to the AF.	
AfEventNotification	5.6.2.11	Represents the notification of an event.	
AfEventSubscription	5.6.2.10	Represents the subscription to events.	
AfNotifMethod	5.6.3.8	Represents the notification methods that can be subscribed for an event.	
AfRequestedData	5.6.3.18	Represents the information the AF requested to be exposed.	IMS_SBI
AfRoutingRequirement	5.6.2.13	Describes the routing requirements for the application traffic flows.	InfluenceOnTrafficRouting
AfRoutingRequirementRm	5.6.2.24	This data type is defined in the same way as the "AfRoutingRequirement" data type, but with the OpenAPI "nullable: true" property.	InfluenceOnTrafficRouting
AnGwAddress	5.6.2.20	Carries the control plane address of the access network gateway.	
AppSessionContext	5.6.2.2	Represents an Individual Application Session Context resource.	
AppSessionContextReqData	5.6.2.3	Represents the Individual Application Session Context resource data received in an HTTP POST request message.	
AppSessionContextRespData	5.6.2.4	Represents the Individual Application Session Context resource data produced by the server and returned in an HTTP response message.	
AppSessionContextUpdateData	5.6.2.5	Describes the modifications to an Individual Application Session Context resource.	
Aspld	5.6.3.2	Contains an identity of an application service provider.	SponsoredConnectivity
CodecData	5.6.3.2	Contains a codec related information.	
ContentVersion	5.6.3.2	Represents the version of a media component.	MediaComponentVersioning
EthFlowDescription	5.6.2.17	Defines a packet filter for an Ethernet flow.	
EventsNotification	5.6.2.9	Describes the notification about the events occurred within an Individual Application Session Context resource.	
EventsSubscPutData	5.6.2.42	Identifies the events the application subscribes to within an Events Subscription sub-resource data. It may also include the attributes of the notification about the events already met at the time of subscription. It is represented as a non-exclusive list of two data types: EventsSubscReqData and EventsNotification.	
EventsSubscReqData	5.6.2.6	Identifies the events the application subscribes to within an Individual Application Session Context resource.	
EventsSubscReqDataRm	5.6.2.6.25	This data type is defined in the same way as the "EventsSubscReqData" data type, but with the OpenAPI "nullable: true" property.	
ExtendedProblemDetails	5.6.2.29	Data type that extends ProblemDetails.	
FlowDescription	5.6.3.2	Defines a packet filter for an IP flow.	
Flows	5.6.2.21	Identifies the flows related to a media component.	
FlowStatus	5.6.3.12	Describes whether the IP flow(s) are enabled or disabled.	
FlowUsage	5.6.3.14	Describes the flow usage of the flows described by a media subcomponent.	
MediaComponent	5.6.2.7	Contains service information for a media component of an AF session.	

Data type	Section defined	Description	Applicability
MediaComponentRm	5.6.2.6.26	This data type is defined in the same way as the "MediaComponent" data type, but with the OpenAPI "nullable: true" property.	
MediaComponentResourcesStatus	5.6.3.13	Indicates whether the media component is active or inactive.	
MediaSubComponent	5.6.2.8	Contains the requested bitrate and filters for the set of IP flows identified by their common flow identifier.	
MediaSubComponentRm	5.6.2.27	This data type is defined in the same way as the "MediaSubComponent" data type, but with the OpenAPI "nullable: true" property.	
MediaType	5.6.3.3	Indicates the media type of a media component.	
NewTsnBridge	5.6.2.40	Contains the Bridge Information and DS-TT port and/or NW-TT ports management information of a new detected 5GS Bridge in the context of a new PDU session.	TimeSensitiveNetworking
OutOfCreditInformation	5.6.2.33	Indicates the service data flows without available credit and the corresponding termination action.	IMS_SBI
PcscfRestorationRequestData	5.6.2.36	Indicates P-CSCF restoration.	PCSCF-Restoration-Enhancement
PreemptionControlInformation	5.6.3.19	Pre-emption control information.	MCPTT-Preemption
PreemptionControlInformationRm	5.6.3.21	This data type is defined in the same way as the "PreemptionControlInformation" data type, but with the OpenAPI "nullable: true" property.	MCPTT-Preemption
PrioritySharingIndicator	5.6.3.20	Priority sharing indicator.	PrioritySharing
QosMonitoringInformation	5.6.2.34	QoS monitoring for UL, DL or round trip delay.	QoSMonitoring
QosMonitoringInformationRm	5.6.2.41	This data type is defined in the same way as the "QosMonitoringInformation" data type, but with the OpenAPI "nullable: true" property.	QoSMonitoring
QosMonitoringReport	5.6.2.37	Contains QoS monitoring reporting information.	QoSMonitoring
QosNotificationControlInfo	5.6.2.15	Indicates whether the QoS targets related to certain media component are not guaranteed or are guaranteed again.	
QosNotifType	5.6.3.9	Indicates type of notification for QoS Notification Control.	
RequiredAccessInfo	5.6.3.15	Indicates the access network information required for an AF session.	NetLoc
ReservPriority	5.6.3.4	Indicates the reservation priority.	
ResourcesAllocationInfo	5.6.2.14	Indicates the status of the PCC rule(s) related to certain media component.	
ServAuthInfo	5.6.3.5	Indicates the result of the Policy Authorization service request from the AF.	
ServiceInfoStatus	5.6.3.16	Preliminary or final service information status.	IMS_SBI
ServiceUrn	5.6.3.2	Service URN.	IMS_SBI
SipForkingIndication	5.6.3.17	Describes if several SIP dialogues are related to an "Individual Application Session Context" resource.	IMS_SBI
SpatialValidity	5.6.2.16	Describes the spatial validity of an AF request for influencing traffic routing.	InfluenceOnTrafficRouting
SpatialValidityRm	5.6.2.28	This data type is defined in the same way as the "SpatialValidity" data type, but with the OpenAPI "nullable: true" property.	InfluenceOnTrafficRouting
SponId	5.6.3.2	Contains an Identity of a sponsor.	SponsoredConnectivity
SponsoringStatus	5.6.3.6	Represents whether sponsored data connectivity is enabled or disabled/not enabled.	SponsoredConnectivity
TemporalValidity	5.6.2.22	Indicates the time interval during which the AF request is to be applied.	InfluenceOnTrafficRouting
TerminationCause	5.6.3.10	Indicates the cause for requesting the deletion of the Individual Application Session Context resource.	

Data type	Section defined	Description	Applicability
TerminationInfo	5.6.2.12	Includes information related to the termination of the Individual Application Session Context resource.	
TosTrafficClass	5.6.3.2	Contains the IPv4 Type-of-Service or the IPv6 Traffic-Class field and the ToS/Traffic Class mask field.	
TosTrafficClassRm	5.6.3.2	This data type is defined in the same way as the "TosTrafficClass" data type, but with the OpenAPI "nullable: true" property.	
TscPriorityLevel	5.6.3.2	Priority of TSC Flows	TimeSensitiveNetworking
TscPriorityLevelRm	5.6.3.2	This data type is defined in the same way as the "TscPriorityLevel" data type, but with the OpenAPI "nullable: true" property	TimeSensitiveNetworking
TscailInputContainer	5.6.2.39	TSCAI Input information container.	TimeSensitiveNetworking
TsnQosContainer	5.6.2.35	TSC traffic QoS parameters.	TimeSensitiveNetworking
TsnQosContainerRm	5.6.2.38	This data type is defined in the same way as the "TsnQosContainer" data type, but with the OpenAPI "nullable: true" property.	TimeSensitiveNetworking
UeIdentityInfo	5.6.2.31	Represents 5GS-Level UE Identities.	IMS_SBI

Table 5.6.1-2 specifies data types re-used by the Npcf_PolicyAuthorization service based interface protocol from other specifications, including a reference to their respective specifications and when needed, a short description of their use within the Npcf_PolicyAuthorization service based interface.

Table 5.6.1-2: Npcf_PolicyAuthorization re-used Data Types

Data type	Reference	Comments	Applicability
AccNetChargingAddresses	3GPP TS 29.512 [8]	Indicates the IP address of the network entity within the access network performing charging.	IMS_SBI
AccessType	3GPP TS 29.571 [12]	The identification of the type of access network.	
AccumulatedUsage	3GPP TS 29.122 [15]	Accumulated Usage.	SponsoredConnectivity
AdditionalAccessInfo	3GPP TS 29.512 [8]	Indicates the combination of additional Access Type and RAT Type for MA PDU session	ATSSS
AfSigProtocol	3GPP TS 29.512 [8]	Represents the protocol used for signalling between the UE and the AF.	ProvAFsignalFlow
ApplicationChargingId	3GPP TS 29.571 [12]	Application provided charging identifier allowing correlation of charging information.	IMS_SBI
BdtReferenceId	3GPP TS 29.122 [15]	Identifies transfer policies.	
BitRate	3GPP TS 29.571 [12]	Specifies bitrate in kbits per second.	
BitRateRm	3GPP TS 29.571 [12]	This data type is defined in the same way as the "BitRate" data type, but with the OpenAPI "nullable: true" property.	
BridgeManagementContainer	3GPP TS 29.512 [8]	Contains bridge management information.	TimeSensitiveNetworking
Bytes	3GPP TS 29.571 [12]	String with format "byte".	
ChargingId	3GPP TS 29.571 [12]	Charging identifier allowing correlation of charging information.	IMS_SBI
DateTime	3GPP TS 29.571 [12]	String with format "date-time" as defined in OpenAPI Specification [11].	InfluenceOnTrafficRouting, TimeSensitiveNetworking
Dnn	3GPP TS 29.571 [12]	Data Network Name.	
DurationSec	3GPP TS 29.571 [12]	Identifies a period of time in units of seconds.	TimeSensitiveNetworking, EnhancedSubscriptionToNotification
FinalUnitAction	3GPP TS 32.291 [22]	Indicates the action to be taken when the user's account cannot cover the service cost.	
Float	3GPP TS 29.571 [12]	Number with format "float" as defined in OpenAPI Specification [11].	FLUS
FloatRm	3GPP TS 29.571 [12]	This data type is defined in the same way as the "Float" data type, but with the OpenAPI "nullable: true" property.	FLUS
FlowDirection	3GPP TS 29.512 [8]	Flow Direction.	
ExtMaxDataBurstVol	3GPP TS 29.571 [12]	Maximum Burst Size.	TimeSensitiveNetworking
ExtMaxDataBurstVolRm	3GPP TS 29.571 [12]	This data type is defined in the same way as the "ExtMaxDataBurstVol" data type, but with the OpenAPI "nullable: true" property	TimeSensitiveNetworking
Gpsi	3GPP TS 29.571 [12]	Identifies the GPSI.	
Ipv4Addr	3GPP TS 29.571 [12]	Identifies an IPv4 address.	
Ipv6Addr	3GPP TS 29.571 [12]	Identifies an IPv6 address.	
MacAddr48	3GPP TS 29.571 [12]	MAC Address.	
NetLocAccessSupport	3GPP TS 29.512 [8]	Indicates the access network does not support the report of the requested access network information.	NetLoc
NullValue	3GPP TS 29.571 [12]	JSON's null value, used as an explicit value of an enumeration.	MCPTT-Preemption
PacketDelBudget	3GPP TS 29.571 [12]	Packet Delay Budget.	TimeSensitiveNetworking
PacketDelBudgetRm	3GPP TS 29.571 [12]	This data type is defined in the same way as the "PacketDelBudget" data type, but with the OpenAPI "nullable: true" property	TimeSensitiveNetworking

Data type	Reference	Comments	Applicability
PacketLossRateRm	3GPP TS 29.571 [12]	This data type is defined in the same way as the "PacketLossRate" data type, but with the OpenAPI "nullable: true" property.	CHEM
Pei	3GPP TS 29.571 [12]	Identifies the PEI.	IMS_SBI
PlmnIdNid	3GPP TS 29.571 [12]	Identifies the network: the PLMN Identifier (mobile country code and mobile network code) and, for an SNPN, also the NID.	
PreemptionCapability	3GPP TS 29.571 [12]	Pre-emption capability.	MCPTT-Preemption
PreemptionVulnerability	3GPP TS 29.571 [12]	Pre-emption vulnerability.	MCPTT-Preemption
PreemptionCapabilityRm	3GPP TS 29.571 [12]	It is defined in the same way as the "PreemptionCapability" data type, but with the OpenAPI "nullable: true" property.	MCPTT-Preemption
PreemptionVulnerabilityRm	3GPP TS 29.571 [12]	It is defined in the same way as the "PreemptionVulnerability" data type, but with the OpenAPI "nullable: true" property.	MCPTT-Preemption
PresenceInfo	3GPP TS 29.571 [12]	Represents an area of interest, e.g. a Presence Reporting Area.	InfluenceOnTrafficRouting
PortManagementContainer	3GPP TS 29.512 [8]	Contains port management information for a related TSN port.	TimeSensitiveNetworking
ProblemDetails	3GPP TS 29.571 [12]	Contains a detailed information about an error.	
RanNasRelCause	3GPP TS 29.512 [8]	Indicates RAN and/or NAS release cause code information.	RAN-NAS-Cause
RequestedQosMonitoringParameter	3GPP TS 29.512 [8]	Indicate the UL packet delay, DL packet delay or round trip packet delay between the UE and the UPF is to be monitored when the QoS Monitoring for URLLC is enabled for the service data flow.	QoSMonitoring
RatType	3GPP TS 29.571 [12]	RAT Type.	
RouteToLocation	3GPP TS 29.571 [12]	Identifies routes to locations of applications.	InfluenceOnTrafficRouting
Snsai	3GPP TS 29.571 [12]	Identifies the S-NSSAI.	
Supi	3GPP TS 29.571 [12]	Identifies the SUPI.	
SupportedFeatures	3GPP TS 29.571 [12]	Used to negotiate the applicability of the optional features defined in table 5.8-1.	
TimeZone	3GPP TS 29.571 [12]	Time Zone.	NetLoc
TsnBridgeInfo	3GPP TS 29.512 [8]	TSN bridge information.	TimeSensitiveNetworking
TsnPortIdentifier	3GPP TS 29.512 [8]	TSN port information.	TimeSensitiveNetworking
Uint32	3GPP TS 29.571 [12]	Unsigned 32-bit integers, i.e. only value 0 and 32-bit integers above 0 are permissible.	ResourceSharing
Uint32Rm	3GPP TS 29.571 [12]	This data type is defined in the same way as the "Uint32" data type, but with the OpenAPI "nullable: true" property.	ResourceSharing
UpPathChgEvent	3GPP TS 29.512 [8]	Contains the subscription information to be delivered to SMF for the UP path management events.	InfluenceOnTrafficRouting
Uri	3GPP TS 29.571 [12]	String providing an URI.	
UsageThreshold	3GPP TS 29.122 [15]	Usage Thresholds.	SponsoredConnectivity
UsageThresholdRm	3GPP TS 29.122 [15]	This data type is defined in the same way as the "UsageThreshold" data type, but with the OpenAPI "nullable: true" property.	SponsoredConnectivity
UserLocation	3GPP TS 29.571 [12]	User Location.	NetLoc

5.6.2 Structured data types

5.6.2.1 Introduction

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

5.6.2.2 Type AppSessionContext

Table 5.6.2.2-1: Definition of type AppSessionContext

Attribute name	Data type	P	Cardinality	Description	Applicability
ascReqData	AppSessionContext ReqData	C	0..1	Identifies the service requirements of an Individual Application Session Context. It shall be present in HTTP POST request messages for the creation of the resource and may be included in the HTTP response messages.	
ascRespData	AppSessionContext RespData	C	0..1	Describes the authorization data of an Individual Application Session Context created by the PCF. It may be present in the HTTP response messages.	
evsNotif	EventsNotification	O	0..1	Describes information related to the notification of events.	

5.6.2.3 Type AppSessionContextReqData

Table 5.6.2.3-1: Definition of type AppSessionContextReqData

Attribute name	Data type	P	Cardinality	Description	Applicability
afAppld	AfAppld	O	0..1	AF application identifier.	
afChargId	ApplicationChargin gld	O	0..1	AF charging identifier. This information may be used for charging correlation with QoS flow.	IMS_SBI
afReqData	AfRequestedData	O	0..1	Represents the AF requested data to be exposed.	IMS_SBI
afRoutReq	AfRoutingRequire ment	C	0..1	Indicates the AF traffic routing requirements. It shall be included if Influence on Traffic Routing feature is supported.	InfluenceOnTr afficRouting
aspId	Aspld	C	0..1	Application service provider identity. It shall be included if "SponsoredConnectivity" feature is supported.	SponsoredCon nectivity
bdtRefId	BdtReferenceld	O	0..1	Reference to a transfer policy negotiated for background data traffic.	
dnn	Dnn	C	0..1	Data Network Name, a full DNN with both the Network Identifier and Operator Identifier, or a DNN with the Network Identifier only. It shall be present when the "afRoutReq" attribute is present.	
evSubsc	EventsSubscReqD ata	O	0..1	Identifies the events the application subscribes to at creation of an Individual Application Session Context resource.	
ipDomain	string	O	0..1	Indicates the IPv4 address domain information that assists session binding.	
mcpttId	string	O	0..1	Indicates that the created Individual Application Session Context resource relates to an MCPTT session prioritized call. It includes either one of the namespace values used for MCPTT (see IETF RFC 8101 [42]) and it may include the name of the MCPTT service provider.	MCPTT
mcVideoid	string	O	0..1	Indicates that the created Individual Application Session Context resource relates to an MCVideo session prioritized call. It includes either one of the namespace values used for MCPTT (see IETF RFC 8101 [42]) and it may include the name of the MCVideo service provider.	MCVideo
medComponents	map(MediaCompo nent)	O	1..N	Media Component information. The key of the map is the attribute "medCompN".	
mpsId	string	O	0..1	Indicates that the created Individual Application Session Context resource relates to an MPS service. It contains the national variant for MPS service name.	
mcsId	string	O	0..1	Indicates that the created Individual Application Session Context resource relates to an MCS service. It contains the national variant for MCS service name.	
preemptControllInfo	PreemptionControll nformation	O	0..1	Pre-emption control information.	MCPTT- Preemption
resPrio	ReservPriority	O	0..1	Indicates the reservation priority.	
servInfStatus	ServiceInfoStatus	O	0..1	Indicates whether the service information is preliminary or final. When the attribute is not provided the default value is "FINAL".	IMS_SBI

Attribute name	Data type	P	Cardinality	Description	Applicability
notifUri	Uri	M	1	Notification URI for Application Session Context termination requests.	
servUrn	ServiceUrn	O	0..1	Service URN.	IMS_SBI
slicelInfo	Snssai	O	0..1	Identifies the S-NSSAI.	
sponId	SponId	C	0..1	Sponsor identity. It shall be included if "SponsoredConnectivity" feature is supported.	SponsoredConnectivity
sponStatus	SponsoringStatus	O	0..1	Indication of whether sponsored connectivity is enabled or disabled/not enabled. The absence of the attribute indicates that the sponsored connectivity is enabled.	SponsoredConnectivity
supi	Supi	O	0..1	Subscription Permanent Identifier.	
gpsi	Gpsi	O	0..1	Generic Public Subscription Identifier.	
supFeat	SupportedFeatures	M	1	This IE represents a list of Supported features used as described in subclause 5.8. It shall be supplied by the NF service consumer in the POST request that requests a creation of an Individual Application Session Context resource.	
uelpv4	Ipv4Addr	C	0..1	The IPv4 address of the served UE.	
uelpv6	Ipv6Addr	C	0..1	The IPv6 address of the served UE.	
ueMac	MacAddr48	C	0..1	The MAC address of the served UE. When the feature "TimeSensitiveNetworking" is supported this attribute represents the DS-TT port MAC address.	
tsnBridgeManCont	BridgeManagementContainer	O	0..1	Transports TSN bridge management information.	TimeSensitiveNetworking
tsnPortManContDsst	PortManagementContainer	O	0..1	Transports TSN port management information for the DS-TT port.	TimeSensitiveNetworking
tsnPortManContNwtt	array(PortManagementContainer)	O	1..N	Transports TSN port management information for one or more NW-TT ports.	TimeSensitiveNetworking
NOTE: Only one of the served UE addressing parameters (the IPv4 address or the IPv6 address or MAC address) shall always be included.					

5.6.2.4 Type AppSessionContextRespData

Table 5.6.2.4-1: Definition of type AppSessionContextRespData

Attribute name	Data type	P	Cardinality	Description	Applicability
servAuthInfo	ServAuthInfo	O	0..1	Indicates the result of the authorization for a service request bound to a transfer policy.	
uelds	array(UeIdentityInfo)	O	1..N	Represents the 5GS-Level UE identities available for an AF session context.	IMS_SBI
supFeat	SupportedFeatures	C	0..1	This IE represents a list of Supported features used as described in subclause 5.8. It shall be supplied by the PCF in the response to the POST request that requested a creation of an Individual Application Session Context resource.	

5.6.2.5 Type AppSessionContextUpdateData

Table 5.6.2.5-1: Definition of type AppSessionContextUpdateData

Attribute name	Data type	P	Cardinality	Description	Applicability
afAppld	AfAppld	O	0..1	AF application identifier.	
afRoutReq	AfRoutingRequirementRm	O	0..1	Indicates the AF traffic routing requirements.	InfluenceOnTrafficRouting
aspId	Aspld	O	0..1	Application service provider identity.	SponsoredConnectivity
bdtRefId	BdtReferenceId	O	0..1	Reference to a transfer policy negotiated for background data traffic.	
evSubsc	EventsSubscReqDataRm	O	0..1	Identifies the events the application subscribes to at modification of an Individual Application Session Context resource.	
mcpttId	string	O	0..1	Indicates that the updated Individual Application Session Context resource relates to an MCPTT session prioritized call. It includes either one of the namespace values used for MCPTT (see IETF RFC 8101 [42]) and it may include the name of the MCPTT service provider.	MCPTT
mcVideoId	string	O	0..1	Indicates that the updated Individual Application Session Context resource relates to an MCVideo session prioritized call. It includes either one of the namespace values used for MCPTT (see IETF RFC 8101 [42]) and it may include the name of the MCVideo service provider.	MCVideo
medComponents	map(MediaComponentRm)	O	1..N	Media Component information.	
mpsId	string	O	0..1	Indicates that the modified Individual Application Session Context resource relates to an MPS service. It contains the national variant for MPS service name.	
mcsId	string	O	0..1	Indicates that the updated Individual Application Session Context resource relates to an MCS service. It contains the national variant for MCS service name.	
preemptControlInfo	PreemptionControlInformationRm	O	0..1	Preemption control information.	MCPTT-Preemption
resPrio	ReservPriority	O	0..1	Indicates the reservation priority.	
servInfStatus	ServiceInfoStatus	O	0..1	Indicates whether the service information is preliminary or final.	IMS_SBI
sipForkInd	SipForkingIndication	O	0..1	Describes if several SIP dialogues are related to an "Individual Application Session Context" resource.	IMS_SBI
sponId	SponId	O	0..1	Sponsor identity.	SponsoredConnectivity
sponStatus	SponsoringStatus	O	0..1	Indication of whether sponsored connectivity is enabled or disabled/not enabled.	SponsoredConnectivity
tsnBridgeManCont	BridgeManagementContainer	O	0..1	Transports TSN bridge management information.	TimeSensitiveNetworking
tsnPortManContDtt	PortManagementContainer	O	0..1	Transports TSN port management information for the DS-TT port.	TimeSensitiveNetworking
tsnPortManContNwts	array(PortManagementContainer)	O	1..N	Transports TSN port management information for one or more NW-TT ports.	TimeSensitiveNetworking

5.6.2.6 Type EventsSubscReqData

Table 5.6.2.6-1: Definition of type EventsSubscReqData

Attribute name	Data type	P	Cardinality	Description	Applicability
events	array(AfEventSubscription)	M	1..N	Subscribed Events.	
notifUri	Uri	O	0..1	Notification URI.	
reqQosMonParams	array(RequestedQoSMonitoringParameter)	O	1..N	Indicates the UL packet delay, DL packet delay and/or round trip packet delay between the UE and the UPF is to be monitored when the QoS Monitoring for URLLC is enabled for the service data flow.	QoSMonitoring
qosMon	QoSMonitoringInformation	O	0..1	QoS Monitoring information. It can be present when the event "QOS_MONITORING" is subscribed.	QoSMonitoring
reqAnis	array(RequiredAccessInfo)	C	1..N	Represents the required access network information. It shall be present when the event "ANI_REPORT" is subscribed.	NetLoc
usgThres	UsageThreshold	O	0..1	Includes the volume and/or time thresholds for sponsored data connectivity.	SponsoredConnectivity
notifCorrelId	string	O	0..1	It is used to set the value of Notification Correlation ID in the corresponding notification.	EnhancedSubscriptionToNotification

5.6.2.7 Type MediaComponent

Table 5.6.2.7-1: Definition of type MediaComponent

Attribute name	Data type	P	Cardinality	Description	Applicability
afAppld	AfAppld	O	0..1	Contains information that identifies the particular service the AF session belongs to.	
afRoutReq	AfRoutingRequirement	O	0..1	Indicates the AF traffic routing requirements.	InfluenceOnTrafficRouting
qosReference	string	O	0..1	Identifies a pre-defined QoS information.	AuthorizationWithRequiredQoS
altSerReqs	array(string)	O	1..N	Ordered list of alternative service requirements. The lower the index of the array for a given entry, the higher the priority.	AuthorizationWithRequiredQoS
contVer	ContentVersion	O	0..1	Represents the content version of a media component.	MediaComponentVersioning
desMaxLatency	Float	O	0..1	Indicates a maximum desirable transport level packet latency in milliseconds.	FLUS, QoSHint
desMaxLoss	Float	O	0..1	Indicates the maximum desirable transport level packet loss rate in percent (without "%" sign).	FLUS, QoSHint
flusId	string	O	0..1	Indicates that the media component is used for FLUS media. It is derived from the media level attribute "a=label:" (see IETF RFC 4574 [50]) obtained from the SDP body. It contains the string after "a=label:" starting with "flus" and may be followed by more characters as described in 3GPP TS 26.238 [51].	FLUS
medCompN	integer	M	1	Identifies the media component number, and it contains the ordinal number of the media component.	
medSubComps	map(MediaSubComponent)	O	1..N	Contains the requested bitrate and filters for the set of service data flows identified by their common flow identifier. The key of the map is the attribute "fNum".	
medType	MediaType	O	0..1	Indicates the media type of the service.	
marBwUI	BitRate	O	0..1	Maximum requested bandwidth for the Uplink.	
marBwDI	BitRate	O	0..1	Maximum requested bandwidth for the Downlink.	
maxPacketLossRateDI	PacketLossRateRateDI	O	0..1	Indicates the downlink maximum rate for lost packets that can be tolerated for the service data flow.	CHEM
maxPacketLossRateUI	PacketLossRateRateUI	O	0..1	Indicates the uplink maximum rate for lost packets that can be tolerated for the service data flow.	CHEM
maxSuppBwDI	BitRate	O	0..1	Maximum supported bandwidth for the Downlink.	IMS_SBI
maxSuppBwUI	BitRate	O	0..1	Maximum supported bandwidth for the Uplink.	IMS_SBI
minDesBwDI	BitRate	O	0..1	Minimum desired bandwidth for the Downlink.	IMS_SBI
minDesBwUI	BitRate	O	0..1	Minimum desired bandwidth for the Uplink.	IMS_SBI
mirBwUI	BitRate	O	0..1	Minimum requested bandwidth for the Uplink.	
mirBwDI	BitRate	O	0..1	Minimum requested bandwidth for the Downlink.	
fStatus	FlowStatus	O	0..1	Indicates whether the status of the service data flows is enabled, or disabled.	

Attribute name	Data type	P	Cardinality	Description	Applicability
preemptCap	PreemptionCapability	O	0..1	Defines whether the media flow may get resources that were already assigned to another media flow with a lower priority level. It may be included together with "prioSharingInd" for ARP decision.	MCPTT-Preemption
preemptVuln	PreemptionVulnerability	O	0..1	Defines whether the media flow may lose the resources assigned to it in order to admit a media flow with higher priority level. It may be included together with "prioSharingInd" for ARP decision.	MCPTT-Preemption
prioSharingInd	PrioritySharingIndicator	O	0..1	Indicates that the media flow is allowed to use the same ARP as media flows belonging to other "Individual Application Session Context" resources bound to the same PDU session.	PrioritySharing
resPrio	ReservPriority	O	0..1	Indicates the reservation priority.	
rrBw	BitRate	O	0..1	Indicates the maximum required bandwidth in bits per second for RTCP receiver reports within the session component as specified in IETF RFC 3556 [37]. The bandwidth contains all the overhead coming from the IP-layer and the layers above, i.e. IP, UDP and RTCP.	IMS_SBI
rsBw	BitRate	O	0..1	Indicates the maximum required bandwidth in bits per second for RTCP sender reports within the session component as specified in IETF RFC 3556 [37]. The bandwidth contains all the overhead coming from the IP-layer and the layers above, i.e. IP, UDP and RTCP.	IMS_SBI
sharingKeyDI	Uint32	O	0..1	Identifies which media components share resources in the downlink direction. If resource sharing applies between media components across "Individual Application Session Context" resources for the same PDU session, the same value of the "sharingKeyDI" attribute shall be used. If resource sharing does not apply among media components across "Individual Application Session Context" resources for the same PDU session, a different value for the "sharingKeyDI" attribute shall be used.	ResourceSharing
sharingKeyUI	Uint32	O	0..1	Identifies which media components share resources in the uplink direction. If resource sharing applies between media components across "Individual Application Session Context" resources for the same PDU session, the same value of the "sharingKeyUI" attribute shall be used. If resource sharing does not apply among media components across "Individual Application Session Context" resources for the same PDU session, a different value for the "sharingKeyUI" attribute shall be used.	ResourceSharing
codecs	array(CodecData)	O	1..2	Indicates the codec data.	
tsnQos	TsnQoSContainer	O	0..1	Transports QoS parameters for TSC traffic.	TimeSensitiveNetworking

Attribute name	Data type	P	Cardinality	Description	Applicability
tscaInputUI	TscaInputContainer	O	0..1	Transports TSCAI input parameters for TSC traffic at the ingress interface of the DS-TT/UE (uplink flow direction).	TimeSensitiveNetworking
tscaInputDI	TscaInputContainer	O	0..1	Transports TSCAI input parameters for TSC traffic at the ingress of the NW-TT (downlink flow direction).	TimeSensitiveNetworking

All IP flows within a "MediaSubComponent" data type are permanently disabled by supplying "FlowStatus" data type with a deletion indication.

Bandwidth information and the "fStatus" attribute provided within the MediaComponent applies to all those IP flows within the media component, for which no corresponding information is being provided within the "medSubComps" attribute. As defined in 3GPP TS 29.513 [7], the bandwidth information within the media component level "marBwUI" and "marBwDI" attributes applies separately to each media subcomponent except for media subcomponents with a "flowUsage" attribute with the value "RTCP". The mapping of bandwidth information for RTCP media subcomponent is defined in 3GPP TS 29.513 [7] subclause 7.3.3.

5.6.2.8 Type MediaSubComponent

Table 5.6.2.8-1: Definition of type MediaSubComponent

Attribute name	Data type	P	Cardinality	Description	Applicability
afSigProtocol	AfSigProtocol	O	0..1	Indicates the protocol used for signalling between the UE and the AF. It may be included only if the "flowUsage" attribute is set to the value "AF_SIGNALLING".	ProvAFsignalFlow
ethfDescs	array(EthFlowDescription)	O	1..2	Contains the flow description for the Uplink and/or Downlink Ethernet flows.	
fNum	integer	M	1	Identifies the ordinal number of the service data flow.	
fDescs	array(FlowDescription)	O	1..2	Contains the flow description for the Uplink and/or Downlink IP flows.	
fStatus	FlowStatus	O	0..1	Indicates whether the status of the service data flows is enabled or disabled.	
flowUsage	FlowUsage	O	0..1	Flow usage of the flows (e.g. RTCP, AF signalling).	
marBwUI	BitRate	O	0..1	Maximum requested bandwidth for the Uplink.	
marBwDI	BitRate	O	0..1	Maximum requested bandwidth for the Downlink.	
tosTrCI	TosTrafficClass	O	0..1	Type of Service or Traffic Class.	

The bit rate information and flow status information provided within the "MediaSubComponent" data type takes precedence over information provided within "MediaComponent" data type.

All service data flows within a "MediaSubComponent" data type are permanently disabled by supplying "FlowStatus" data type with a deletion indication.

5.6.2.9 Type EventsNotification

Table 5.6.2.9-1: Definition of type EventsNotification

Attribute name	Data type	P	Cardinality	Description	Applicability
accessType	AccessType	C	0..1	Includes the access type. It shall be present when the notified event is "ACCESS_TYPE_CHG".	
addAccessInfo	AdditionalAccessInfo	O	0..1	Indicates the additional combination of Access Type and RAT Type available for MA PDU session. It may be present when the notified event is "ACCESS_TYPE_CHG" and the PDU session is a Multi-Access PDU session.	ATSSS
relAccessInfo	AdditionalAccessInfo	O	0..1	Indicates the released combination of Access Type and RAT Type previously available for MA PDU session. It may be present when the notified event is "ACCESS_TYPE_CHG" and the PDU session is a Multi-Access PDU session.	ATSSS
anChargAddr	AccNetChargingAddress	O	0..1	Includes the access network charging address. It shall be present if available when the notified event is "CHARGING_CORRELATION".	IMS_SBI
anChargIds	array(AccessNetChargingIdentifier)	C	1..N	Includes the access network charging identifier(s). It shall be present when the notified event is "CHARGING_CORRELATION".	IMS_SBI
anGwAddr	AnGwAddress	O	0..1	Access network Gateway Address. It shall be present, if applicable, when the notified event is "ACCESS_TYPE_CHG".	
evSubsUri	Uri	M	1	The Events Subscription URI. Identifies the Events Subscription sub-resource that triggered the notification.	
evNotifs	array(AfEventNotification)	M	1..N	Notifications about individual events.	
failedResourceAllocReports	array(ResourceAllocationInfo)	C	1..N	Indicates the status of the PCC rule(s) related to certain failed media components. It shall be included when the event trigger is "FAILED_RESOURCES_ALLOCATION".	
noNetLocSupp	NetLocAccessSupport	O	0..1	Indicates the access network does not support the report of the requested access network information.	NetLoc
outOfCredReports	array(OutOfCreditInformation)	C	1..N	Out of credit information per service data flow. It shall be present when the notified event is "OUT_OF_CREDIT".	IMS_SBI
plmnId	PlmnIdNid	C	0..1	PLMN Identifier and, for an SNPN, also the NID. It shall be present when the notified event is "PLMN_CHG" or, if location information is required but is not available when the notified event is "ANI_REPORT". It shall be present if available when the notified event is "RAN_NAS_CAUSE".	
qncReports	array(QosNotificationControlInfo)	C	1..N	QoS notification control information. It shall be present when the notified event is "QOS_NOTIF".	
qosMonReports	array(QosMonitoringReport)	C	1..N	QoS Monitoring reporting information. It shall be present when the notified event is "QOS_MONITORING".	QoSMonitoring
ranNasRelCauses	array(RanNasRelCause)	C	1..N	RAN-NAS release cause. It shall be present if available when the notified event is "RAN_NAS_CAUSE".	RAN-NAS-Cause
ratType	RatType	O	0..1	RAT type. It shall be present, if applicable, when the notified event is "ACCESS_TYPE_CHG".	

Attribute name	Data type	P	Cardinality	Description	Applicability
ueLoc	UserLocation	O	0..1	E-UTRA, NR, or non-3GPP trusted and untrusted access user location information. "n3gppTai" and "n3lwfld" attributes within the "N3gaLocation" data type shall not be supplied. It shall be present if required and available when the notified event is "ANI_REPORT". It shall be present if available when the notified event is "RAN_NAS_CAUSE".	NetLoc, RAN-NAS-Cause
ueTimeZone	TimeZone	O	0..1	UE time zone. It shall be present if required and available when the notified event is "ANI_REPORT". It shall be present if available when the notified event is "RAN_NAS_CAUSE".	NetLoc, RAN-NAS-Cause
usgRep	AccumulatedUsage	C	0..1	Indicates the measured volume and/or time for sponsored data connectivity. It shall be present when the notified event is "USAGE_REPORT".	SponsoredConnectivity
tsnBridgeInfo	TsnBridgeInfo	O	0..1	Reports the TSN bridge information.	TimeSensitiveNetworking
tsnBridgeManagement	BridgeManagementContainer	O	0..1	Transports TSN bridge management information.	TimeSensitiveNetworking
tsnPortManagementDST	PortManagementContainer	O	0..1	Transports TSN port management information for the DS-TT port.	TimeSensitiveNetworking
tsnPortManagementNwTT	array(PortManagementContainer)	O	1..N	Transports TSN port management information for one or more NW-TT ports.	TimeSensitiveNetworking

5.6.2.10 Type AfEventSubscription

Table 5.6.2.10-1: Definition of type AfEventSubscription

Attribute name	Data type	P	Cardinality	Description	Applicability
event	AfEvent	M	1	Subscribed Event.	
notifMethod	AfNotifMethod	O	0..1	If notifMethod is not supplied, the default value "EVENT_DETECTION" applies.	
repPeriod	DurationSec	O	0..1	Indicates the time interval between successive event notifications. It is supplied for notification method "PERIODIC".	EnhancedSubscriptionToNotification
waitTime	DurationSec	O	0..1	Indicates the minimum waiting time between subsequent reports. Only applicable when the notification is set to "EVENT_DETECTION".	EnhancedSubscriptionToNotification

5.6.2.11 Type AfEventNotification

Table 5.6.2.11-1: Definition of type AfEventNotification

Attribute name	Data type	P	Cardinality	Description	Applicability
event	AfEvent	M	1	Notified Event.	
flows	array(Flows)	O	1..N	Affected Service Data Flows.	

5.6.2.12 Type TerminationInfo

Table 5.6.2.12-1: Definition of type TerminationInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
termCause	TerminationCause	M	1	Indicates the cause for requesting the deletion of the Individual Application Session Context resource.	
resUri	Uri	M	1	Identifies the Individual Application Session Context.	

5.6.2.13 Type AfRoutingRequirement

Table 5.6.2.13-1: Definition of type AfRoutingRequirement

Attribute name	Data type	P	Cardinality	Description	Applicability
appReloc	boolean	O	0..1	Indication of application relocation possibility. When it is included and set to "true", it indicates that the application cannot be relocated once a location of the application is selected by the 5GC. The default value is "false".	InfluenceOnTrafficRouting
routeToLocs	array(RouteToLocation)	O	1..N	A list of traffic routes to applications locations.	InfluenceOnTrafficRouting
spVal	SpatialValidity	O	0..1	Indicates where the traffic routing requirements apply. The absence of this attribute indicates no spatial restrictions.	InfluenceOnTrafficRouting
tempVals	array(TemporalValidity)	O	1..N	Indicates the time interval(s) during which the AF request is to be applied.	InfluenceOnTrafficRouting
upPathChgSub	UpPathChgEvent	O	0..1	Subscription to UP path management events.	InfluenceOnTrafficRouting
addrPreserInd	boolean	O	0..1	Indicates whether UE IP address should be preserved. This attribute shall set to "true" if preserved, otherwise, set to "false". Default value is false if omitted.	URLLC

5.6.2.14 Type ResourcesAllocationInfo

Table 5.6.2.14-1: Definition of type ResourcesAllocationInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
mcResourcStatus	MediaComponentResourcesStatus	M	1	Indicates the status of the PCC rule(s) related to the media components identified by the "flows" attribute.	
flows	array(Flows)	C	1..N	Identification of the flows. It shall be included if "MediaComponentVersioning" feature is supported. When "MediaComponentVersioning" feature is not supported, if no flows are provided, the status in the "mcResourcStatus" applies for all flows within the AF session.	

5.6.2.15 Type QosNotificationControllInfo

Table 5.6.2.15-1: Definition of type QosNotificationControllInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
notifType	QosNotifType	M	0..1	Indicates whether the GBR targets for the indicated SDFs are "NOT_GUARANTEED" or "GUARANTEED" again.	
flows	array(Flows)	C	1..N	Identification of the flows. It shall be included if "MediaComponentVersioning" feature is supported. When "MediaComponentVersioning" feature is not supported, if no flows are provided, the notification in the "notifType" applies for all flows within the AF session.	
altSerReq	string	O	0..1	Indicates the alternative service requirement the NG-RAN can guarantee.	AuthorizationWithRequiredQoS

5.6.2.16 Type SpatialValidity

Table 5.6.2.16-1: Definition of type SpatialValidity

Attribute name	Data type	P	Cardinality	Description	Applicability
presenceInfoList	map(PresenceInfo)	M	1..N	Defines the presence information provisioned by the AF. The "presenceState" attribute within the "PresenceInfo" data type shall not be supplied.	InfluenceOnTrafficRouting

5.6.2.17 Type EthFlowDescription

Table 5.6.2.17-1: Definition of type EthFlowDescription

Attribute name	Data type	P	Cardinality	Description	Applicability
destMacAddr	MacAddr48	O	0..1	Destination MAC address.	
ethType	string	M	1	A two-octet string that represents the Ethertype, as described in IEEE 802.3 [16] and IETF RFC 7042 [18] in hexadecimal representation. Each character in the string shall take a value of "0" to "9" or "A" to "F" and shall represent 4 bits. The most significant character representing the 4 most significant bits of the ethType shall appear first in the string, and the character representing the 4 least significant bits of the ethType shall appear last in the string.	
fDesc	FlowDescription	C	0..1	Contains the flow description for the Uplink or Downlink IP flow. It shall be present when the Ethertype is IP. (NOTE 3)	
fDir	FlowDirection	O	0..1	Contains the packet filter direction. Only the "DOWNLINK" or "UPLINK" value is applicable. (NOTE 2)	
sourceMacAddr	MacAddr48	O	0..1	Source MAC address.	
vlanTags	array(string)	O	1..2	Customer-VLAN and/or Service-VLAN tags containing the VID, PCP/DEI fields as defined in IEEE 802.1Q [17] and IETF RFC 7042 [18]. The first/lower instance in the array stands for the Customer-VLAN tag and the second/higher instance in the array stands for the Service-VLAN tag. Each field is encoded as a two-octet string in hexadecimal representation. Each character in the string shall take a value of "0" to "9" or "A" to "F" and shall represent 4 bits. The most significant character representing the PCP/DEI field shall appear first in the string, followed by character representing the 4 most significant bits of the VID field, and the character representing the 4 least significant bits of the VID field shall appear last in the string. If only Service-VLAN tag is provided, empty string for Customer-VLAN tag shall be provided.	
srcMacAddrEnd	MacAddr48	O	0..1	Source MAC address end. If this attribute is present, the sourceMacAddr attribute specifies the source MAC address start. E.g. srcMacAddrEnd with value 00-10-A4-23-3E-FE and sourceMacAddr with value 00-10-A4-23-3E-02 means all MAC addresses from 00-10-A4-23-3E-02 up to and including 00-10-A4-23-3E-FE.	MacAddressRange
destMacAddrEnd	MacAddr48	O	0..1	Destination MAC address end. If this attribute is present, the destMacAddr attribute specifies the destination MAC address start.	MacAddressRange

Attribute name	Data type	P	Cardinality	Description	Applicability
NOTE 1:	The "srcMacAddrEnd" attribute may only be present if the "sourceMacAddr" attribute is present; the "destMacAddrEnd" attribute may only be present if the "destMacAddr" attribute is present.				
NOTE 2:	If the "UPLINK" is included within the "fDir" attribute, the "sourceMacAddr" attribute and "srcMacAddrEnd" attribute (if MacAddressRange feature is supported) contain the UE address and "destMacAddr" attribute and "destMacAddrEnd" attribute (if MacAddressRange feature is supported) contain the remote address; otherwise if the "DOWNLINK" is included within the "fDir" attribute or the "fDir" attribute is never provided, the "sourceMacAddr" attribute and "srcMacAddrEnd" attribute (if MacAddressRange feature is supported) contain the remote address and "destMacAddr" attribute and "destMacAddrEnd" attribute (if MacAddressRange feature is supported) contain the UE address.				
NOTE 3:	The direction of the "fDesc" attribute shall be set to "in" if the "UPLINK" is included within the "fDir" attribute; the direction of the "fDesc" attribute shall be set to "out" if the "DOWNLINK" is included within the "fDir" attribute or the "fDir" attribute is never provided.				

5.6.2.18 Void

5.6.2.19 Void

5.6.2.20 Type AnGwAddress

Table 5.6.2.20-1: Definition of type AnGwAddress

Attribute name	Data type	P	Cardinality	Description	Applicability
anGwIpv4addr	Ipv4Addr	O	0..1	Includes the IPv4 address of the access network gateway control node.	
anGwIpv6addr	Ipv6Addr	O	0..1	Includes the IPv6 address of the access network gateway control node.	
NOTE:	At least one address of the access network gateway control node (the IPv4 address or the IPv6 address or both if both addresses are available) shall be included.				

5.6.2.21 Type Flows

Table 5.6.2.21-1: Definition of type Flows

Attribute name	Data type	P	Cardinality	Description	Applicability
contVers	array(ContentVersion)	C	1..N	Represents the content version of the content of a media component. If "MediaComponentVersioning" feature is supported, the content version shall be included if it was included when the corresponding media component was provided or modified.	MediaComponentVersioning
fNums	array(integer)	O	1..N	Indicates the service data flows via their flow identifier. If no flow identifier is supplied, the Flows data type refers to all the flows matching the media component number.	
medCompN	integer	M	1	Identifies the media component number, and it contains the ordinal number of the media component.	

5.6.2.22 Type TemporalValidity

Table 5.6.2.22-1: Definition of type TemporalValidity

Attribute name	Data type	P	Cardinality	Description	Applicability
startTime	DateTime	O	0..1	Indicates the time from which the traffic routing requirements start to apply. The absence of this attribute indicates the traffic routing requirements apply immediately.	InfluenceOnTraffic Routing
stopTime	DateTime	O	0..1	Indicates the time when the traffic routing requirements cease to apply. The absence of this attribute indicates the traffic routing requirements do not cease at any time.	InfluenceOnTraffic Routing

5.6.2.23 Void

5.6.2.24 Type AfRoutingRequirementRm

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

- with the OpenAPI "nullable: true" property;
- the removable attribute "spVal" is defined with the data type "SpatialValidityRm"; and
- the removable attributes "tempVals", "routeToLocs" and "addrPreserInd" are defined as nullable in the OpenAPI.

Table 5.6.2.24-1: Definition of type AfRoutingRequirementRm

Attribute name	Data type	P	Cardinality	Description	Applicability
appReloc	boolean	O	0..1	Indication of application relocation possibility. When it is set to "true", it indicates that the application cannot be relocated once a location of the application is selected by the 5GC.	InfluenceOnTrafficRouting
routeToLocs	array(RouteToLocation)	O	1..N	A list of traffic routes to applications locations.	InfluenceOnTrafficRouting
spVal	SpatialValidityRm	O	0..1	Indicates where the traffic routing requirements apply.	InfluenceOnTrafficRouting
tempVals	array(TemporalValidity)	O	1..N	Indicates the time interval(s) during which the AF request is to be applied.	InfluenceOnTrafficRouting
upPathChgSub	UpPathChgEvent	O	0..1	Subscription to UP path management events.	InfluenceOnTrafficRouting
addrPreserInd	boolean	O	0..1	Indicates whether UE IP address should be preserved.	URLLC

5.6.2.25 Type EventsSubscReqDataRm

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

- with the OpenAPI "nullable: true" property; and
- the removable attribute "usgThres" is defined with the removable data type "UsageThresholdRm"; and removable attribute "qosMon" is defined with the removable data type "QosMonitoringInformationRm".

Table 5.6.2.25-1: Definition of type EventsSubscReqDataRm

Attribute name	Data type	P	Cardinality	Description	Applicability
events	array(AfEventSubsc ription)	M	1..N	Subscribed Events.	
notifUri	Uri	O	0..1	Notification URI.	
reqQosMonPara ms	array(RequestedQo sMonitoringParamet er)	O	1..N	Indicates the UL packet delay, DL packet delay and/or round trip packet delay between the UE and the UPF is to be monitored when the QoS Monitoring for URLLC is enabled for the service data flow.	QoSMonitoring
qosMon	QosMonitoringInfor mationRm	O	0..1	Qos Monitoring information. It can be present when the event "QOS_MONITORING" is subscribed.	QoSMonitoring
reqAnis	array(RequiredAcce ssInfo)	C	1..N	Represents the required access network information. It shall be present when the event "ANI_REPORT" is subscribed. (NOTE)	NetLoc
usgThres	UsageThresholdRm	O	0..1	Includes the volume and/or time thresholds for sponsored data connectivity.	SponsoredCon nectivity
notifCorreld	string	O	0..1	It is used to set the value of Notification Correlation ID in the corresponding notification.	EnhancedSub scriptionToNoti fication
NOTE: "ANI_REPORT" is the one-time reported event and thus the attribute "reqAnis" is not defined as removable attribute (i.e. with the removable data type "RequiredAccessInfoRm"). Once the access network information is reported to the AF the subscription to this event is automatically terminated in the PCF and the related information is removed.					

5.6.2.26 Type MediaComponentRm

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

- with the OpenAPI "nullable: true" property; and
- the removable attributes "afRoutReq" is defined with the removable data type "AfRoutingRequirementRm"; "maxPacketLossRateDL" and "maxPacketLossRateUL" are defined with the removable data type "PacketLossRateRm"; "medSubComps" is defined with the removable data type "MediaSubComponentRm"; "preemptCap" is defined with the removable data type "PreemptionCapabilityRm"; "preemptVuln" is defined with the removable data type "PreemptionVulnerabilityRm"; "marBwDL", "marBwUL", "minDesBwDL", "minDesBwUL", "mirBwDL", "mirBwUL", "maxSuppBwDL", "maxSuppBwUL", "rrBw", "rsBw" are defined with the removable data type "BitRateRm"; "sharingKeyDL", "sharingKeyUL", and "tsnQos" are defined with the removable data types, "Uint32Rm" and "TsnQosContainerRm"; the removable attributes "desMaxLatency" and "desMaxLoss" are defined with the removable data type "FloatRm"; the removable attribute "flusId" is defined as nullable in the OpenAPI.
- the removable attributes "qosReference" and "altSerReqs" are defined as nullable.

Table 5.6.2.26-1: Definition of type MediaComponentRm

Attribute name	Data type	P	Cardinality	Description	Applicability
afAppld	AfAppld	O	0..1	Contains information that identifies the particular service the AF session belongs to.	
afRoutReq	AfRoutingRequirementRm	O	0..1	Indicates the AF traffic routing requirements.	InfluenceOnTrafficRouting
qosReference	string	O	0..1	Identifies a pre-defined QoS information.	AuthorizationWithRequiredQoS
altSerReqs	array(string)	O	1..N	Ordered list of alternative service requirements. The lower the index of the array for a given entry, the higher the priority.	AuthorizationWithRequiredQoS
contVer	ContentVersion	O	0..1	Represents the content version of a media component.	MediaComponentVersioning
desMaxLatency	FloatRm	O	0..1	Indicates a maximum desirable transport level packet latency in milliseconds.	FLUS, QoSHint
desMaxLoss	FloatRm	O	0..1	Indicates the maximum desirable transport level packet loss rate in percent (without "%" sign).	FLUS, QoSHint
flusId	string	O	0..1	Indicates that the media component is used for FLUS media. It is derived from the media level attribute "a=label:" (see IETF RFC 4574 [50]) obtained from the SDP body. It contains the string after "a=label:" starting with "flus" and may be followed by more characters as described in 3GPP TS 26.238 [51].	FLUS
maxPacketLossRateDI	PacketLossRateRm	O	0..1	Indicates the downlink maximum rate for lost packets that can be tolerated for the service data flow.	CHEM
maxPacketLossRateUI	PacketLossRateRm	O	0..1	Indicates the uplink maximum rate for lost packets that can be tolerated for the service data flow.	CHEM
medCompN	integer	M	1	Identifies the media component number, and it contains the ordinal number of the media component.	
medSubComps	map(MediaSubComponentRm)	O	1..N	Contains the requested bitrate and filters for the set of service data flows identified by their common flow identifier. The key of the map is the attribute "fNum".	
medType	MediaType	O	0..1	Indicates the media type of the service.	
marBwUI	BitRateRm	O	0..1	Maximum requested bandwidth for the Uplink.	
marBwDI	BitRateRm	O	0..1	Maximum requested bandwidth for the Downlink.	
maxSuppBwDI	BitRateRm	O	0..1	Maximum supported bandwidth for the Downlink.	IMS_SBI
maxSuppBwUI	BitRateRm	O	0..1	Maximum supported bandwidth for the Uplink.	IMS_SBI
minDesBwDI	BitRateRm	O	0..1	Minimum desired bandwidth for the Downlink.	IMS_SBI
minDesBwUI	BitRateRm	O	0..1	Minimum desired bandwidth for the Uplink.	IMS_SBI
mirBwUI	BitRateRm	O	0..1	Minimum requested bandwidth for the Uplink.	
mirBwDI	BitRateRm	O	0..1	Minimum requested bandwidth for the Downlink.	
fStatus	FlowStatus	O	0..1	Indicates whether the status of the service data flows is enabled, or disabled.	

Attribute name	Data type	P	Cardinality	Description	Applicability
preemptCap	PreemptionCapabilityRm	O	0..1	Defines whether the media flow may get resources that were already assigned to another media flow with a lower priority level.	MCPTT-Preemption
preemptVuln	PreemptionVulnerabilityRm	O	0..1	Defines whether the media flow may lose the resources assigned to it in order to admit a media flow with higher priority level.	MCPTT-Preemption
prioSharingInd	PrioritySharingIndicator	O	0..1	Indicates that the media flow is allowed to use the same ARP as media flows belonging to other "Individual Application Session Context" resources bound to the same PDU session.	PrioritySharing
resPrio	ReservPriority	O	0..1	Indicates the reservation priority.	
rrBw	BitRateRm	O	0..1	Indicates the maximum required bandwidth in bits per second for RTCP receiver reports within the session component as specified in IETF RFC 3556 [37]. The bandwidth contains all the overhead coming from the IP-layer and the layers above, i.e. IP, UDP and RTCP.	IMS_SBI
rsBw	BitRateRm	O	0..1	Indicates the maximum required bandwidth in bits per second for RTCP sender reports within the session component as specified in IETF RFC 3556 [37]. The bandwidth contains all the overhead coming from the IP-layer and the layers above, i.e. IP, UDP and RTCP.	IMS_SBI
codecs	array(CodecData)	O	1..2	Indicates the codec data.	
sharingKeyDI	Uint32Rm	O	0..1	Identifies which media components share resources in the downlink direction. If resource sharing applies between media components across "Individual Application Session Context" resources for the same PDU session, the same value of the "sharingKeyDI" attribute shall be used. If resource sharing does not apply among media components across "Individual Application Session Context" resources for the same PDU session, a different value for the "sharingKeyDI" attribute shall be used. If resource sharing does no longer apply for this media component, the "sharingKeyDI" attribute shall be set to "null".	ResourceSharing
sharingKeyUI	Uint32Rm	O	0..1	Identifies which media components share resources in the uplink direction. If resource sharing applies between media components across "Individual Application Session Context" resources for the same PDU session, the same value of the "sharingKeyUI" attribute shall be used. If resource sharing does not apply among media components across "Individual Application Session Context" resources for the same PDU session, a different value for the "sharingKeyUI" attribute shall be used. If resource sharing does no longer apply for this media component, the "sharingKeyUI" attribute shall be set to "null".	ResourceSharing

Attribute name	Data type	P	Cardinality	Description	Applicability
tsnQos	TsnQoSContainerRm	O	0..1	Transports QoS parameters for TSC traffic.	TimeSensitive Networking
tscailInputUI	TscailInputContainer	O	0..1	Transports TSCAI input parameters for TSC traffic at the ingress interface of the DS-TT/UE (uplink flow direction).	TimeSensitive Networking
tscailInputDI	TscailInputContainer	O	0..1	Transports TSCAI input parameters for TSC traffic at the ingress of the NW-TT (downlink flow direction).	TimeSensitive Networking

5.6.2.27 Type MediaSubComponentRm

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

- with the OpenAPI "nullable: true" property;
- the removable attributes "marBwDI", "marBwUI", defined with the removable data type "BitRateRm"; the removable attribute "tosTrCl", defined with the removable data type "TosTrafficClassRm"; and
- the removable attributes "ethfDescs" and "fDescs" are defined as nullable in the OpenAPI.

Table 5.6.2.27-1: Definition of type MediaSubComponentRm

Attribute name	Data type	P	Cardinality	Description	Applicability
afSigProtocol	AfSigProtocol	O	0..1	Indicates the protocol used for signalling between the UE and the AF. It may be included only if the "flowUsage" attribute is set to the value "AF_SIGNALLING".	ProvAFsignalFlow
ethfDescs	array(EthFlowDescription)	O	1..2	Contains the flow description for the Uplink and/or Downlink Ethernet flows.	
fNum	integer	M	1	Identifies the ordinal number of the IP flow.	
fDescs	array(FlowDescription)	O	1..2	Contains the flow description for the Uplink and/or Downlink IP flows.	
fStatus	FlowStatus	O	0..1	Indicates whether the status of the service data flows is enabled or disabled.	
flowUsage	FlowUsage	O	0..1	Flow usage of the flows (e.g. RTCP, AF signalling).	
marBwUI	BitRateRm	O	0..1	Maximum requested bandwidth for the Uplink.	
marBwDI	BitRateRm	O	0..1	Maximum requested bandwidth for the Downlink.	
tosTrCl	TosTrafficClassRm	O	0..1	Type of Service or Traffic Class.	

5.6.2.28 Type SpatialValidityRm

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

5.6.2.29 Type ExtendedProblemDetails

This data type is the "ProblemDetails" data type defined in 3GPP TS 29.571 [12] but extended with the attribute "acceptableServInfo" of data type "AcceptableServiceInfo".

Table 5.6.2.29-1: Definition of type ExtendedProblemDetails

Attribute name	Data type	P	Cardinality	Description	Applicability
acceptableServInfo	AcceptableServiceInfo	O	0..1	Describes information related to the acceptable service information, i.e., the maximum acceptable bandwidth for an AF session and/or for specific media components.	
NOTE: ExtendedProblemDetails data type also contains all the properties defined for ProblemDetails data type in 3GPP TS 29.571[12].					

5.6.2.30 Type AcceptableServiceInfo

Table 5.6.2.30-1: Definition of type AcceptableServiceInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
accBwMedComps	map(MediaComponent)	O	1..N	Indicates the maximum bandwidth that shall be authorized by the PCF for each media component of the map. Each media component of the map shall only include the "medCompN" attribute and the "marBwDI" and/or "marBwUI" attributes indicating the maximum acceptable bandwidth. The key of the map is the media component number.	
marBwUI	BitRate	O	0..1	Maximum acceptable bandwidth for the Uplink for the AF session.	
marBwDI	BitRate	O	0..1	Maximum acceptable bandwidth for the Downlink for the AF session.	
NOTE: When the acceptable bandwidth applies to one or more media components, only the "accBwMedComps" attribute shall be provided. When the acceptable bandwidth applies to the whole AF session, only the "marBwDI" and "marBwUI" attributes shall be present.					

5.6.2.31 Type UeIdentityInfo

Table 5.6.2.31-1: Definition of type UeIdentityInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
gpsi	Gpsi	O	0..1	Represents the GPSI.	
pei	Pei	O	0..1	Represents the PEI.	
supi	Supi	O	0..1	Represents the SUPI.	
NOTE: At least one of the "gpsi", "supi" and "pei" attributes shall be present. More than one attribute may be present simultaneously.					

5.6.2.32 Type AccessNetChargingIdentifier

Table 5.6.2.32-1: Definition of type AccessNetChargingIdentifier

Attribute name	Data type	P	Cardinality	Description	Applicability
accNetChaldValue	ChargingId	M	1	Contains a charging identifier.	
flows	array(Flows)	O	1..N	Identifications of the flows transported within the corresponding QoS flow. If no flows are provided, the charging identifier applies for all flows within the AF session.	

5.6.2.33 Type OutOfCreditInformation

Table 5.6.2.33-1: Definition of type OutOfCreditInformation

Attribute name	Data type	P	Cardinality	Description	Applicability
finUnitAct	FinalUnitAction	M	1	Indicates the termination action to be taken when the user's account cannot cover the service cost.	
flows	array(Flows)	O	1..N	Identifications of the flows without available credit. If no flows are provided, the termination action in "finUnitAct" attribute applies for all flows within the AF session.	

5.6.2.34 Type QoSMonitoringInformation

Table 5.6.2.34-1: Definition of type QoSMonitoringInformation

Attribute name	Data type	P	Cardinality	Description	Applicability
repThreshDL	integer	O	0..1	Unsigned integer identifying a threshold in units of milliseconds for DL packet delay. Only applicable when the "notifMethod" attribute is not supplied or the "notifMethod" is supplied and set to "EVENT_TRIGGERED".	QoSMonitoring
repThreshUL	integer	O	0..1	Unsigned integer identifying a threshold in units of milliseconds for UL packet delay. Only applicable when the "notifMethod" attribute is not supplied or the "notifMethod" is supplied and set to "EVENT_TRIGGERED".	QoSMonitoring
repThreshRp	integer	O	0..1	Unsigned integer identifying a threshold in units of milliseconds for round trip packet delay. Only applicable when the "notifMethod" attribute is not supplied or the "notifMethod" is supplied and set to "EVENT_TRIGGERED".	QoSMonitoring
NOTE: The "repThreshDL" attribute and/or the "repThreshUL" attribute and/or the "repThreshRp" attribute shall be present.					

5.6.2.35 Type TsnQoSContainer

Table 5.6.2.35-1: Definition of type TsnQoSContainer

Attribute name	Data type	P	Cardinality	Description	Applicability
maxTscBurstSize	ExtMaxDataBurstVol	O	0..1	Maximum burst size of the TSC traffic in units of Bytes. Minimum = 4096, Maximum = 2000000.	
tscPackDelay	PacketDelBudget	O	0..1	Delay of the TSC traffic.	
tscPrioLevel	TscPriorityLevel	O	0..1	Unsigned integer indicating the TSC traffic priority in relation to other TSC and non-TSC traffic.	
NOTE: At least one of the attributes shall be present in an instance of the TsnQoSContainer.					

5.6.2.36 Type PcsfRestorationRequestData

Table 5.6.2.36-1: Definition of type PcsfRestorationRequestData

Attribute name	Data type	P	Cardinality	Description	Applicability
dnn	Dnn	C	0..1	Data Network Name, a full DNN with both the Network Identifier and Operator Identifier, or a DNN with the Network Identifier only. It shall be present when the "afRoutReq" attribute is present.	
ipDomain	string	O	0..1	Indicates the IPv4 address domain information that assists session binding.	
sliceInfo	Snssai	O	0..1	Identifies the S-NSSAI.	
supi	Supi	O	0..1	Subscription Permanent Identifier.	
ueIpv4	Ipv4Addr	C	0..1	The IPv4 address of the served UE.	
ueIpv6	Ipv6Addr	C	0..1	The IPv6 address of the served UE.	
NOTE: When present, only one of the served UE addressing parameters (the IPv4 address or the IPv6 address) shall always be included.					

5.6.2.37 Type QosMonitoringReport

Table 5.6.2.42-1: Definition of type QosMonitoringReport

Attribute name	Data type	P	Cardinality	Description	Applicability
flows	array(Flows)	C	1..N	Identification of the flows. It shall be included if "MediaComponentVersioning" feature is supported. When "MediaComponentVersioning" feature is not supported, if no flows are provided, the notification in the "notifType" applies for all flows within the AF session.	
ulDelays	array(integer)	O	1..N	Uplink packet delay in units of milliseconds. (NOTE)	
dlDelays	array(integer)	O	1..N	Downlink packet delay in units of milliseconds. (NOTE)	
rtDelays	array(integer)	O	1..N	Round trip delay in units of milliseconds. (NOTE)	
NOTE: In this release of the specification the maximum number of elements in the array is 2.					

5.6.2.38 Type TsnQosContainerRm

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

5.6.2.39 Type TscailInputContainer

Table 5.6.2.39-1: Definition of type TscailInputContainer

Attribute name	Data type	P	Cardinality	Description	Applicability
periodicity	DurationSec	O	0..1	Identifications of the time period between the start of two bursts in reference to the TSN GM.	
burstArrivalTime	DateTime	O	0..1	Indicates the arrival time of the data burst in reference to the TSN GM.	

5.6.2.40 Type PduSessionTsnBridge

Table 5.6.2.40-1: Definition of type PduSessionTsnBridge

Attribute name	Data type	P	Cardinality	Description	Applicability
tsnBridgeInfo	TsnBridgeInfo	M	1	Reports the 5GS Bridge information.	
tsnBridgeManagement	BridgeManagementContainer	O	0..1	Transports TSN bridge management information.	
tsnPortManagementDST	PortManagementContainer	O	0..1	Transports TSN port management information for the DS-TT port.	
tsnPortManagementNWTT	array(PortManagementContainer)	O	1..N	Transports TSN port management information for one or more NW-TT ports.	

5.6.2.41 Type QosMonitoringInformationRm

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

5.6.2.42 Type EventsSubscPutData

Table 5.6.2.42-1: Definition of type EventsSubscPutData

Data Type	P	Cardinality	Description	Applicability
EventsSubscReqData	C	0..1	Identifies the events the application subscribes to and represents the Events Subscription sub-resource data. It shall be present in the response to PUT requests as specified in table 5.3.4.3.1-3.	
EventsNotification	C	0..1	Describes the notification about the events already met at the time of subscription. It shall be present if available.	
NOTE: EventsSubscPutData data type is represented as a non-exclusive list of two data types: EventsSubscReqData and EventsNotification.				

5.6.3 Simple data types and enumerations

5.6.3.1 Introduction

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

5.6.3.2 Simple data types

The simple data types defined in table 5.6.3.2-1 shall be supported.

Table 5.6.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability
AfAppld	string	Contains an AF application identifier.	
Aspld	string	Contains an identity of an application service provider.	SponsoredConnectivity
CodecData	string	Contains codec related information. Refer to subclause 5.3.7 of 3GPP TS 29.214 [20] for encoding.	
ContentVersion	integer	Unsigned 64-bit integer that indicates the version of some content, as e.g. the content of a media component. The content version shall be unique for the content and for the lifetime of that content. (NOTE)	MediaComponentVersioning
FlowDescription	string	Defines a packet filter for an IP flow. It contains an IpFilterRule according to section 4.3 of IETF RFC 6733 [52]. Refer to subclause 5.3.8 of 3GPP TS 29.214 [20] for encoding.	
SponId	string	Contains an identity of a sponsor.	SponsoredConnectivity
ServiceUrn	string	Indicates that an AF session is used for Emergency traffic. It contains values of the service URN and it may include subservices, as defined in IETF RFC 5031 [34] or registered at IANA. The string "urn:service:" in the beginning of the URN shall be omitted and all subsequent text shall be included. Examples of valid values of the ServiceUrn data structure are "sos", "sos.fire", "sos.police" and "sos.ambulance".	IMS_SBI
TosTrafficClass	string	2-octet string, where each octet is encoded in hexadecimal representation. The first octet contains the IPv4 Type-of-Service or the IPv6 Traffic-Class field and the second octet contains the ToS/Traffic Class mask field. Each character in the string shall take a value of "0" to "9" or "A" to "F" and shall represent 4 bits. One example is that of a TFT packet filter as defined in 3GPP TS 24.008 [36].	
TosTrafficClassRm	string	This data type is defined in the same way as the "TosTrafficClass" data type, but with the OpenAPI "nullable: true" property.	
TscPriorityLevel	integer	Unsigned integer indicating the TSC traffic Priority Level, within the range 1 to 8. Values are ordered in decreasing order of priority, i.e. with 1 as the highest priority and 8 as the lowest priority.	TimeSensitiveNetworking
TscPriorityLevelRm	integer	This data type is defined in the same way as the "TscPriorityLevel" data type, but with the OpenAPI "nullable: true" property.	TimeSensitiveNetworking
NOTE: The method of assigning content versions is implementation specific.			

5.6.3.3 Enumeration: MediaType

The enumeration "MediaType" represents the media type of a media component.

Table 5.6.3.3-1: Enumeration MediaType

Enumeration value	Description	Applicability
AUDIO	The type of media is audio.	
VIDEO	The type of media is video.	
DATA	The type of media is data.	
APPLICATION	The type of media is application data.	
CONTROL	The type of media is control.	
TEXT	The type of media is text.	
MESSAGE	The type of media is message	
OTHER	Other type of media.	

5.6.3.4 Enumeration: ReservPriority

The enumeration "ReservPriority" represents the reservation priority. The lowest priority shall be indicated with the "PRIO_1" value, the next after the lowest with the "PRIO_2" value, and so on up to the highest priority which shall be indicated with "PRIO_16".

Table 5.6.3.4-1: Enumeration ReservPriority

Enumeration value	Description	Applicability
PRIO_1		
PRIO_2		
PRIO_3		
PRIO_4		
PRIO_5		
PRIO_6		
PRIO_7		
PRIO_8		
PRIO_9		
PRIO_10		
PRIO_11		
PRIO_12		
PRIO_13		
PRIO_14		
PRIO_15		
PRIO_16		

5.6.3.5 Enumeration: ServAuthInfo

The enumeration "servAuthInfo" represents the result of the Npcf_PolicyAuthorization service request from the AF.

Table 5.6.3.5-1: Enumeration ServAuthInfo

Enumeration value	Description	Applicability
TP_NOT_KNOWN	Indicates the transfer policy is not known.	
TP_EXPIRED	Indicates the transfer policy has expired.	
TP_NOT_YET_OCCURRED	Indicates the time window of the transfer policy has not yet occurred.	

5.6.3.6 Enumeration: SponsoringStatus

The enumeration "SponsoringStatus" represents whether the sponsored data connectivity is enabled or disabled/not-enabled.

Table 5.6.3.6-1: Enumeration SponsoringStatus

Enumeration value	Description	Applicability
SPONSOR_DISABLED	Sponsored data connectivity is disabled or not enabled.	SponsoredConnectivity
SPONSOR_ENABLED	Sponsored data connectivity is enabled.	SponsoredConnectivity

5.6.3.7 Enumeration: AfEvent

The enumeration "AfEvent" represents the traffic events the PCF can notify to the AF.

Table 5.6.3.7-1: Enumeration AfEvent

Enumeration value	Description	Applicability
ACCESS_TYPE_CHG	Access type change.	
ANI_REPORT	Access Network Information Report requested.	NetLoc
CHARGING_CORRELATION	Access Network Charging Correlation Information.	IMS_SBI
EPS_FALLBACK	Indicates that the establishment of the QoS flow for the requested voice media type was rejected due to fallback to EPS.	EPSFallbackReport
FAILED_RESOURCES_ALLOCATION	Indicates that one or more of the SDFs of an Individual Application Session Context are deactivated at the SMF. It also indicates that the resources requested for a particular service information cannot be successfully allocated.	
OUT_OF_CREDIT	Out of credit.	IMS_SBI
PLMN_CHG	This trigger indicates PLMN change.	
QOS_NOTIF	The GBR QoS targets of a SDF are not guaranteed or are guaranteed again.	
QOS_MONITORING	Indicates PCF to enable QoS Monitoring for the Service Data Flow.	QoSMonitoring
RAN_NAS_CAUSE	This trigger indicates RAN-NAS release cause information is available in the PCF from the SMF. This event does not require explicit subscription.	RAN-NAS-Cause
REALLOCATION_OF_CREDIT	Credit has been reallocated after a former out of credit indication.	IMS_SBI, ReallocationOfCredit
SUCCESSFUL_RESOURCES_ALLOCATION	Indicates that the resources requested for particular service information have been successfully allocated.	
TSN_BRIDGE_INFO	5GS Bridge information received by the PCF from the SMF.	TimeSensitiveNetworking
USAGE_REPORT	Volume and/or time usage for sponsored data connectivity.	SponsoredConnectivity

5.6.3.8 Enumeration: AfNotifMethod

The enumeration "AfNotifMethod" represents the notification methods that can be subscribed by an AF.

Table 5.6.3.8-1: Enumeration AfNotifMethod

Enumeration value	Description	Applicability
EVENT_DETECTION	Event is reported whenever the event is met and the subscription is alive.	
ONE_TIME	Events are reported once the event is met and are not reported again unless the AF refreshes the subscription.	
PERIODIC	The notification is periodically sent.	EnhancedSubscriptionToNotification
PDU_SESSION_RELEASE	Event is reported when the PDU session is released.	EnhancedSubscriptionToNotification

5.6.3.9 Enumeration: QosNotifType

The enumeration "QosNotifType" represents the types of reports bound to the notification of QoS Notification Control.

Table 5.6.3.9-1: Enumeration QosNotifType

Enumeration value	Description	Applicability
GUARANTEED	The QoS targets of one or more SDFs are guaranteed again.	
NOT_GUARANTEED	The QoS targets of one or more SDFs are not being guaranteed.	

5.6.3.10 Enumeration: TerminationCause

The enumeration "TerminationCause" represents the types of causes the PCF can report when requesting to the AF the deletion of the "Individual Application Session Context" resource.

Table 5.6.3.10-1: Enumeration TerminationCause

Enumeration value	Description	Applicability
ALL_SDF_DEACTIVATION	All the SDFs of an Individual Application Session Context are deactivated at the SMF.	
PDU_SESSION_TERMINATION	The PDU session is terminated.	
PS_TO_CS_HO	Indication of PS to CS handover is received from the SMF.	MS_SBI

5.6.3.11 Void

5.6.3.12 Enumeration: FlowStatus

The enumeration "FlowStatus" represents whether the service data flow(s) are enabled or disabled.

Table 5.6.3.12-1: Enumeration FlowStatus

Enumeration value	Description	Applicability
ENABLED-UPLINK	Indicates to enable associated uplink service data flow(s) and to disable associated downlink service data flow(s).	
ENABLED-DOWNLINK	Indicates to enable associated downlink service data flow(s) and to disable associated uplink service data flow(s).	
ENABLED	Indicates to enable all associated service data flow(s) in both directions.	
DISABLED	Indicates to disable all associated service data flow(s) in both directions.	
REMOVED	Indicates to remove all associated service data flow(s). The IP Filters for the associated service data flow(s) shall be removed. The associated service data flows shall not be taken into account when deriving the authorized QoS.	

5.6.3.13 Enumeration: MediaComponentResourcesStatus

The enumeration "MediaComponentResourcesStatus" indicates whether the PCC rule(s) related to certain media component are active or inactive.

Table 5.6.3.13-1: Enumeration MediaComponentResourcesStatus

Enumeration value	Description	Applicability
ACTIVE	Indicates that the PCC rule(s) related to certain media component are active.	
INACTIVE	Indicates that the PCC rule(s) related to certain media component are inactive.	

5.6.3.14 Enumeration: FlowUsage

The enumeration "FlowUsage" represents the flow usage of the flows described by a media subcomponent.

Table 5.6.3.14-1: Enumeration FlowUsage

Enumeration value	Description	Applicability
NO_INFO	This value is used to indicate that no information about the usage of the IP flow is being provided. This is the default value.	
RTCP	This value is used to indicate that an IP flow is used to transport RTCP.	
AF_SIGNALLING	This value is used to indicate that the IP flow is used to transport AF Signalling Protocols (e.g. SIP/SDP).	IMS_SBI

NOTE: An AF can choose not to identify RTCP flows, e.g. in order to avoid that RTCP flows are always enabled by the server.

5.6.3.15 Enumeration: RequiredAccessInfo

The enumeration "RequiredAccessInfo" represents the access network information required for the "Individual Application Session Context" resource.

Table 5.6.3.15-1: Enumeration RequiredAccessInfo

Enumeration value	Description	Applicability
USER_LOCATION	Indicates that the user location information shall be reported.	
UE_TIME_ZONE	Indicates that the user timezone shall be reported.	

5.6.3.16 Enumeration: ServiceInfoStatus

The enumeration "ServiceInfoStatus" represents whether the AF provided service information is preliminary or final.

Table 5.6.3.16-1: Enumeration ServiceInfoStatus

Enumeration value	Description	Applicability
FINAL	This value is used to indicate that the service has been fully negotiated between the two ends and service information provided is the result of that negotiation.	
PRELIMINARY	This value is used to indicate that the service information that the AF has provided to the PCF is preliminary and needs to be further negotiated between the two ends (e.g. for IMS when the service information is sent based on the SDP offer).	

5.6.3.17 Enumeration: SipForkingIndication

The enumeration "SipForkingIndication" describes if several SIP dialogues are related to an "Individual Application Session Context" resource.

Table 5.6.3.17-1: Enumeration SipForkingIndication

Enumeration value	Description	Applicability
SINGLE_DIALOGUE	This value is used to indicate that the "Individual Application Session Context" resource relates to a single SIP dialogue. This is the default value.	
SEVERAL_DIALOGUES	This value is used to indicate that the "Individual Application Session Context" resource relates to several SIP dialogues.	

5.6.3.18 Enumeration: AfRequestedData

The enumeration "AfRequestedData" represents the information the AF requested to be exposed.

Table 5.6.3.18-1: Enumeration AfRequestedData

Enumeration value	Description	Applicability
UE_IDENTITY	Indicates that the AF requests the PCF to provide the 5GS-level UE identities (SUPI, GPSI, PEI) available for that PDU session.	

5.6.3.19 Enumeration: PreemptionControlInformation

The enumeration "PreemptionControlInformation" represents how to perform pre-emption among multiple potential media flow candidates of same priority.

Table 5.6.3.19-1: Enumeration PreemptionControlInformation

Enumeration value	Description	Applicability
MOST_RECENT	Indicates the most recent added flow is to be pre-empted.	
LEAST_RECENT	Indicates the least recent added flow is to be pre-empted.	
HIGHEST_BW	Indicates the highest bandwidth flow is to be pre-empted.	

5.6.3.20 Enumeration: PrioritySharingIndicator

The enumeration "PrioritySharingIndicator" represents whether the media component is enabled or disabled for priority sharing with other media components which are assigned the same 5QI and belong to other "Individual Application Session Context" resource bound to the same PDU session.

Table 5.6.3.20-1: Enumeration PrioritySharingIndicator

Enumeration value	Description	Applicability
ENABLED	Indicates the media component is allowed to share ARP with other medias which are assigned the same 5QI and belong to other "Individual Application Session Context" resources bound to the same PDU session.	
DISABLED	Indicates the media component is not allowed to share ARP with other media components. This is the default value when omitted.	

5.6.3.21 Enumeration: PreemptionControlInformationRm

This data type is defined in the same way as the "PreemptionControlInformation" data type but also allows null value (specified as "NullValue" data type).

5.7 Error handling

5.7.1 General

HTTP error handling shall be supported as specified in subclause 5.2.4 of 3GPP TS 29.500 [5].

For the Npcf_PolicyAuthorization API, HTTP error responses shall be supported as specified in subclause 4.8 of 3GPP TS 29.501 [6]. Protocol errors and application errors specified in table 5.2.7.2-1 of 3GPP TS 29.500 [5] shall be supported for an HTTP method if the corresponding HTTP status codes are specified as mandatory for that HTTP method in table 5.2.7.1-1 of 3GPP TS 29.500 [5]. In addition, the requirements in the following subclauses shall apply.

5.7.2 Protocol Errors

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

5.7.3 Application Errors

The application errors defined for the Npcf_PolicyAuthorization API are listed in table 5.7.3-1. The PCF shall include in the HTTP status code a "ProblemDetails" data structure with the "cause" attribute indicating the application error as listed in table 5.7.3-1.

Table 5.7.3-1: Application errors

Application Error	HTTP status code	Description
REQUESTED_SERVICE_NOT_AUTHORIZED	403 Forbidden	The service information provided in the request is rejected. (NOTE 1)
REQUESTED_SERVICE_TEMPORARILY_NOT_AUTHORIZED	403 Forbidden	The service information provided in the request is temporarily rejected. (NOTE 2)
UNAUTHORIZED_SPONSORED_DATA_CONNECTIVITY	403 Forbidden	The request for sponsored data connectivity is not authorized. (NOTE 3)
UNAUTHORIZED_NON_EMERGENCY_SESSION	403 Forbidden	The PCF rejects a new AF session context setup because the session binding function associated a non-Emergency IMS session to a PDU session established to an Emergency DNN.
APPLICATION_SESSION_CONTEXT_NOT_FOUND	404 Not Found	The HTTP request is rejected because the specified Individual Application Session Context does not exist. (NOTE 4)
PDU_SESSION_NOT_AVAILABLE	500 Internal Server Error	The PCF failed in executing session binding. (NOTE 5)
NOTE 1: This application error is included in the response to the POST request (see subclauses 4.2.2.2 and 4.2.2.5) and to the PATCH request (see subclauses 4.2.3.2 and 4.2.3.5).		
NOTE 2: This application error is included in the response to the POST request (see subclause 4.2.2.2) and to the PATCH request (see subclause 4.2.3.2).		
NOTE 3: This application error is included in the response to the POST request (see subclause 4.2.2.5) and to the PATCH request (see subclause 4.2.3.5).		
NOTE 4: This application error is included in the responses to the GET, PATCH and delete custom operation requests to the Individual Application Session Context resource.		
NOTE 5: This application error is included in the response to the POST request (see subclauses 4.2.2.2, 4.2.6.3 and 4.2.2.27).		

5.8 Feature negotiation

The optional features in table 5.8-1 are defined for the Npcf_PolicyAuthorization API. They shall be negotiated using the extensibility mechanism defined in subclause 6.6.2 of 3GPP TS 29.500 [5].

When requesting the PCF to create an Individual Application Session Context resource the NF service consumer shall indicate the optional features the NF service consumer supports for the Npcf_PolicyAuthorization service by including the "supFeat" attribute in the "AppSessionContextReqData" data type of the HTTP POST request.

The PCF shall determine the supported features for the created Individual Application Session Context resource as specified in subclause 6.6.2 of 3GPP TS 29.500 [5]. The PCF shall indicate the supported features in the HTTP response confirming the creation of the Individual Application Session Context resource by including the "supFeat" attribute in the "AppSessionContextRespData" data type.

Table 5.8-1: Supported Features

Feature number	Feature Name	Description
1	InfluenceOnTrafficRouting	Indicates support of Application Function influence on traffic routing. If the PCF supports this feature, the AF may influence SMF routing to applications or subscribe to notifications of UP path management for the traffic flows of an active PDU session.
2	SponsoredConnectivity	Indicates support of sponsored data connectivity. If the PCF supports this feature, the AF may provide sponsored data connectivity to the SUPI.
3	MediaComponentVersioning	Indicates the support of the media component versioning.
4	URLLC	Indicates support of Ultra-Reliable Low-Latency Communication (URLLC) requirements, i.e. AF application relocation acknowledgement and UE address(es) preservation. The InfluenceOnTrafficRouting feature shall be supported in order to support this feature.
5	IMS_SBI	Indicates support of the communication with the 5GC IMS AF via Service Based Interfaces.
6	NetLoc	Indicates the support of access network information reporting.
7	ProvAFsignalFlow	This indicates support for the feature of provisioning of AF signalling flow information as described in subclauses 4.2.2.16 and 4.2.3.17. If the PCF supports this feature the AF may provision AF signalling flow information. NOTE: This feature is used by the IMS Restoration Procedures to provide to the SMF the address of the P-CSCF selected by the UE, refer to 3GPP TS 23.380 [39]. The IMS_SBI feature shall be supported in order to support this feature.
8	ResourceSharing	This feature indicates the support of resource sharing across several "Individual Application Session Context" resources. The IMS_SBI feature shall be supported in order to support this feature.
9	MCPTT	This feature indicates the support of Mission Critical Push To Talk services as described in 3GPP TS 24.379 [41].
10	MCVideo	This feature indicates the support of Mission Critical Video services as described in 3GPP TS 24.281 [43].
11	PrioritySharing	This feature indicates that Priority Sharing is supported as described in 3GPP TS 23.503 [4], subclause 6.1.3.15.
12	MCPTT-Preemption	This feature indicates the support of service pre-emption based on the information provided by the AF. It requires that both PrioritySharing and MCPTT features are also supported.
13	MacAddressRange	Indicates the support of a set of MAC addresses with a specific range in the traffic filter.
14	RAN-NAS-Cause	This feature indicates the support for the release cause code information from the access network.
15	EnhancedSubscriptionToNotification	Indicates the support of: <ul style="list-style-type: none"> - Subscription to periodic notifications. - Definition of a waiting time between the reporting of two event triggered events. - Indication of whether the event has to be reported at PDU Session termination. - Notification Correlation Id for a subscription to an event.
16	QoSMonitoring	Indicates the support of QoS monitoring information. This feature requires the support of the EnhancedSubscriptionToNotification feature.
17	AuthorizationWithRequiredQoS	Indicates support of policy authorization for the AF session with required QoS.
18	TimeSensitiveNetworking	Indicates that the 5G System is integrated within the external network as a TSN bridge.
19	PCSCF-Restoration-Enhancement	This feature indicates support of P-CSCF Restoration Enhancement. It is used for the PCF and the P-CSCF to indicate if they support P-CSCF Restoration Enhancement.
20	CHEM	This feature indicates the support of Coverage and Handover Enhancements for Media (CHEM).
21	FLUS	This feature indicates the support of FLUS functionality as described in 3GPP TS 26.238 [51].

Feature number	Feature Name	Description
22	EPSFallbackReport	This feature indicates the support of the report of EPS Fallback as defined in subclauses 4.2.2.30, 4.2.3.29 and 4.2.5.15.
23	ATSSS	Indicates the support of the report of the multiple access types of a MA PDU session.
24	QoSHint	This feature indicates the support of specific QoS hint parameters as described in 3GPP TS 26.114 [30], subclause 6.2.10.
25	ReallocationOfCredit	This feature indicates the support of notifications of reallocation of credits events. It requires the support of IMS_SBI feature.

5.9 Security

As indicated in 3GPP TS 33.501 [25] and 3GPP TS 29.500 [5], the access to the Npcf_PolicyAuthorization API, based on local configuration, may be authorized by means of the OAuth2 protocol (see IETF RFC 6749 [26]), using the "Client Credentials" authorization grant, where the NRF (see 3GPP TS 29.510 [27]) plays the role of the authorization server.

If OAuth2 authorization is used, an NF Service Consumer, prior to consuming services offered by the Npcf_PolicyAuthorization API, shall obtain a "token" from the authorization server, by invoking the Access Token Request service, as described in 3GPP TS 29.510 [27], subclause 5.4.2.2.

NOTE: When multiple NRFs are deployed in a network, the NRF used as authorization server is the same NRF that the NF Service Consumer used for discovering the Npcf_PolicyAuthorization service.

The Npcf_PolicyAuthorization API defines a single scope "npcf-policyauthorization" for OAuth2 authorization (as specified in 3GPP TS 33.501 [25]) for the entire API, and it does not define any additional scopes at resource or operation level.

Annex A (normative): OpenAPI specification

A.1 General

The present Annex contains an OpenAPI [11] specification of HTTP messages and content bodies used by the Npcf_PolicyAuthorization API.

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.

NOTE: 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 file contained in this 3GPP Technical Specification are available on a Git-based repository hosted in ETSI Forge, that uses the GitLab software version control system (see clause 5B of the 3GPP TR 21.900 [28] and subclause 5.3.1 of the 3GPP TS 29.501 [6] for further information).

A.2 Npcf_PolicyAuthorization API

```

openapi: 3.0.0
info:
  title: Npcf_PolicyAuthorization Service API
  version: 1.1.1
  description: |
    PCF Policy Authorization Service.
    © 2020, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: 3GPP TS 29.514 V16.6.0; 5G System; Policy Authorization Service;Stage 3.
  url: 'http://www.3gpp.org/ftp/Specs/archive/29_series/29.514/'
#
servers:
- url: '{apiRoot}/npcf-policyauthorization/v1'
  variables:
    apiRoot:
      default: https://example.com
      description: apiRoot as defined in subclause 4.4 of 3GPP TS 29.501

security:
- {}
- oAuth2ClientCredentials:
  - npcf-policyauthorization

paths:
  /app-sessions:
    post:
      summary: Creates a new Individual Application Session Context resource
      operationId: PostAppSessions
      tags:
        - Application Sessions (Collection)
      requestBody:
        description: Contains the information for the creation the resource
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/AppSessionContext'
      responses:
        '201':
          description: Successful creation of the resource
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/AppSessionContext'

```

```

    headers:
      Location:
        description: 'Contains the URI of the created individual application session context
resource, according to the structure: {apiRoot}/npcf-policyauthorization/v1/app-
sessions/{appSessionId} or the URI of the created events subscription sub-resource, according to the
structure: {apiRoot}/npcf-policyauthorization/v1/app-sessions/{appSessionId}/events-subscription}'
        required: true
        schema:
          type: string
    '303':
      description: See Other. The result of the HTTP POST request would be equivalent to the
existing Application Session Context.
      headers:
        Location:
          description: 'Contains the URI of the existing individual Application Session Context
resource.'
          required: true
          schema:
            type: string
    '400':
      $ref: 'TS29571_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29571_CommonData.yaml#/components/responses/401'
    '403':
      description: Forbidden
      content:
        application/problem+json:
          schema:
            $ref: '#/components/schemas/ExtendedProblemDetails'
      headers:
        Retry-After:
          description: 'Indicates the time the AF has to wait before making a new request. It
can be a non-negative integer (decimal number) indicating the number of seconds the AF has to wait
before making a new request or an HTTP-date after which the AF can retry a new request. '
          schema:
            anyOf:
              - type: integer
              - type: string
    '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:
    $ref: 'TS29571_CommonData.yaml#/components/responses/default'
  callbacks:
    terminationRequest:
      '{$request.body#/ascReqData/notifUri}/terminate':
        post:
          requestBody:
            description: Request of the termination of the Individual Application Session
Context
            required: true
            content:
              application/json:
                schema:
                  $ref: '#/components/schemas/TerminationInfo'
  responses:
    '204':
      description: The receipt of the notification is acknowledged.
    '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:
    $ref: 'TS29571_CommonData.yaml#/components/responses/default'
eventNotification:
  '{$request.body#/ascReqData/evSubsc/notifUri}/notify':
    post:
      requestBody:
        description: Notification of an event occurrence in the PCF.
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/EventsNotification'
      responses:
        '204':
          description: The receipt of the notification is acknowledged
        '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:
          $ref: 'TS29571_CommonData.yaml#/components/responses/default'
detected5GsBridgeForPduSession:
  '{$request.body#/ascReqData/evSubsc/notifUri}/new-bridge':
    post:
      requestBody:
        description: Notification of a new 5GS Bridge detected in the PCF.
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/PduSessionTsnBridge'
      responses:
        '204':
          description: The receipt of the notification is acknowledged
        '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'
/app-sessions/pcscf-restoration:
  post:
    summary: "Indicates P-CSCF restoration and does not create an Individual Application Session
Context"
    operationId: PcscfRestoration
    tags:
      - PCSCF Restoration Indication
    requestBody:
      description: PCSCF Restoration Indication
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/PcscfRestorationRequestData'
    responses:
      '204':
        description: The deletion is confirmed without returning additional data.
      '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'
#
/app-sessions/{appSessionId}:
  get:
    summary: "Reads an existing Individual Application Session Context"
    operationId: GetAppSession
    tags:
      - Individual Application Session Context (Document)
    parameters:
      - name: appSessionId
        description: string identifying the resource
        in: path
        required: true
        schema:
          type: string
    responses:
      '200':
        description: A representation of the resource is returned.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/AppSessionContext'
      '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'
      '406':
        $ref: 'TS29571_CommonData.yaml#/components/responses/406'
      '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'
patch:
  summary: "Modifies an existing Individual Application Session Context"
  operationId: ModAppSession
  tags:
    - Individual Application Session Context (Document)
  parameters:
    - name: appSessionId
      description: string identifying the resource
      in: path
      required: true
      schema:
        type: string
  requestBody:
    description: modification of the resource.
    required: true
    content:
      application/merge-patch+json:
        schema:
          $ref: '#/components/schemas/AppSessionContextUpdateData'
  responses:
    '200':
      description: successful modification of the resource and a representation of that resource
      is returned
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/AppSessionContext'
    '204':
      description: The successful modification
    '400':
      $ref: 'TS29571_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29571_CommonData.yaml#/components/responses/401'
    '403':
      description: Forbidden
      content:
        application/problem+json:
          schema:
            $ref: '#/components/schemas/ExtendedProblemDetails'
      headers:
        Retry-After:
          description: 'Indicates the time the AF has to wait before making a new request. It
can be a non-negative integer (decimal number) indicating the number of seconds the AF has to wait
before making a new request or an HTTP-date after which the AF can retry a new request. '
          schema:
            anyOf:
              - type: integer
              - type: string
    '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:
    $ref: 'TS29571_CommonData.yaml#/components/responses/default'
callbacks:
  eventNotification:
    '{$request.body#/evSubsc/notifUri}/notify':
      post:
        requestBody:
          description: Notification of an event occurrence in the PCF.
          required: true
          content:
            application/json:

```

```

        schema:
          $ref: '#/components/schemas/EventsNotification'
      responses:
        '204':
          description: The receipt of the notification is acknowledged
        '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'
#
#
/app-sessions/{appSessionId}/delete:
  post:
    summary: "Deletes an existing Individual Application Session Context"
    operationId: DeleteAppSession
    tags:
      - Individual Application Session Context (Document)
    parameters:
      - name: appSessionId
        description: string identifying the Individual Application Session Context resource
        in: path
        required: true
        schema:
          type: string
    requestBody:
      description: deletion of the Individual Application Session Context resource, req
notification
      required: false
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/EventsSubscReqData'
    responses:
      '200':
        description: The deletion of the resource is confirmed and a resource is returned
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/AppSessionContext'
      '204':
        description: The deletion is confirmed without returning additional data.
      '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'
#
/app-sessions/{appSessionId}/events-subscription:
  put:
    summary: "creates or modifies an Events Subscription subresource"
    operationId: updateEventsSubsc
    tags:
      - Events Subscription (Document)
    parameters:
      - name: appSessionId
        description: string identifying the Events Subscription resource
        in: path
        required: true
        schema:
          type: string
    requestBody:
      description: Creation or modification of an Events Subscription resource.
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/EventsSubscReqData'
    responses:
      '201':
        description: The creation of the Events Subscription resource is confirmed and its
representation is returned.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/EventsSubscPutData'
        headers:
          Location:
            description: 'Contains the URI of the created Events Subscription resource, according
to the structure: {apiRoot}/npcf-policyauthorization/v1/app-sessions/{appSessionId}/events-
subscription}'
            required: true
            schema:
              type: string
      '200':
        description: The modification of the Events Subscription resource is confirmed its
representation is returned.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/EventsSubscPutData'
      '204':
        description: The modification of the Events Subscription subresource is confirmed without
returning additional data.
      '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:
      $ref: 'TS29571_CommonData.yaml#/components/responses/default'
  callbacks:
    eventNotification:
      '{$request.body#/notifUri}/notify':
        post:
          requestBody:

```

```

    description: Contains the information for the notification of an event occurrence in
the PCF.
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/EventsNotification'
    responses:
      '204':
        description: The receipt of the notification is acknowledged.
      '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'
  delete:
    summary: deletes the Events Subscription subresource
    operationId: DeleteEventsSubsc
    tags:
      - Events Subscription (Document)
    parameters:
      - name: appSessionId
        description: string identifying the Individual Application Session Context resource
        in: path
        required: true
        schema:
          type: string
    responses:
      '204':
        description: The deletion of the of the Events Subscription sub-resource is confirmed
without returning additional data.
      '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'
      '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: '{nrfApiRoot}/oauth2/token'
            scopes:
              npcfc-policyauthorization: Access to the Npcf_PolicyAuthorization API
  schemas:
    AppSessionContext:
      description: Represents an Individual Application Session Context resource.
      type: object
      properties:

```

```

ascReqData:
  $ref: '#/components/schemas/AppSessionContextReqData'
ascRespData:
  $ref: '#/components/schemas/AppSessionContextRespData'
evsNotif:
  $ref: '#/components/schemas/EventsNotification'
AppSessionContextReqData:
  description: Identifies the service requirements of an Individual Application Session Context.
  type: object
  required:
    - notifUri
    - suppFeat
  oneOf:
    - required: [ueIpv4]
    - required: [ueIpv6]
    - required: [ueMac]
  properties:
    afAppId:
      $ref: '#/components/schemas/AfAppId'
    afChargId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/ApplicationChargingId'
    afReqData:
      $ref: '#/components/schemas/AfRequestedData'
    afRoutReq:
      $ref: '#/components/schemas/AfRoutingRequirement'
    aspId:
      $ref: '#/components/schemas/AspId'
    bdtRefId:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/BdtReferenceId'
    dnn:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
    evSubsc:
      $ref: '#/components/schemas/EventsSubscReqData'
    mcpttId:
      description: indication of MCPTT service request
      type: string
    mcVideoId:
      description: indication of MCVideo service request
      type: string
    medComponents:
      type: object
      additionalProperties:
        $ref: '#/components/schemas/MediaComponent'
      minProperties: 1
    ipDomain:
      type: string
    mpsId:
      description: indication of MPS service request
      type: string
    mcsId:
      description: indication of MCS service request
      type: string
    preemptControlInfo:
      $ref: '#/components/schemas/PreemptionControlInformation'
    resPrio:
      $ref: '#/components/schemas/ReservPriority'
    servInfStatus:
      $ref: '#/components/schemas/ServiceInfoStatus'
    notifUri:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
    servUrn:
      $ref: '#/components/schemas/ServiceUrn'
    sliceInfo:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
    sponId:
      $ref: '#/components/schemas/SponId'
    sponStatus:
      $ref: '#/components/schemas/SponsoringStatus'
    supi:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Supi'
    gpsi:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
    suppFeat:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
    ueIpv4:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv4Addr'
    ueIpv6:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Addr'

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    ueMac:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/MacAddr48'
    tsnBridgeManCont:
      $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/BridgeManagementContainer'
    tsnPortManContDstt:
      $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/PortManagementContainer'
    tsnPortManContNwtts:
      type: array
      items:
        $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/PortManagementContainer'
      minItems: 1
  AppSessionContextRespData:
    description: Describes the authorization data of an Individual Application Session Context
    created by the PCF.
    type: object
    properties:
      servAuthInfo:
        $ref: '#/components/schemas/ServAuthInfo'
      ueIds:
        type: array
        items:
          $ref: '#/components/schemas/UeIdentityInfo'
        minItems: 1
      suppFeat:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  AppSessionContextUpdateData:
    description: Identifies the modifications to an Individual Application Session Context and may
    include the modifications to the sub-resource Events Subscription.
    type: object
    properties:
      afAppId:
        $ref: '#/components/schemas/AfAppId'
      afRoutReq:
        $ref: '#/components/schemas/AfRoutingRequirementRm'
      aspId:
        $ref: '#/components/schemas/AspId'
      bdtRefId:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/BdtReferenceId'
      evSubsc:
        $ref: '#/components/schemas/EventsSubscReqDataRm'
      mcpttId:
        description: indication of MCPTT service request
        type: string
      mcVideoId:
        description: indication of modification of MCVideo service
        type: string
      medComponents:
        type: object
        additionalProperties:
          $ref: '#/components/schemas/MediaComponentRm'
        minProperties: 1
      mpsId:
        description: indication of MPS service request
        type: string
      mcsId:
        description: indication of MCS service request
        type: string
      preemptControlInfo:
        $ref: '#/components/schemas/PreemptionControlInformationRm'
      resPrio:
        $ref: '#/components/schemas/ReservPriority'
      servInfStatus:
        $ref: '#/components/schemas/ServiceInfoStatus'
      sipForkInd:
        $ref: '#/components/schemas/SipForkingIndication'
      sponId:
        $ref: '#/components/schemas/SponId'
      sponStatus:
        $ref: '#/components/schemas/SponsoringStatus'
    tsnBridgeManCont:
      $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/BridgeManagementContainer'
    tsnPortManContDstt:
      $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/PortManagementContainer'
    tsnPortManContNwtts:
      type: array
      items:
        $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/PortManagementContainer'
      minItems: 1

```

```

EventsSubscReqData:
  description: Identifies the events the application subscribes to.
  type: object
  required:
    - events
  properties:
    events:
      type: array
      items:
        $ref: '#/components/schemas/AfEventSubscription'
      minItems: 1
    notifUri:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
    reqQosMonParams:
      type: array
      items:
        $ref:
'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/RequestedQosMonitoringParameter'
      minItems: 1
    qosMon:
      $ref: '#/components/schemas/QosMonitoringInformation'
    reqAnis:
      type: array
      items:
        $ref: '#/components/schemas/RequiredAccessInfo'
      minItems: 1
    usgThres:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/UsageThreshold'
    notifCorreId:
      type: string
EventsSubscReqDataRm:
  description: this data type is defined in the same way as the EventsSubscReqData data type,
but with the OpenAPI nullable property set to true.
  type: object
  required:
    - events
  properties:
    events:
      type: array
      items:
        $ref: '#/components/schemas/AfEventSubscription'
    notifUri:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
    reqQosMonParams:
      type: array
      items:
        $ref:
'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/RequestedQosMonitoringParameter'
      minItems: 1
    qosMon:
      $ref: '#/components/schemas/QosMonitoringInformationRm'
    reqAnis:
      type: array
      items:
        $ref: '#/components/schemas/RequiredAccessInfo'
      minItems: 1
    usgThres:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/UsageThresholdRm'
    notifCorreId:
      type: string
  nullable: true
MediaComponent:
  description: Identifies a media component.
  type: object
  required:
    - medCompN
  properties:
    afAppId:
      $ref: '#/components/schemas/AfAppId'
    afRoutReq:
      $ref: '#/components/schemas/AfRoutingRequirement'
    qosReference:
      type: string
    altSerReqs:
      type: array
      items:
        type: string
      minItems: 1

```



```

contVer:
  $ref: '#/components/schemas/ContentVersion'
codecs:
  type: array
  items:
    $ref: '#/components/schemas/CodecData'
  minItems: 1
  maxItems: 2
desMaxLatency:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/Float'
desMaxLoss:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/Float'
flusId:
  type: string
fStatus:
  $ref: '#/components/schemas/FlowStatus'
marBwDl:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRate'
marBwUl:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRate'
maxPacketLossRateDl:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/PacketLossRateRm'
maxPacketLossRateUl:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/PacketLossRateRm'
maxSuppBwDl:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRate'
maxSuppBwUl:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRate'
medCompN:
  type: integer
medSubComps:
  type: object
  additionalProperties:
    $ref: '#/components/schemas/MediaSubComponent'
  minProperties: 1
medType:
  $ref: '#/components/schemas/MediaType'
minDesBwDl:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRate'
minDesBwUl:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRate'
mirBwDl:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRate'
mirBwUl:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRate'
preemptCap:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/PreemptionCapability'
preemptVuln:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/PreemptionVulnerability'
prioSharingInd:
  $ref: '#/components/schemas/PrioritySharingIndicator'
resPrio:
  $ref: '#/components/schemas/ReservPriority'
rrBw:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRate'
rsBw:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRate'
sharingKeyDl:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint32'
sharingKeyUl:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint32'
tsnQos:
  $ref: '#/components/schemas/TsnQosContainer'
tscaiInputDl:
  $ref: '#/components/schemas/TscaiInputContainer'
tscaiInputUl:
  $ref: '#/components/schemas/TscaiInputContainer'
MediaComponentRm:

```

description: This data type is defined in the same way as the MediaComponent data type, but with the OpenAPI nullable property set to true

```

type: object
required:
  - medCompN
properties:
  afAppId:
    $ref: '#/components/schemas/AfAppId'
  afRoutReq:
    $ref: '#/components/schemas/AfRoutingRequirementRm'

```

```

qosReference:
  type: string
  nullable: true
altSerReqs:
  type: array
  items:
    type: string
  minItems: 1
  nullable: true
contVer:
  $ref: '#/components/schemas/ContentVersion'
codecs:
  type: array
  items:
    $ref: '#/components/schemas/CodecData'
  minItems: 1
  maxItems: 2
desMaxLatency:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/FloatRm'
desMaxLoss:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/FloatRm'
flusId:
  type: string
  nullable: true
fStatus:
  $ref: '#/components/schemas/FlowStatus'
marBwDl:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRateRm'
marBwUl:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRateRm'
maxPacketLossRateDl:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/PacketLossRateRm'
maxPacketLossRateUl:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/PacketLossRateRm'
maxSuppBwDl:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRateRm'
maxSuppBwUl:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRateRm'
medCompN:
  type: integer
medSubComps:
  type: object
  additionalProperties:
    $ref: '#/components/schemas/MediaSubComponentRm'
  minProperties: 1
medType:
  $ref: '#/components/schemas/MediaType'
minDesBwDl:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRateRm'
minDesBwUl:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRateRm'
mirBwDl:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRateRm'
mirBwUl:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRateRm'
preemptCap:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/PreemptionCapabilityRm'
preemptVuln:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/PreemptionVulnerabilityRm'
prioSharingInd:
  $ref: '#/components/schemas/PrioritySharingIndicator'
resPrio:
  $ref: '#/components/schemas/ReservPriority'
rrBw:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRateRm'
rsBw:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRateRm'
sharingKeyDl:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint32Rm'
sharingKeyUl:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint32Rm'
tsnQos:
  $ref: '#/components/schemas/TsnQosContainerRm'
tscaiInputDl:
  $ref: '#/components/schemas/TscaiInputContainer'
tscaiInputUl:
  $ref: '#/components/schemas/TscaiInputContainer'
nullable: true

```

```

MediaSubComponent:
  description: Identifies a media subcomponent
  type: object
  required:
    - fNum
  properties:
    afSigProtocol:
      $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/AfSigProtocol'
    ethfDescs:
      type: array
      items:
        $ref: '#/components/schemas/EthFlowDescription'
      minItems: 1
      maxItems: 2
    fNum:
      type: integer
    fDescs:
      type: array
      items:
        $ref: '#/components/schemas/FlowDescription'
      minItems: 1
      maxItems: 2
    fStatus:
      $ref: '#/components/schemas/FlowStatus'
    marBwDl:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRate'
    marBwUl:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRate'
    tosTrCl:
      $ref: '#/components/schemas/TosTrafficClass'
    flowUsage:
      $ref: '#/components/schemas/FlowUsage'

```

MediaSubComponentRm:

description: This data type is defined in the same way as the MediaSubComponent data type, but with the OpenAPI nullable property set to true. Removable attributes marBwDl and marBwUl are defined with the corresponding removable data type.

```

  type: object
  required:
    - fNum
  properties:
    afSigProtocol:
      $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/AfSigProtocol'
    ethfDescs:
      type: array
      items:
        $ref: '#/components/schemas/EthFlowDescription'
      minItems: 1
      maxItems: 2
      nullable: true
    fNum:
      type: integer
    fDescs:
      type: array
      items:
        $ref: '#/components/schemas/FlowDescription'
      minItems: 1
      maxItems: 2
      nullable: true
    fStatus:
      $ref: '#/components/schemas/FlowStatus'
    marBwDl:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRateRm'
    marBwUl:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRateRm'
    tosTrCl:
      $ref: '#/components/schemas/TosTrafficClassRm'
    flowUsage:
      $ref: '#/components/schemas/FlowUsage'
  nullable: true

```

EventsNotification:

```

  description: describes the notification of a matched event
  type: object
  required:
    - evSubsUri
    - evNotifs
  properties:
    accessType:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/AccessType'

```

```

addAccessInfo:
  $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/AdditionalAccessInfo'
relAccessInfo:
  $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/AdditionalAccessInfo'
anChargAddr:
  $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/AccNetChargingAddress'
anChargIds:
  type: array
  items:
    $ref: '#/components/schemas/AccessNetChargingIdentifier'
  minItems: 1
anGwAddr:
  $ref: '#/components/schemas/AnGwAddress'
evSubsUri:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
evNotifs:
  type: array
  items:
    $ref: '#/components/schemas/AfEventNotification'
  minItems: 1
failedResourcAllocReports:
  type: array
  items:
    $ref: '#/components/schemas/ResourcesAllocationInfo'
  minItems: 1
noNetLocSupp:
  $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/NetLocAccessSupport'
outOfCredReports:
  type: array
  items:
    $ref: '#/components/schemas/OutOfCreditInformation'
  minItems: 1
plmnId:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/PlmnIdNid'
qncReports:
  type: array
  items:
    $ref: '#/components/schemas/QosNotificationControlInfo'
  minItems: 1
qosMonReports:
  type: array
  items:
    $ref: '#/components/schemas/QosMonitoringReport'
  minItems: 1
ranNasRelCauses:
  type: array
  items:
    $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/RanNasRelCause'
  minItems: 1
  description: Contains the RAN and/or NAS release cause.
ratType:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/RatType'
ueLoc:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/UserLocation'
ueTimeZone:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/TimeZone'
usgRep:
  $ref: 'TS29122_CommonData.yaml#/components/schemas/AccumulatedUsage'
tsnBridgeInfo:
  $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/TsnBridgeInfo'
tsnBridgeManCont:
  $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/BridgeManagementContainer'
tsnPortManContDdst:
  $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/PortManagementContainer'
tsnPortManContNwtts:
  type: array
  items:
    $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/PortManagementContainer'
  minItems: 1
AfEventSubscription:
  description: describes the event information delivered in the subscription
  type: object
  required:
    - event
  properties:
    event:
      $ref: '#/components/schemas/AfEvent'
  notifMethod:

```

```

    $ref: '#/components/schemas/AfNotifMethod'
  repPeriod:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
  waitTime:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
AfEventNotification:
  description: describes the event information delivered in the notification
  type: object
  required:
    - event
  properties:
    event:
      $ref: '#/components/schemas/AfEvent'
    flows:
      type: array
      items:
        $ref: '#/components/schemas/Flows'
      minItems: 1
TerminationInfo:
  description: indicates the cause for requesting the deletion of the Individual Application
Session Context resource
  type: object
  required:
    - termCause
    - resUri
  properties:
    termCause:
      $ref: '#/components/schemas/TerminationCause'
    resUri:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
AfRoutingRequirement:
  description: describes the event information delivered in the subscription
  type: object
  properties:
    appReloc:
      type: boolean
    routeToLocs:
      type: array
      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/RouteToLocation'
      minItems: 1
    spVal:
      $ref: '#/components/schemas/SpatialValidity'
    tempVals:
      type: array
      items:
        $ref: '#/components/schemas/TemporalValidity'
      minItems: 1
    upPathChgSub:
      $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/UpPathChgEvent'
    addrPreserInd:
      type: boolean
SpatialValidity:
  description: describes explicitly the route to an Application location
  type: object
  required:
    - presenceInfoList
  properties:
    presenceInfoList:
      type: object
      additionalProperties:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/PresenceInfo'
      minProperties: 1
SpatialValidityRm:
  description: this data type is defined in the same way as the SpatialValidity data type, but
with the OpenAPI nullable property set to true
  type: object
  required:
    - presenceInfoList
  properties:
    presenceInfoList:
      type: object
      additionalProperties:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/PresenceInfo'
      minProperties: 1
  nullable: true
AfRoutingRequirementRm:

```

description: this data type is defined in the same way as the AfRoutingRequirement data type, but with the OpenAPI nullable property set to true and the spVal and tempVals attributes defined as removable.

```

type: object
properties:
  appReloc:
    type: boolean
  routeToLocs:
    type: array
    items:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/RouteToLocation'
    minItems: 1
    nullable: true
  spVal:
    $ref: '#/components/schemas/SpatialValidityRm'
  tempVals:
    type: array
    items:
      $ref: '#/components/schemas/TemporalValidity'
    minItems: 1
    nullable: true
  upPathChgSub:
    $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/UpPathChgEvent'
  addrPreserInd:
    type: boolean
    nullable: true
  nullable: true
AnGwAddress:
  description: describes the address of the access network gateway control node
  type: object
  anyOf:
    - required: [anGwIpv4Addr]
    - required: [anGwIpv6Addr]
  properties:
    anGwIpv4Addr:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv4Addr'
    anGwIpv6Addr:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Addr'
Flows:
  description: Identifies the flows
  type: object
  required:
    - medCompN
  properties:
    contVers:
      type: array
      items:
        $ref: '#/components/schemas/ContentVersion'
      minItems: 1
    fNums:
      type: array
      items:
        type: integer
      minItems: 1
    medCompN:
      type: integer
EthFlowDescription:
  description: Identifies an Ethernet flow
  type: object
  required:
    - ethType
  properties:
    destMacAddr:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/MacAddr48'
    ethType:
      type: string
    fDesc:
      $ref: '#/components/schemas/FlowDescription'
    fDir:
      $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/FlowDirection'
    sourceMacAddr:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/MacAddr48'
  vlanTags:
    type: array
    items:
      type: string
    minItems: 1
    maxItems: 2

```

```

srcMacAddrEnd:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/MacAddr48'
destMacAddrEnd:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/MacAddr48'

ResourcesAllocationInfo:
  description: describes the status of the PCC rule(s) related to certain media components.
  type: object
  required:
    - mcResourcStatus
  properties:
    mcResourcStatus:
      $ref: '#/components/schemas/MediaComponentResourcesStatus'
    flows:
      type: array
      items:
        $ref: '#/components/schemas/Flows'
      minItems: 1
  TemporalValidity:
    description: Indicates the time interval(s) during which the AF request is to be applied
    type: object
    properties:
      startTime:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
      stopTime:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
#
QoSNotificationControlInfo:
  description: Indicates whether the QoS targets for a GRB flow are not guaranteed or guaranteed
again
  type: object
  required:
    - notifType
  properties:
    notifType:
      $ref: '#/components/schemas/QoSNotifType'
    flows:
      type: array
      items:
        $ref: '#/components/schemas/Flows'
      minItems: 1
    altSerReq:
      type: string
#
AcceptableServiceInfo:
  description: Indicates the maximum bandwidth that shall be authorized by the PCF.
  type: object
  properties:
    accBwMedComps:
      type: object
      additionalProperties:
        $ref: '#/components/schemas/MediaComponent'
      minProperties: 1
    marBwUl:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRate'
    marBwDl:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRate'

UeIdentityInfo:
  description: Represents 5GS-Level UE identities.
  type: object
  anyOf:
    - required: [gpsi]
    - required: [pei]
    - required: [supi]
  properties:
    gpsi:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
    pei:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Pei'
    supi:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Supi'
#
AccessNetChargingIdentifier:
  description: Describes the access network charging identifier.
  type: object
  required:

```

```

    - accNetChaIdValue
  properties:
    accNetChaIdValue:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/ChargingId'
  flows:
    type: array
    items:
      $ref: '#/components/schemas/Flows'
    minItems: 1
#
  OutOfCreditInformation:
    description: Indicates the SDFs without available credit and the corresponding termination
    action.
    type: object
    required:
      - finUnitAct
    properties:
      finUnitAct:
        $ref: 'TS32291_Nchf_ConvergedCharging.yaml#/components/schemas/FinalUnitAction'
    flows:
      type: array
      items:
        $ref: '#/components/schemas/Flows'
      minItems: 1
#
  QosMonitoringInformation:
    description: Indicates the QoS Monitoring information to report, i.e. UL and/or DL and or
    round trip delay.
    type: object
    properties:
      repThreshDl:
        type: integer
      repThreshUl:
        type: integer
      repThreshRp:
        type: integer
#
#
  PduSessionTsnBridge:
    description: Contains the new 5GS Bridge information and may contain the DS-TT port and/or NW-
    TT port management information.
    type: object
    required:
      - tsnBridgeInfo
    properties:
      tsnBridgeInfo:
        $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/TsnBridgeInfo'
      tsnBridgeManCont:
        $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/BridgeManagementContainer'
      tsnPortManContDstt:
        $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/PortManagementContainer'
      tsnPortManContNwtts:
        type: array
        items:
          $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/PortManagementContainer'
        minItems: 1
#
  QosMonitoringInformationRm:
    description: this data type is defined in the same way as the QosMonitoringInformation data
    type, but with the OpenAPI nullable property set to true.
    type: object
    properties:
      repThreshDl:
        type: integer
      repThreshUl:
        type: integer
      repThreshRp:
        type: integer
    nullable: true
#
  PcsfRestorationRequestData:
    description: Indicates P-CSCF restoration.
    type: object
    oneOf:
      - required: [ueIpv4]
      - required: [ueIpv6]
    properties:

```



```

dnn:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
ipDomain:
  type: string
sliceInfo:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
supi:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/Supi'
ueIpv4:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv4Addr'
ueIpv6:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Addr'

#
#
QosMonitoringReport:
  description: QoS Monitoring reporting information
  type: object
  properties:
    flows:
      type: array
      items:
        $ref: '#/components/schemas/Flows'
      minItems: 1
    ulDelays:
      type: array
      items:
        type: integer
      minItems: 1
    dlDelays:
      type: array
      items:
        type: integer
      minItems: 1
    rtDelays:
      type: array
      items:
        type: integer
      minItems: 1
#
#
TsnQosContainer:
  description: Indicates TSC Traffic QoS.
  type: object
  properties:
    maxTscBurstSize:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/ExtMaxDataBurstVol'
    tscPackDelay:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/PacketDelBudget'
    tscPrioLevel:
      $ref: '#/components/schemas/TscPriorityLevel'
#
#
TsnQosContainerRm:
  description: Indicates removable TSC Traffic QoS.
  type: object
  properties:
    maxTscBurstSize:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/ExtMaxDataBurstVolRm'
    tscPackDelay:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/PacketDelBudgetRm'
    tscPrioLevel:
      $ref: '#/components/schemas/TscPriorityLevelRm'
  nullable: true
#
#
TscaiInputContainer:
  description: Indicates TSC Traffic pattern.
  type: object
  properties:
    periodicity:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
    burstArrivalTime:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
  nullable: true
#
#
EventsSubscPutData:
  description: Identifies the events the application subscribes to within an Events Subscription
  sub-resource data. It may contain the notification of the already met events

```

```

    anyOf:
      - $ref: '#/components/schemas/EventsSubscReqData'
      - $ref: '#/components/schemas/EventsNotification'
#
# EXTENDED PROBLEMDetails
#
ExtendedProblemDetails:
  description: Extends ProblemDetails to also include the acceptable service info.
  allOf:
    - $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
    - type: object
      properties:
        acceptableServInfo:
          $ref: '#/components/schemas/AcceptableServiceInfo'

#
# SIMPLE DATA TYPES
#
AfAppId:
  description: Contains an AF application identifier.
  type: string
AspId:
  description: Contains an identity of an application service provider.
  type: string
CodecData:
  description: Contains codec related information.
  type: string
ContentVersion:
  description: Represents the content version of some content.
  type: integer
FlowDescription:
  description: Defines a packet filter of an IP flow.
  type: string
SponId:
  description: Contains an identity of a sponsor.
  type: string
ServiceUrn:
  description: Contains values of the service URN and may include subservices.
  type: string
TosTrafficClass:
  description: 2-octet string, where each octet is encoded in hexadecimal representation. The
  first octet contains the IPv4 Type-of-Service or the IPv6 Traffic-Class field and the second octet
  contains the ToS/Traffic Class mask field.
  type: string
TosTrafficClassRm:
  description: this data type is defined in the same way as the TosTrafficClass data type, but
  with the OpenAPI nullable property set to true
  type: string
  nullable: true
TscPriorityLevel:
  type: integer
  minimum: 1
  maximum: 8
TscPriorityLevelRm:
  type: integer
  minimum: 1
  maximum: 8
  nullable: true

#
# ENUMERATIONS DATA TYPES
#
MediaType:
  anyOf:
    - type: string
      enum:
        - AUDIO
        - VIDEO
        - DATA
        - APPLICATION
        - CONTROL
        - TEXT
        - MESSAGE
        - OTHER
    - type: string

#
ReservPriority:
  anyOf:
    - type: string

```

```
enum:
  - PRIO_1
  - PRIO_2
  - PRIO_3
  - PRIO_4
  - PRIO_5
  - PRIO_6
  - PRIO_7
  - PRIO_8
  - PRIO_9
  - PRIO_10
  - PRIO_11
  - PRIO_12
  - PRIO_13
  - PRIO_14
  - PRIO_15
  - PRIO_16
- type: string
#
ServAuthInfo:
  anyOf:
  - type: string
  enum:
    - TP_NOT_KNOWN
    - TP_EXPIRED
    - TP_NOT_YET_OCURRED
  - type: string
#
SponsoringStatus:
  anyOf:
  - type: string
  enum:
    - SPONSOR_DISABLED
    - SPONSOR_ENABLED
  - type: string
#
AfEvent:
  anyOf:
  - type: string
  enum:
    - ACCESS_TYPE_CHANGE
    - ANI_REPORT
    - CHARGING_CORRELATION
    - EPS_FALLBACK
    - FAILED_RESOURCES_ALLOCATION
    - OUT_OF_CREDIT
    - PLMN_CHG
    - QOS_MONITORING
    - QOS_NOTIF
    - RAN_NAS_CAUSE
    - REALLOCATION_OF_CREDIT
    - SUCCESSFUL_RESOURCES_ALLOCATION
    - TSN_BRIDGE_INFO
    - USAGE_REPORT
  - type: string
#
AfNotifMethod:
  anyOf:
  - type: string
  enum:
    - EVENT_DETECTION
    - ONE_TIME
    - PERIODIC
    - PDU_SESSION_RELEASE
  - type: string
#
QosNotifType:
  anyOf:
  - type: string
  enum:
    - GUARANTEED
    - NOT_GUARANTEED
  - type: string
#
TerminationCause:
  anyOf:
  - type: string
  enum:
```

```
- ALL_SDF_DEACTIVATION
- PDU_SESSION_TERMINATION
- PS_TO_CS_HO
- type: string
#
MediaComponentResourcesStatus:
  anyOf:
  - type: string
  enum:
  - ACTIVE
  - INACTIVE
  - type: string
#
#
FlowUsage:
  anyOf:
  - type: string
  enum:
  - NO_INFO
  - RTCP
  - AF_SIGNALLING
  - type: string

FlowStatus:
  anyOf:
  - type: string
  enum:
  - ENABLED-UPLINK
  - ENABLED-DOWNLINK
  - ENABLED
  - DISABLED
  - REMOVED
  - type: string
#
RequiredAccessInfo:
  anyOf:
  - type: string
  enum:
  - USER_LOCATION
  - UE_TIME_ZONE
  - type: string
#
SipForkingIndication:
  anyOf:
  - type: string
  enum:
  - SINGLE_DIALOGUE
  - SEVERAL_DIALOGUES
  - type: string
#
AfRequestedData:
  anyOf:
  - type: string
  enum:
  - UE_IDENTITY
  - type: string
#
ServiceInfoStatus:
  anyOf:
  - type: string
  enum:
  - FINAL
  - PRELIMINARY
  - type: string
#
PreemptionControlInformation:
  anyOf:
  - type: string
  enum:
  - MOST_RECENT
  - LEAST_RECENT
  - HIGHEST_BW
  - type: string
#
PrioritySharingIndicator:
  anyOf:
  - type: string
```

```
    enum:
      - ENABLED
      - DISABLED
    - type: string
#
PreemptionControlInformationRm:
  anyOf:
    - $ref: '#/components/schemas/PreemptionControlInformation'
    - $ref: 'TS29571_CommonData.yaml#/components/schemas/NullValue'
```

Annex B (normative): IMS Related P-CSCF Procedures over N5

B.1 Provision of Service Information at P-CSCF

When the "IMS_SBI" feature is supported, the P-CSCF shall send service information to the PCF upon every SIP message that includes an SDP answer payload for the purpose of authorizing the IP flows and the QoS resources required for a negotiated IMS session, unless the SDP payload only relates to a circuit-switched bearer (i.e. "c=" line set to "PSTN" and an "m=" line set to "PSTN", refer to 3GPP TS 24.292 [29]). The service information shall be derived both from the SDP offer and the SDP answer. This ensures that the PCF receives proper information to perform media authorization for all possible IMS session set-up scenarios, and that the PCF is also capable of handling session modifications. The P-CSCF may include "servInfStatus" attribute set to "FINAL".

Additionally, the P-CSCF may send service information to the PCF when receiving a SIP message that includes an SDP offer payload for the purpose of performing an early bandwidth authorization check, or for enabling pre-authorization for a UE terminated IMS session establishment or modification with UE initiated resource reservation, or for the retrieval of network provided access network information (see subclause B.8.2).

The P-CSCF shall send service information to the PCF when receiving a SIP message that includes an SDP offer payload when the IMS session is an MPS session that requires priority treatment. For a UE terminated session the P-CSCF may send the service information derived from the SDP offer when the SDP offer either does not include any preconditions information or includes preconditions information indicating that the local preconditions (i.e. the preconditions related to the remote peer) are already met. In this case, the P-CSCF shall derive the service information only from the SDP offer and shall include "servInfStatus" attribute set to "PRELIMINARY".

NOTE 1: For a UE terminated session setup, when the SDP offer either does not include any preconditions information or includes preconditions information indicating that the local preconditions (i.e. the preconditions related to the remote peer) are already met, the terminating UE can request a resource modification prior to sending the SDP answer. Even if the IP address and port information in the session information derived from the SDP offer can be insufficient for PCC rule authorization, the policy to handle such UE initiated requests at the PCF can take into account the fact that an IMS session establishment is ongoing, for instance in deciding whether to authorize the request and in selecting an appropriate charging key and a gating policy.

The P-CSCF shall derive the value of the "fDescs" attribute within the service information from the SDP as follows:

- An uplink entry in the "fDescs" attribute shall be formed as follows: The destination address shall be taken from the SDP information received by the P-CSCF in downlink direction, while the source IP address may be formed from the address present in the SDP received by the P-CSCF in uplink direction (taking into account only the 64 bit prefix of the Ipv6 address) Source and destination ports shall be derived according to rules provided in 3GPP TS 29.513 [7] subclause 7.2.

EXAMPLE 1: Assuming UE A sends an SDP to UE B, the PCF of UE B uses the address present in this SDP for the destination address of UE B's uplink entry in the "fDescs" attribute, while the PCF of the UE A uses the 64 bit prefix of the same address for the source address of UE A's uplink entry in the "fDescs" attribute. If the source address is not formed from the 64 bit prefix, the source address shall be wildcarded.

- A downlink entry in the "fDescs" attribute shall be formed as follows: The destination address shall be taken from the SDP information received by the P-CSCF in uplink direction, while the source IP address may be formed (in order to reduce the possibilities of QoS flow misuse) from the destination address in the SDP received by the P-CSCF in downlink direction (taking into account only the 64 bit prefix of the Ipv6 address) Source and destination ports shall be derived according to rules provided in 3GPP TS 29.513 [7] subclause 7.2.

EXAMPLE 2: Assuming UE A sends an SDP to UE B, the PCF of UE A uses the address present in this SDP for the destination address of UE A's downlink entry in the "fDescs" attribute, while the PCF of UE B uses the 64 bit prefix of the same address for the source address of UE B's downlink entry in the "fDescs" attribute. If the source address is not formed from the 64 bit prefix, the source address shall be wildcarded.

The P-CSCF shall derive the bandwidth information within the service information, from the "b=AS" SDP parameter and "a=bw-info" SDP parameter, if available. If "a=bw-info" is used for bandwidth derivation, the P-CSCF shall use the SDP attribute line that contains the bandwidth properties for the IP version used by the UE, as detailed in 3GPP TS 29.513 [7] subclause 7.2. If the received "a=bw-info" SDP attribute line(s) contain only bandwidth properties for an IP version that is not used by the UE, the P-CSCF shall re-compute the bandwidth properties for the used IP version and use that value for the bandwidth derivation as defined in 3GPP TS 26.114 [30].

NOTE 2: If no IP version is included for any of the "a=bw-info" SDP attribute lines related to a certain payload type and direction then IPv6 is assumed for all bandwidth properties related to the same direction and payload type, on all of the related "a=bw-info" SDP attribute lines, see clause 19 of 3GPP TS 26.114 [30].

If "a=bw-info" is used for bandwidth derivation and it includes both known and unknown bandwidth properties, the P-CSCF shall only consider the known bandwidth properties to derive the bandwidth information and ignore the unknown ones. If the "a=bw-info" line is received with an unknown directionality, then the entire "a=bw-info" line shall be ignored.

For the possibly associated RTCP IP flows, the P-CSCF shall use the SDP "b=RR" and "b=RS" parameters, if present, as specified in 3GPP TS 29.513 [7] subclause 7.2. The "b=AS", "b=RR" and "b=RS" parameters in the SDP contain all the overhead coming from the IP-layer and the layers above, e.g. IP, UDP, RTP and RTCP payload, or IP, UDP and RTCP.

For multiplexed RTP/RTCP flows (as negotiated using the "a=rtcp-mux" SDP attribute defined in IETF RFC 5761 [31]), a P-CSCF supporting RTP/RTCP transport multiplexing shall derive the bandwidth information within the service information as specified in 3GPP TS 29.513 [7] subclause 7.2.

However, if service information is received containing the "b=TIAS" SDP parameter that corresponds to an SDP answer payload, and if the P-CSCF supports this parameter, the P-CSCF may derive the bandwidth from this parameter rather than from the "b=AS" SDP parameter, as detailed in 3GPP TS 29.513 [7] subclause 7.2.

When available, the P-CSCF shall also indicate to PCF, as a complement to the Service Information, the IMS Communication Service Identifier within the "afAppId" attribute. The originating P-CSCF shall take the IMS Communication Service Identifier value from the SIP response. The terminating P-CSCF shall take the IMS Communication Service Identifier value from the SIP request. Otherwise, the P-CSCF may not be able to provide an IMS Communication Service Identifier value to the PCF. The format and specific headers where IMS communication service identifiers are transported within SIP are defined in 3GPP TS 24.229 [32].

NOTE 3: In order to indicate the IMS Communication Service Identifier to the PCF, the originating P-CSCF sets the "afAppId" attribute to the ICSI contained in the topmost occurrence of the "+g.3gpp.icsi-ref" header field parameter of the Feature-Caps header field(s) of 18x or 2xx SIP response (Feature-Caps: *;+g.3gpp.icsi-ref="urn:Aurn-7:A3gpp-service.ims.icsi.mm1el") and the terminating P-CSCF sets the "afAppId" attribute to the ICSI of the P-Asserted-Service header information received in the SIP request (e.g. P-Asserted-Service: urn:urn-7:3gpp-service.ims.icsi.mm1el). Since the headers and the format of the ICSI can vary depending on the case, the PCF has to be prepared to accept the complete ICSI information received in different formats, as described in subclause 7.2A.8.2 in 3GPP TS 24.229 [32].

Additionally, if "ResourceSharing" feature is supported, the P-CSCF may include the "sharingKeyUI" attribute and/or "sharingKeyDI" attribute within a media component of the "medComponents" attribute in order to indicate the PCF that resource sharing should apply for the media components in the related direction with the same value for the "sharingKeyUI" attribute and/or "sharingKeyDI" attribute.

Additionally, if "PrioritySharing" feature is supported, the P-CSCF may provide the "prioSharingInd" attribute within a media component of the "medComponents" attribute as described in subclause 4.2.2.21 and 4.2.3.21.

NOTE 4: The P-CSCF obtains this information from the Application Server as described in 3GPP TS 23.228 [33], subclause 5.4.7.9.

NOTE 5: RTCP flows are not subject to resource sharing. This requirement cannot be met for multiplexed RTP/RTCP flows as in this case there is no mechanism in the current release to distinguish between RTP and RTCP flows.

If the "servUrn" attribute does not include an emergency service URN, i.e. a top-level service type of "sos" as specified in IETF RFC 5031 [34] and possibly additional sub-service information on the type of the emergency service and the PCF binds the IMS service session to a PDU session established to an Emergency DNN, the PCF shall return the application error UNAUTHORIZED_NON_EMERGENCY_SESSION to the P-CSCF. Upon receiving an application

error UNAUTHORIZED_NON_EMERGENCY_SESSION the P-CSCF shall apply the procedures defined in 3GPP TS 24.229 [32].

NOTE 6: The PCF determines whether a PDU session is established to an Emergency DNN based on the information received over N7 and operator configuration.

If the "afReqData" attribute is provided in the "ascReqData" attribute indicating "5GS-level UE Identities required", the PCF shall provide the available user information for the PDU session within the "ueIds" attribute included in the "ascRespData" attribute, where each entry shall contain either the "supi", and/or the "gpsi" and/or the "pei" attributes.

The PCF may decide not to authorize requested service information. The PCF will indicate it to the P-CSCF by rejecting the HTTP request with an HTTP "403 Forbidden" response message including the "cause" attribute set to "REQUESTED_SERVICE_NOT_AUTHORIZED". Upon receiving an HTTP "403 Forbidden" response message including the "cause" attribute set to the value "REQUESTED_SERVICE_NOT_AUTHORIZED" the P-CSCF shall apply the procedures defined in 3GPP TS 24.229 [32].

B.2 Enabling of IP Flows

B.2.1 General

Prior to the completion of the SIP session set-up, i.e. until the 2xx response to the INVITE request is received, the P-CSCF may enable or disable media IP flows depending on operator policy, thus allowing or forbidding early media in forward and/or backward direction. The P-CSCF may set the values of the "fStatus" attribute derived from the SDP direction attributes as defined in 3GPP TS 29.513 [7] subclause 7.3.3 or set the values of the "fStatus" attributes considering the em-param of the P-Early-Media header field according to subclause B.2.2 or downgrade the values of the "fStatus" attribute derived from the SDP direction attribute based on the configuration in the P-CSCF according to subclause B.2.3. However for multiplexed RTP/RTCP flows (as negotiated using the "a=rtp-mux" SDP attribute defined in IETF RFC 5761 [31]), a P-CSCF supporting RTP/RTCP transport multiplexing shall set the "fStatus" attribute to "ENABLED" to prevent that RTCP is blocked. If the P-CSCF chooses to modify the values of the "fStatus" as received from the SDP direction attribute, the P-CSCF shall store the last received SDP.

When a 2xx response is received, the P-CSCF shall enable all media IP flows according to the direction attribute within the last received SDP, as specified in 3GPP TS 29.513 [7] subclause 7.3.3. When a 2xx response is received and the P-CSCF previously provided the values of the "fStatus" attributes different from the value derived from the SDP direction attribute in the session information, the P-CSCF shall provide service information with values of the "fStatus" attributes corresponding to the last received SDP.

NOTE: In most cases a 2xx response is a 200 (OK) response.

If the P-CSCF receives SDP answers after the completion of the SIP session set-up, i.e. after the 2xx response to the INVITE request is received, the P-CSCF shall provide the "fStatus" attribute, based on the last received SDP answer. The "fStatus" attribute shall be derived from the SDP according to 3GPP TS 29.513 [7] subclause 7.3.3.

B.2.2 Gate control procedures considering the P-Early-Media header field

Prior to the completion of the SIP session set-up, the P-CSCF may use the em-param of the P-Early-Media header field defined in IETF RFC 5009 [35] in order to enable or disable early media in forward and/or backward direction. If the P-CSCF uses the em-param of the P-Early-Media header field for the gate control of early media, the P-CSCF shall perform the following procedures.

In the terminating P-CSCF, when a SIP message with the P-Early-Media header field is received from the UE and the policies configured in the P-CSCF indicate that the UE is authorized to send early media, then:

- 1) the P-CSCF shall set the "fStatus" attribute to "ENABLED" if:
 - the received em-param(s) in the P-Early-Media header field includes "sendrecv" and the last received SDP direction attribute from the UE is "sendrecv" or no SDP direction attribute has been received; or

- 2) the P-CSCF shall set the "fStatus" attribute to "ENABLED-UPLINK" if:
 - the received em-param(s) in the P-Early-Media header field includes "sendrecv" and the last received SDP direction attribute from the UE is "sendonly"; or
 - the received em-param(s) in the P-Early-Media header field includes "sendonly" and the last received SDP direction attribute from the UE is "sendrecv" or "sendonly" or no SDP direction attribute has been received; or
- 3) the P-CSCF shall set the "fStatus" attribute to "ENABLED-DOWNLINK" if:
 - the received em-param(s) in the P-Early-Media header field includes "sendrecv" and the last received SDP direction attribute from the UE is "recvonly"; or
 - the received em-param(s) in the P-Early-Media header field includes "recvonly" and the last received SDP direction attribute from the UE is "sendrecv" or "recvonly" or no SDP direction attribute has been received; or
- 4) the P-CSCF shall set the "fStatus" attribute to "DISABLED" if either the received em-param(s) in the P-Early-Media header field or the last received SDP direction attribute from the UE includes "inactive"; or
- 5) the P-CSCF may set the "fStatus" attribute to "DISABLED" or apply the rules defined in subclause B.2.2 if the received em-param(s) in the P-Early-Media header field includes "sendonly" or "recvonly" and the last received SDP direction attribute from the UE is "recvonly" or "sendonly" respectively.

NOTE 1: If the UE is authorized to send early media, the P-CSCF will not remove or modify the P-Early-Media header field according to 3GPP TS 24.229 [32].

When a SIP message with the P-Early-Media header field is received from the functional entity within the trust domain, and if:

- the P-Early-Media header field includes the "gated" parameter, then the P-CSCF may decide not to perform the gate control of early media; or
- the P-Early-Media header field does not include the "gated" parameter, then the P-CSCF shall perform the following procedures:
 - 1) the P-CSCF shall set the "fStatus" attribute to "ENABLED" if:
 - the received em-param(s) in the P-Early-Media header field includes "sendrecv" and the last received SDP direction attribute from the functional entity is "sendrecv" or no SDP direction attribute has been received; or
 - 2) the P-CSCF shall set the "fStatus" attribute to "ENABLED-DOWNLINK" if:
 - the received em-param(s) in the P-Early-Media header field includes "sendrecv" and the last received SDP direction attribute from the functional entity is "sendonly"; or
 - the received em-param(s) in the P-Early-Media header field includes "sendonly" and the last received SDP direction attribute from the functional entity is "sendrecv" or "sendonly" or no SDP direction parameter has been received; or
 - 3) the P-CSCF shall set the "fStatus" attribute to "ENABLED-UPLINK" if:
 - the received em-param(s) in the P-Early-Media header field includes "sendrecv" and the last received SDP direction attribute from the functional entity is "recvonly"; or
 - the received em-param(s) in the P-Early-Media header field includes "recvonly" and the last received SDP direction attribute from the functional entity is "sendrecv" or "recvonly" or no SDP direction parameter has been received; or
 - 4) the P-CSCF shall set the "fStatus" attribute to "DISABLED" if either the received em-param(s) in the P-Early-Media header field or the last received SDP direction attribute from the functional entity includes "inactive"; or

- 5) the P-CSCF may set the "fStatus" attribute to "DISABLED" or apply the rules defined in subclause A.2.2 if the received em-param(s) in the P-Early-Media header field includes "sendonly" or "recvonly" and the last received SDP direction attribute from the functional entity is "recvonly" or "sendonly" respectively.

NOTE 2: According to IETF RFC 5009 [35], the non-direction parameter "gated" can be included after the direction parameter (e.g. "sendrecv") in the parameter list. The proxy performing gating of early media can add the parameter before forwarding the SIP message.

When a SIP message without the P-Early-Media header field is received from either the functional entity within the trust domain or the UE that is authorized to send early media, then the P-CSCF may set the "fStatus" attribute to "DISABLED" or apply the rules defined in subclause B.2.3 or apply the rules defined in 3GPP TS 29.513 [7] subclause 7.3.3.

NOTE 3: As indicated in IETF RFC 5009 [35] the applicable preconditions need to be met in order to allow early media in a particular direction.

When a SIP message is received from the functional entity other than the functional entity within the trust domain or the UE that is authorized to send early media, then the P-CSCF shall not use the received em-param(s) in the P-Early-Media header field and may apply the rules defined in subclause B.2.2 or apply the rules defined in 3GPP TS 29.513 [7] subclause 7.3.3.

NOTE 4: The P-CSCF will remove or modify the P-Early-Media header field in the above case.

B.2.3 Gate control procedures based on the configuration in the P-CSCF

Prior to the completion of the SIP session set-up, the P-CSCF may downgrade the values of the "fStatus" attributes derived from the SDP direction attributes based on the configuration in the P-CSCF. If the P-CSCF has the configuration for the gate control of early media, the P-CSCF shall perform the following procedures.

NOTE: The gate control of early media can be configured in the P-CSCF per UE basis.

When the "fStatus" attribute derived from the SDP direction attribute is "ENABLED", then the P-CSCF may downgrade the value of the "fStatus" attribute to the value "DISABLED", "ENABLED_UPLINK", or "ENABLED_DOWNLINK" based on the configuration in the P-CSCF.

When the "fStatus" attribute derived from the SDP direction attribute is "ENABLED_UPLINK" or "ENABLED_DOWNLINK", then the P-CSCF may downgrade the value of the "fStatus" attribute to the value "DISABLED" based on the configuration in the P-CSCF.

B.3 Support for SIP forking

The P-CSCF shall be able to handle forking when PCC is applied and the "IMS_SBI" feature is supported. Forking can occur as specified in 3GPP TS 23.228 [33]. The related UE procedures are described in 3GPP TS 24.229 [32].

B.3.1 PCC rule provisioning for early media for forked responses

When a SIP session has been originated by a connected UE, the P-CSCF may receive multiple provisional responses due to forking before the first final answer is received. Multiple early media session may be established during this process.

The UE and the P-CSCF become aware of the forking only when a subsequent provisional response arrives for a new early dialogue. After the first early media session is established, for each subsequent provisional response establishing an additional early media session, the P-CSCF shall use an Npcf_PolicyAuthorization_Update service operation containing the "sipForkInd" attribute with value "SEVERAL_DIALOGUES" and include the service information derived from the latest provisional response.

The P-CSCF shall also provision the service information derived from any subsequent SDP offer-answer exchange within an early dialogue (e.g. in PRACK and OK(PRACK), or UPDATE and OK(UPDATE)) using an

Npcf_PolicyAuthorization_Update service operation containing the "sipForkInd" attribute with value "SEVERAL_DIALOGUES" and the derived service information.

When receiving an Npcf_PolicyAuthorization_Update service operation containing the "sipForkInd" attribute with value "SEVERAL_DIALOGUES", the PCF shall identify the existing "Individual Application Session Context" resource with existing authorization information.

The PCF shall send additional PCC Rules or individual service data flow filters to already provided PCC rules as required by the "fDescs" attribute within the AF session context information to the SMF. The PCF shall authorize any additional media components and any increased QoS requirements for the previously authorized media components, as requested within the service information.

The PCF shall authorize the maximum bandwidth required by any of the dialogues, but not the sum of the bandwidths required by all dialogues. Thus, the QoS authorized for a media component is equal to the highest QoS requested for that media component by any of the forked responses.

The PCF shall open or close the gates for service flows depending on the flow status that is being provisioned. However, if a flow ID has been enabled in uplink or downlink direction or both way within previous service information, it shall remain enabled even if the PCF receives service information that disable this flow ID within an Npcf_PolicyAuthorization_Update service operation containing the "sipForkInd" attribute with value "SEVERAL_DIALOGUES".

If the P-CSCF provides one or more media components within the "medComponents" attribute with the "fStatus" attribute set to "REMOVED" for previously authorized media component(s) the media component shall remain as authorized and the PCF shall not take any action on that media component(s).

NOTE: There can be cases where a forked response could not support some of the media components included in the SDP Offer (e.g. when early session disposition SDP as described in Annex B.6 applies, the forked response related to the early session could include the port set to zero for those media components not related to the early session or when a subsequent SDP Offer-Answer to indicate that some media is disabled). For those cases the P-CSCF will indicate the PCF about the removal of the corresponding media component. However this media component is already supported by other UEs and the PCF needs to maintain the corresponding PCC rules until the final SDP answer is received in the P-CSCF in order to avoid the release of resources in the network.

B.3.2 Updating the provisioned PCC rules at the final answer

The P-CSCF shall store the SDP information for each early dialogue separately till the first final SIP answer is received. Then the related early dialogue is progressed to an established dialogue to establish the final SIP session. All the other early dialogues are terminated. The service information for the SIP session is updated to match the requirements of the remaining early dialogue only.

When receiving the first final SIP response, the P-CSCF shall send an Npcf_PolicyAuthorization_Update service operation setting to null the "sipForkInd" attribute and shall include the service information derived from the SDP corresponding to the dialogue of the final response. The P-CSCF shall provision the full service information including the applicable "fDescs" attribute and "fStatus" attribute.

When receiving an Npcf_PolicyAuthorization_Update service operation with a "sipForkInd" attribute with value "SINGLE_DIALOGUE", the PCF shall update installed PCC Rules information and Authorized-QoS information to match only the requirements of the service information within this Npcf_PolicyAuthorization_Update service operation. The PCF should immediately remove PCC Rule(s) or individual service data flow filters not matching IP flow(s) in the updated Service Information, to reduce the risk for initial clipping of the media stream, and to minimize possible misuse of resources. The PCF shall also open or close the gates for service flows according to the flow status in the received service information.

B.4 Notification of AF Signalling Transmission Path Status

When the P-CSCF receives an initial REGISTER SIP message from an attached UE, the P-CSCF may subscribe to notifications of the status of the AF signalling transmission path using the procedures specified in subclause 4.2.6.7. Once the P-CSCF has subscribed, the P-CSCF may receive notifications from the PCF according to subclause 4.2.5.10.

NOTE: This procedure is not applicable for IMS registrations for Emergency sessions.

The P-CSCF shall cancel the subscription to notification of the status of the AF signalling transmission path when the AF signalling to that particular user is terminated (i.e. when the user is de-REGISTERED from the IM CN subsystem).

When the P-CSCF receives a notification of loss of signalling connectivity from the PCF, the P-CSCF shall behave as defined in 3GPP TS 24.229 [32].

B.5 Indication of Emergency Registration and Session Establishment

When the P-CSCF receives an initial REGISTER SIP message for an IMS emergency registration or an INVITE SIP message for an emergency session and the P-CSCF determines that there are no IMS-level roaming interfaces, and the "IMS_SBI" feature is supported the P-CSCF may request the PCF to provide the 5GS-Level UE identities (GPSI, SUPI, PEI) available for that PDU session using the procedure as specified in this subclause (for an IMS emergency registration) or B.5.1 (for an IMS emergency session establishment).

A P-CSCF may request the PCF to provide the 5GS-level identities (GPSI, SUPI, PEI) available for that PDU session when no service information is available in the AF. To do so, the P-CSCF shall create an "Individual Application Session Context" resource in the PCF for the AF signalling using an Npcf_PolicyAuthorization_Create service operation. The P-CSCF shall provide the UE's IP address (using either the "ueIpv4" attribute or the "ueIpv6" attribute) and the "afReqData" attribute set to "UE_IDENTITY". The AF shall include the "servUrn" attribute set to the value "sos", in order to indicate that the new AF session context relates to emergency traffic that is not related to a specific emergency service.

When the PCF receives an Npcf_PolicyAuthorization_Create service operation as described in the preceding paragraphs from the P-CSCF, the PCF shall perform session binding as described in 3GPP TS 29.513 [7]. When the PCF receives the "servUrn" attribute indicating an emergency session, the PCF may apply special policies, for instance prioritising service flows relating to the AF session context or allowing these service flows free of charge.

When the "servUrn" attribute indicates that the AF session context relates to emergency traffic and the "afReqData" attribute is received indicating "UE_IDENTITY", the PCF shall provide the requested available user information (GPSI, SUPI, PEI) for the PDU session within "ueIds" attribute within the "ascRespData" in the HTTP "201 Created" response.

When the P-CSCF receives the HTTP "201 Created" response with the 5GS-level UE identities from the PCF, the P-CSCF stores the "ueIds" received within "Individual Application Session Context" resource returned in the HTTP "201 Created" response and behaves as defined in 3GPP TS 24.229 [32].

NOTE: The user information received within the "ueIds" attribute can be used to support PSAP callback functionality for anonymous IMS emergency sessions. See 3GPP TS 23.167 [40] for further information.

The P-CSCF may decide to delete the "Individual Application Session Context" resource at any time. In that case, the Npcf_PolicyAuthorization_Delete service operation, as described in subclause 4.2.4.2.

A SIP INVITE request can contain a service URN as defined in IETF RFC 5031 [34] within the request URI. If the service within this URN is "sos", possibly with additional sub-service information, the P-CSCF shall provision this service and sub-service information within the "servUrn" attribute towards the PCF. The P-CSCF may also provision possible information about other services received within the service URN.

B.6 Support for Early Session disposition SDP

B.6.1 General

As a network option, when the "IMS_SBI" feature is supported, the P-CSCF may support the PCC procedures in the present subclause to handle "early session" disposition type SDP, as standardised in IETF RFC 3959 [38].

B.6.2 Service Information Provisioning for Early Media

The P-CSCF can receive "early session" disposition SDP in addition to "session" disposition SDP in SIP early dialogues.

The P-CSCF shall then provision service information derived both from the "early session" disposition SDP and "session" disposition SDP applying the procedures in clauses B.1, B.2, and B.3, and in the present subclause.

The P-CSCF shall apply the mapping rules in Annex C to derive the flow identifiers from "early session" disposition SDP.

If a single media line with one media type (e.g. "audio" or "video") is contained in "early session" disposition SDP and a single media line with the same media type is contained in the "session" disposition SDP of the same SIP dialogue, and both media lines describe service flows of the same directionality (uplink, downlink, or bidirectional), the P-CSCF should describe those SDP media lines in the same session information media component (with the same flow ID).

The "early session" disposition SDP can also contain media lines of a type not included in the "session" disposition SDP, or several media lines of the same type. Such media components shall be described in own media components in the service information.

If the P-CSCF desires to invoke special policies or separate event notifications for an "early session" disposition media line, it may choose to provision a separate session information media component even if a media line with the same media type and directionality is contained in "session" disposition SDP.

NOTE 1: A PCF is then likely to supply separate PCC rules for early media and the corresponding final media. This may lead to an over provisioning of resources during call establishment and a subsequent reconfiguration of the radio bearer, or even to a call failure if the extra resources are not authorized or available.

If the P-CSCF receives "early session" disposition SDP before any "session" disposition SDP and supplies service information derived from the "early session" disposition SDP at this point of time, it shall use dedicated media components relating only to the "early session" disposition SDP in the service information.

NOTE 2: The "session" disposition SDP offer will frequently occur before the "early session" disposition SDP offer, but can also occur in parallel or in exceptional cases afterwards. The "session" disposition SDP answer can be contained in the same SIP message as the "early session" disposition SDP offer, or can be sent in a 200 OK (INVITE), i.e. after the "early session" disposition SDP answer.

If the P-CSCF includes any media component relating both to "early session" disposition SDP and "session" disposition SDP in the service information, the P-CSCF shall:

- provision the service information derived from "early session" disposition SDP and the service information derived from "session" disposition SDP in separate Npcf_PolicyAuthorization_Update requests (to the same "Individual Application Session Context" resource), and shall send a new Npcf_PolicyAuthorization_Update request only after any previous Npcf_PolicyAuthorization_Update request has been acknowledged; and
- provision the first service information (either derived from "early session" disposition SDP or "session" disposition SDP) without the "sipForkInd" attribute, or with "sipForkInd" attribute with value "SINGLE_DIALOGUE"; and
- provision all subsequent service information during ongoing call establishment with the "sipForkInd" attribute with value SEVERAL_DIALOGUES; and

- if an SDP answer has been received and codecs are provisioned within the "codecs" attribute included in a media component of the "medComponents" attribute, provision within a "codecs" attribute the codec derived from the corresponding offer together with a codec derived from the SDP answer.

NOTE 3: The P-CSCF needs to provision the service information derived from "early session" disposition SDP and the service information derived from "session" disposition SDP in separate Npcf_PolicyAuthorization_Update requests because the encoding of the media component does not allow for the simultaneous provisioning of two corresponding filters.

NOTE 4: The PCF will treat service information containing the "sipForkInd" attribute as described in subclause B.3.

B.6.3 Updating the Provisioned Service Information when Dialogue is established

The P-CSCF shall store the SDP information for the "session" disposition type until the first final SIP answer is received. Then the early media described in the "early session" disposition type SDP are terminated.

The P-CSCF shall then update the service information to match the requirements of the media described in the "session" disposition type SDP only:

- If the P-CSCF included any media component relating both to "early session" disposition SDP and "session" disposition SDP in the service information, the P-CSCF shall send an Npcf_PolicyAuthorization_Update request without the "sipForkInd" attribute or with a "sipForkInd" attribute with value SINGLE_DIALOGUE and shall include the service information derived from the "session" disposition SDP. The P-CSCF shall provision the full service information including the applicable "fDescs" attribute and "fStatus" attribute.
- The P-CSCF shall disable any media component(s) in the service information that relate to early media only by setting their flow status to "REMOVED".

B.7 Provision of Signalling Flow Information at P-CSCF

When the P-CSCF has successfully concluded the initial registration of an attached UE, i.e., when the P-CSCF has sent to the UE a SIP 200 (OK) response to the SIP REGISTER request, the P-CSCF may provision information about the SIP signalling flows between the UE and itself using the procedure specified in subclause 4.2.2.16. If the P-CSCF already has created an "Individual Application Session Context" resource with the PCF related to the signalling with the UE, e.g. one that has been opened according to the procedure described in clause B.4, the P-CSCF shall reuse the already open session to provision the SIP Signalling IP Flow information using the procedure specified in subclause 4.2.3.17.

NOTE: This procedure is not applicable for IMS registrations for Emergency sessions.

If the P-CSCF provisions information about SIP signalling flows, the P-CSCF shall ensure that for each signalling IP flow information it provides, the flow descriptions within the "fDescs" attribute shall accurately reflect the IP flow information as seen in the IP header 'on the wire'. The P-CSCF shall set the value of the "afSigProtocol" attribute to "SIP".

When the P-CSCF de-registers the UE and terminates SIP Signalling to the UE, the P-CSCF shall de-provision the SIP Signalling IP flow information from the PCRF as described in subclauses 4.2.2.16 and 4.2.3.17.

B.8 Retrieval of network provided location information

B.8.1 General

According to clause E.7 of 3GPP TS 23.228 [33], the P-CSCF can use PCC to retrieve network provided location information. Information flows related to the distribution of network provided location information within the IMS are provided in Annex R of 3GPP TS 23.228 [33].

The following subclauses provide optional PCC procedures to support the retrieval of network provided location information.

The originating P-CSCF can, depending on operator policy, retrieve the user location and/or UE Time Zone information either before sending the INVITE towards the terminating side or upon reception of the SDP answer from the terminating side.

B.8.2 Retrieval of network provided location information at originating P-CSCF for inclusion in SIP Request

If the originating P-CSCF is required by operator policy to retrieve network provided location information before forwarding a SIP INVITE request, upon reception of the SIP INVITE/UPDATE request, the P-CSCF shall invoke:

- the Npcf_PolicyAuthorization_Create service operation according to subclause 4.2.2.14 (SIP INVITE request); or
- the Npcf_PolicyAuthorization_Update service operation according to subclause 4.2.3.14 or the Npcf_PolicyAuthorization_Subscribe service operation according to subclause 4.2.6.6 (SIP INVITE/UPDATE request);

including in the corresponding HTTP request:

- an entry of the "AfEventSubscription" data type in the "events" attribute with:
 - a) the "event" attribute set to the value "ANI_REPORT"; and
 - b) the "notifMethod" attribute set to the value "ONE_TIME"; and
- the "reqAnis" attribute, with the required access network information, i.e. user location and/or user time zone information).

If the SIP INVITE request is an initial SIP INVITE request, the P-CSCF shall create a new "Individual Application Session Context" for the new SIP session with the Npcf_PolicyAuthorization_Subscribe service operation according to subclause 4.2.6.6 (if no session information is included) or with the Npcf_PolicyAuthorization_Create service operation according to subclause 4.2.2.14 (if preliminary session information is included).

The P-CSCF will receive the access network information from the PCF within the Npcf_PolicyAuthorization_Notify service operation as described in subclause 4.2.5.11 and should include this access network information in the SIP INVITE/UPDATE requests that it forwards. When the retrieved access network information corresponds to the "tnapId" or "twapId" attribute, the P-CSCF may also map the retrieved access network information to a Geographical Identifier for routing, as specified in clause E.8 of 3GPP TS 23.228 [33].

B.8.3 Retrieval of network provided location information at originating P-CSCF for inclusion in SIP response confirmation

If an originating P-CSCF is required by operator policy to retrieve network provided location information before forwarding an SDP answer, the P-CSCF shall apply the following procedures.

Upon reception of an SDP offer, the P-CSCF may invoke the Npcf_PolicyAuthorization_Create service operation to the PCF according to clause B.1 and may include in the corresponding HTTP POST request:

- an entry of the "AfEventSubscription" data type in the "events" attribute with:
 - a) the "event" attribute set to the value "ANI_REPORT"; and
 - b) the "notifMethod" attribute set to the value "ONE_TIME"; and
- the "reqAnis" attribute, with the required access network information, i.e. user location and/or user time zone information).

Upon reception of an SDP answer, the P-CSCF will invoke the Npcf_PolicyAuthorization_Update service operation to the PCF according to clause B.1. If the P-CSCF has not requested access network information upon reception of the SDP offer, the P-CSCF shall include in the corresponding HTTP PATCH request:

- an entry of the "AfEventSubscription" data type in the "events" attribute with:
 - a) the "event" attribute set to the value "ANI_REPORT"; and
 - b) the "notifMethod" attribute set to the value "ONE_TIME"; and
- the "reqAnis" attribute, with the required access network information, i.e. user location and/or user time zone information).

The P-CSCF will receive the access network information from the PCF in the Npcf_PolicyAuthorization_Notify service operation and should include this access network information in the SIP message with the response confirmation before forwarding it. When the retrieved access network information corresponds to the "tnapId" or "twapId" attribute, the P-CSCF may also map the retrieved access network information to a Geographical Identifier for routing, as specified in clause E.8 of 3GPP TS 23.228 [33].

B.8.4 Retrieval of network provided location information at terminating P-CSCF

If a terminating P-CSCF is required by operator policy to retrieve network provided location information at session establishment and/or modification, the P-CSCF shall apply the following procedures.

The terminating P-CSCF may request network provided location information upon reception of a SIP INVITE request in the following manner:

- if the SIP INVITE request is an initial SIP INVITE request, the P-CSCF shall create a new "Individual Application Session Context" for the new SIP session with the Npcf_PolicyAuthorization_Subscribe service operation according to subclause 4.2.6.6 (if no session information is included) or with the Npcf_PolicyAuthorization_Create service operation according to subclause 4.2.2.14 (if preliminary session information is included);
- if the SIP INVITE contains an SDP offer, the P-CSCF shall include in the corresponding HTTP request:
 - a) an entry of the "AfEventSubscription" data type in the "events" attribute with:
 - (i) the "event" attribute set to the value "ANI_REPORT"; and
 - (ii) the "notifMethod" attribute set to the value "ONE_TIME";
 - b) the "reqAnis" attribute, with the required access network information, i.e. user location and/or user time zone information);
 - c) service information derived from the SDP offer; and
 - d) the "servInfStatus" attribute with the value set to "PRELIMINARY"; and
- if the SIP INVITE does not contain an SDP offer, the P-CSCF shall include in the corresponding HTTP request:
 - a) an entry of the "AfEventSubscription" data type in the "events" attribute with:
 - (i) the "event" attribute set to the value "ANI_REPORT"; and
 - (ii) the "notifMethod" attribute set to the value "ONE_TIME"; and
 - b) the "reqAnis" attribute, with the required access network information, i.e. user location and/or user time zone information).

Upon reception of a SIP response that requires the inclusion of access network information, if the P-CSCF has not already requested network provided location information upon reception of the corresponding SIP INVITE request, the P-CSCF shall request network provided location information in the following manner:

- if an "Individual Application Session Context" related to service data has not yet been created, the P-CSCF shall create an "Individual Application Session Context" for the new SIP session with the Npcf_PolicyAuthorization_Subscribe service operation according to subclause 4.2.6.6 (if no session information is included) or with the Npcf_PolicyAuthorization_Create service operation according to subclause 4.2.2.14 (if session information is included);
- if the SIP response includes an SDP answer, the P-CSCF shall send an HTTP request to the PCF according to clause B.1; the P-CSCF shall include in this HTTP request:
 - a) an entry of the "AfEventSubscription" data type in the "events" attribute with:
 - (i) the "event" attribute set to the value "ANI_REPORT"; and
 - (ii) the "notifMethod" attribute set to the value "ONE_TIME"; and
 - b) the "reqAnis" attribute, with the required access network information, i.e. user location and/or user time zone information);
- if the SIP response does not contain an SDP body, the P-CSCF shall include in the corresponding HTTP request:
 - a) an entry of the "AfEventSubscription" data type in the "events" attribute with:
 - (i) the "event" attribute set to the value "ANI_REPORT"; and
 - (ii) the "notifMethod" attribute set to the value "ONE_TIME"; and
 - b) the "reqAnis" attribute, with the required access network information, i.e. user location and/or user time zone information); and
- if the SIP response includes an SDP offer, the P-CSCF shall include in the corresponding HTTP request:
 - a) an entry of the "AfEventSubscription" data type in the "events" attribute with:
 - (i) the "event" attribute set to the value "ANI_REPORT"; and
 - (ii) the "notifMethod" attribute set to the value "ONE_TIME";
 - b) the "reqAnis" attribute, with the required access network information, i.e. user location and/or user time zone information);
 - c) service information derived from the SDP offer; and
 - d) the "servInfStatus" attribute with the value set to "PRELIMINARY".

The P-CSCF will receive the access network information from the PCF in the Npcf_PolicyAuthorization_Notify service operation and should include this access network information in the appropriate SIP response before forwarding it. When the retrieved access network information corresponds to the "tnapId" or "twapId" attribute, the P-CSCF may also map the retrieved access network information to a Geographical Identifier for routing, as specified in clause E.8 of 3GPP TS 23.228 [33].

B.8.5 Provisioning of network provided location information at SIP session release

If a P-CSCF is required by operator policy to include network provided location information in SIP session release signalling, the P-CSCF shall apply the following procedures:

Upon reception of a SIP session release request that requires the inclusion of network provided location information, the P-CSCF will invoke the Npcf_PolicyAuthorization_Delete service operation to the PCF according to subclause 4.2.4.6 and shall include in the HTTP request:

- an entry of the "AfEventSubscription" data type in the "events" attribute with:
 - a) the "event" attribute set to the value "ANI_REPORT"; and
 - b) the "notifMethod" attribute set to the value "ONE_TIME"; and

- the "reqAnis" attribute, with the required access network information, i.e. user location and/or user time zone information).

The P-CSCF will receive the access network information from the PCF in the Npcf_PolicyAuthorization_Delete service operation according to subclause 4.2.4.6 and shall include this access network information in the appropriate SIP message before forwarding it. When the retrieved access network information corresponds to the "tnapId" or "twapId" attribute, the P-CSCF may also map the retrieved access network information to a Geographical Identifier for routing, as specified in clause E.8 of 3GPP TS 23.228 [33].

B.9 Resource Sharing

The P-CSCF may indicate to the PCF that media of an "Individual Application Session Context" resource may share resources with media belonging to other "Individual Application Session Context" resources according to 3GPP TS 23.228 [33].

If the P-CSCF determines that resource sharing is possible, it may at creation of a new "Individual Application Session Context" resource, include the "sharingKeyUI" attribute and/or "sharingKeyDI" attribute indicating that media resources may be shared in the related direction. The P-CSCF shall assign a distinct value for the "sharingKeyUI" attribute and/or "sharingKeyDI" attribute for each media component within the "medComponents" attribute.

NOTE 1: When resource sharing applies to both directions for a certain media component, the P-CSCF can assign the same value for "sharingKeyUI" attribute and "sharingKeyDI" attribute within the same media component.

The P-CSCF shall not include the "sharingKeyUI" attribute and/or "sharingKeyDI" attribute within the media components in the "medComponents" attribute when the "Individual Application Session Context" resource relates to an Emergency Session.

The PCF shall not include the "sharingKeyUI" attribute and/or "sharingKeyDI" attribute for those PCC/QoS Rules related to the RTCP traffic.

Trigger conditions that require applying or stopping resource sharing are described in 3GPP TS 24.229 [32].

NOTE 2: When P-CSCF needs to stop sharing according to the procedures described in 3GPP TS 24.229 [32], the P-CSCF will provide "null" value for the "sharingKeyUI" attribute and/or "sharingKeyDI" attribute within the media component in the "medComponents" attribute.

B.10 Handling of MCPTT priority call

B.10.1 General

Within the framework of MCPTT, when the SIP Core (3GPP TS 24.379 [41]) is implemented by an IMS core network, if the P-CSCF receives a SIP request message including a Resource-Priority header field with a namespace field and priority value defined for MCPTT for adjusting the priority of an MCPTT session, the P-CSCF shall provide the "resPrio" attribute and the "mcpttId" in the Npcf_PolicyAuthorization_Create request as defined in subclause B.13.2 to allow the PCF to set the corresponding PCC rule(s) according to the prioritized MCPTT service. Additionally, if "PrioritySharing" feature is supported, the P-CSCF may provide the "prioSharingInd" attribute within the media component included in the "medComponents" attribute as described in clause B.1. For MCPTT the service priority and the priority sharing indicator are defined in 3GPP TS 24.379 [41].

NOTE 1: The process of adjusting priority may occur several times during the course of one session, e.g. a normal MCPTT group call elevated to an MCPTT emergency group call, returned to a normal priority MCPTT group call, elevated to an MCPTT imminent peril group call and returned to a normal priority MCPTT group call.

NOTE 2: Upon reception of a request that requires the adjustment of the MCPTT priority, the PCF is expected to derive the PCC Rules corresponding to the this MCPTT session, as appropriate according to operator policies.

NOTE 3: The PCF can identify an MCPTT call using the IMS Communication Service Identifier specific to MCPTT, which is provided by the P-CSCF in the "afAppId" attribute in the Npcf_PolicyAuthorization_Create request sent to PCF.

B.10.2 Determination of MCPTT priority parameter values

When the P-CSCF receives an authorized Resource-Priority header field containing an appropriate namespace and priority value used for MCPTT in SIP signalling, the P-CSCF shall include the "mcpttId" attribute and the "resPrio" attribute in the corresponding Npcf_PolicyAuthorization service operation towards the PCF.

The "mcpttId" attribute shall include the namespace defined for MCPTT as received within the Resource-Priority header field.

NOTE: Two different values are defined for the MCPTT-Identifier AVP, one for each namespace value defined for MCPTT (see IETF RFC 8101 [42]).

The "resPrio" attribute shall contain the priority value of the Resource-Priority header; the lowest priority shall be mapped to PRIO_1 (Resource-Priority header value 0), the next after the lowest to PRIO_2 (Resource-Priority header value 1), and so on up to the highest priority which shall be mapped to PRIO_16 (Resource-Priority header value 15).

Additionally, when the P-CSCF receives information about priority sharing from an MCPTT server that supports simultaneous sessions and that needs to share a common priority for several MCPTT sessions and if "PrioritySharing" feature is supported, the P-CSCF may include the "prioSharingInd" attribute within the media component received in the "medComponents" attribute in the corresponding Npcf_PolicyAuthorization service operation. See 3GPP TS 24.379 [41] for further information.

B.11 Handling of MCVideo priority call

B.11.1 General

Within the framework of MCVideo, when the SIP Core (3GPP TS 23.281 [34]) is implemented by an IMS core network, if the P-CSCF receives a SIP request message including a Resource-Priority header field with a namespace field and priority value defined for MCVideo for adjusting the priority of an MCVideo session, the P-CSCF shall provide the "resPrio" attribute and the "mcVideoId" in the Npcf_PolicyAuthorization_Create request as defined in subclause B.15.2 to allow the PCF to set the corresponding PCC rule(s) according to the prioritized MCVideo service.

NOTE 1: The process of adjusting priority may occur several times during the course of one session, e.g. a normal MCVideo group call elevated to an MCVideo emergency group call and returned to a normal priority MCVideo group call, elevated to an MCVideo imminent peril group call and returned to a normal priority MCVideo group call.

NOTE 2: Upon reception of a request that requires the adjustment of the MCVideo priority, the PCF is expected to derive the PCC Rules corresponding to the this MCVideo session, as appropriate according to operator policies.

NOTE 3: The PCF can identify an MCVideo call using the IMS Communication Service Identifier specific to MCVideo, which is provided by the P-CSCF in the "afAppId" attribute in the Npcf_PolicyAuthorization_Create request sent to PCF.

B.11.2 Determination of MCVideo priority parameter values

When the P-CSCF receives an authorized Resource-Priority header field containing an appropriate namespace and priority value used for MCVideo in SIP signalling, the P-CSCF shall include the "mcVideoId" attribute and the "resPrio" attribute in the corresponding Npcf_PolicyAuthorization service operation towards the PCF.

The "mcVideoId" attribute shall include the namespace defined for MCVideo as received within the Resource-Priority header field.

The "resPrio" attribute shall contain the priority value of the Resource-Priority header; the lowest priority shall be mapped to PRIO_1 (Resource-Priority header value 0), the next after the lowest to PRIO_2 (Resource-Priority header value 1), and so on up to the highest priority which shall be mapped to PRIO_16 (Resource-Priority header value 15).

B.12 Notification Access Type Change

When the P-CSCF receives an initial SIP REGISTER message or a SIP INVITE message from an attached UE, the P-CSCF may request from the PCF the information about the access type the UE is attached to using the procedure specified in subclauses 4.2.2.2, 4.2.3.2 and 4.2.6.2.

NOTE 1: This procedure is not applicable for IMS registrations for Emergency sessions.

NOTE 2: The P-CSCF can request information about the access type as part of the SIP session setup when it is only interested in the related information when the IMS session is ongoing.

If the P-CSCF requests information about the access type, the P-CSCF shall also subscribe within the same Npcf_PolicyAuthorization service operation to notifications for changes of the access type used by the UE. The P-CSCF shall include an entry of the "AfEventSubscription" data type in the "events" attribute with the "event" attribute set to the value "ACCESS_TYPE_CHG".

When the P-CSCF receives from the PCF the access type:

- in the subscription request response within the HTTP response; or
- in the notification of access type change in an HTTP POST request from the PCF,

the P-CSCF shall store the access type information received within the "accessType" attribute and the RAT type information received within "ratType" attribute and use the received information as per P-CSCF procedures in 3GPP TS 24.229 [32].

The P-CSCF may receive subsequent notifications for changes of the access type from the PCF according to subclause 4.2.5.2. When the P-CSCF receives a notification of the change of the access type used by the UE, the P-CSCF shall store the new access type information and RAT type information and use the received information as per P-CSCF procedures in 3GPP TS 24.229 [32].

NOTE 3: The subscription to receive information about the access type will be cancelled when the corresponding Individual Application Session Context resource is removed by the AF (i.e. when the UE is de-REGISTERED or the related SIP call is released).

B.13 Notification of PLMN Change

When the P-CSCF receives an initial SIP REGISTER message from an attached UE, the P-CSCF may subscribe to notifications of PLMN changes corresponding to the identity of the network where the UE is located using the procedure specified in subclauses 4.2.2.2, 4.2.3.2 and 4.2.6.2.

When the P-CSCF receives the subscription request response in an HTTP response or the notification of PLMN change in an HTTP POST request from the PCF, the P-CSCF shall store the PLMN identifier and, if available, the NID received within the "plmnId" attribute and use the received information as per P-CSCF procedures in 3GPP TS 24.229 [32].

The P-CSCF shall cancel the subscription to notification for changes of the PLMN used by the UE when the user is de-registered from the IM CN subsystem.

B.14 Coverage and Handoff Enhancements using Multimedia error robustness feature (CHEM)

As a network option, the P-CSCF may support the PCC procedures in the present clause to handle the Coverage and Handoff Enhancements using Multimedia error robustness feature (CHEM).

NOTE: When the CHEM feature is supported, improved error robustness might be enabled by packet-loss handling procedures of the codec, codec mode, or codec configuration to avoid, delay, or reduce the need to handoff a terminal due to degradation in the media quality. Communicating the level of robustness of the media to the network enables the eNB to use this information to determine a threshold for when the terminal should be handed off to another cell, domain (circuit-switched vs. packet-switched), or radio access technology.

When a session is initiated or modified the P-CSCF supporting the CHEM feature shall derive the "maxPacketLossRateDI" attribute and "maxPacketLossRateUI" attribute based on the PLR_adapt and maxe2e-PLR attribute values in both the SDP offer and/or SDP answer to determine the maximum tolerable end-to-end PLR budget distributed across the uplink and downlink in a media transport path as described in 3GPP TS 29.513 [7] subclause 7.2.3.

Upon reception of SDP offer and answer, the P-CSCF should check whether "a= PLR_adapt" line is present in both SDP offer and answer to derive "maxPacketLossRateDI" attribute and "maxPacketLossRateUI" attribute in "medComponents" attribute else "maxPacketLossRateDI" and "maxPacketLossRateUI" attributes are not included by the P-CSCF.

The originating P-CSCF should derive "maxPacketLossRateDI" attribute to the maximum value of MaxPacketLossRateDI among all the RTP payload types. For each RTP payload type MaxPacketLossRateDI is computed as described in 3GPP TS 29.513 [7] subclause 7.2.3.

- If maxe2e-PLR is included in the SDP offer then the MaxPacketLossRateDI for a payload type is derived as value of maxe2e-PLR in the SDP offer minus maxUL-PLR in the SDP answer if present else the MaxPacketLossRateDI is $\frac{1}{2}$ maxe2e-PLR value present in the SDP offer.
- If maxe2e-PLR is not included in the SDP offer then the MaxPacketLossRateDI for a payload type is derived from the default value in end-to-end Maximum End-to-End Packet Loss Rate for the decoder of the RTP payload type as recommended in 3GPP TS 26.114 [30] subclause X.1.2 for application layer redundancy or X.1.1 for partial redundancy minus maxUL-PLR in the SDP answer if present else the MaxPacketLossRateDI $\frac{1}{2}$ default value in end-to-end Maximum End-to-End Packet Loss Rate for the decoder of the RTP payload type as recommended in 3GPP TS 26.114 [30] subclause X.1.2 for application layer redundancy or X.1.1 for partial redundancy.

The originating P-CSCF should derive "maxPacketLossRateUI" attribute to the maximum value of MaxPacketLossRateUI among all the RTP payload types. For each RTP payload type MaxPacketLossRateUI is computed as described in 3GPP TS 29.513 [7] subclause 7.2.3.

- If maxe2e-PLR is included in the SDP answer then the MaxPacketLossRateUI for a payload type is derived as value of maxe2e-PLR in the SDP answer minus maxDL-PLR in the SDP answer if present else the MaxPacketLossRateUI is $\frac{1}{2}$ maxe2e-PLR value present in the SDP answer.
- If maxe2e-PLR is not included in the SDP answer then the MaxPacketLossRateUI for a payload type is derived as the $\frac{1}{2}$ default value in end-to-end Maximum End-to-End Packet Loss Rate for the decoder of the RTP payload type as recommended in 3GPP TS 26.114 [30] subclause X.1.2 for application layer redundancy or X.1.1 for partial redundancy.

The terminating P-CSCF should derive "maxPacketLossRateDI" attribute to the maximum value of MaxPacketLossRateDI among all the RTP payload types. For each RTP payload type MaxPacketLossRateDI is computed as described in 3GPP TS 29.513 [7] subclause 7.2.3.

- If maxe2e-PLR is included in the SDP answer then the MaxPacketLossRateDI for a payload type is derived as value of maxDL-PLR in the SDP answer if present else the MaxPacketLossRateDI is $\frac{1}{2}$ maxe2e-PLR value present in the SDP answer.
- If maxe2e-PLR is not included in the SDP answer then the MaxPacketLossRateDI for a payload type is derived as the $\frac{1}{2}$ default value in end-to-end Maximum End-to-End Packet Loss Rate for the decoder of the RTP payload type as recommended in 3GPP TS 26.114 [30] subclause X.1.2 for application layer redundancy or X.1.1 for partial redundancy.

The terminating P-CSCF should derive "maxPacketLossRateUI" attribute to the maximum value of MaxPacketLossRateUI among all the RTP payload types. For each RTP payload type MaxPacketLossRateUI is computed as described in 3GPP TS 29.513 [7] subclause 7.2.3.

- If maxe2e-PLR is included in the SDP offer then the MaxPacketLossRateUI for a payload type is derived as value of maxUL-PLR in the SDP answer if present else the MaxPacketLossRateUI is ½ maxe2e-PLR value present in the SDP offer.
- If maxe2e-PLR is not included in the SDP offer then the MaxPacketLossRateUI for a payload type is derived as the ½ default value in end-to-end Maximum End-to-End Packet Loss Rate for the decoder of the RTP payload type as recommended in 3GPP TS 26.114 [30] subclause X.1.2 for application layer redundancy or X.1.1 for partial redundancy.

B.15 Handling of a FLUS session

If the P-CSCF receives a SIP request that requires provisioning of a service information to the PCF, the "FLUS" feature is supported and an SDP attribute "a=label:flus..." is included in one or more of the received SDP media descriptions, the P-CSCF shall provide the string after "a=label:" starting with "flus" within the "flusId" attribute for each affected media components within the "medComponents" attribute in the corresponding Npcf_PolicyAuthorization service operation towards the PCF.

NOTE: During the first interaction with the PCF, the P-CSCF does not know if the "FLUS" feature is supported by the PCF. In this case the P-CSCF will include the information as if the feature is supported.

If additionally the P-CSCF receives the "a=3gpp-qos-hint" media-level SDP attribute in the SIP request, the P-CSCF shall provide the PCF with the "desMaxLatency" attribute and/or "desMaxLoss" attribute as described in 3GPP TS 29.513 [7], subclause 7.2.3.

Upon receiving the information from the P-CSCF and if the "FLUS" feature is supported, the PCF shall derive the QoS information as described in 3GPP TS 29.513 [7], subclause 7.3.3.

B.16 QoS hint support for data channel media

If the P-CSCF receives a SIP request that requires provisioning of a service information to the PCF, the QoSHint feature is supported and an SDP attribute "a=3gpp-qos-hint" is included in one or more of the received data channel media descriptions, the P-CSCF may provide the "desMaxLatency" attribute and/or "desMaxLoss" attribute for each affected application media component within the "medComponents" attribute in the corresponding Npcf_PolicyAuthorization service operation towards the PCF.

NOTE: During the first interaction with the PCF, the P-CSCF does not know if the QoSHint feature is supported by the PCF. In this case the P-CSCF will include the information as if the feature is supported.

Upon receiving the information from the P-CSCF and if the QoSHint feature is supported, the PCF shall derive the QoS information as described in 3GPP TS 29.513 [7], subclause 7.3.3.

B.17 Handling of MPS Session

When the P-CSCF receives an authorised Resource-Priority header field or when the P-CSCF adds a temporarily authorised Resource-Priority header field containing an appropriate namespace and priority value in SIP signaling, and recognizes the need for priority treatment as specified in 3GPP TS 24.229 [32], and the "IMS_SBI" feature is supported, the P-CSCF shall include the "mpsId" attribute and the "resPrio" attribute in the corresponding Npcf_PolicyAuthorization service operation towards the PCF. The "mpsId" attribute shall contain the national variant for MPS service name indicating an MPS session. The "resPrio" attribute shall be determined based on the resource value received in the "wps" namespace of the SIP Resource-Priority header field, and shall be included at "AppSessionContextReqData" data type level as well as the "MediaComponent" data type level. The "resPrio" attribute shall be populated with a default value if the priority value is unknown.

NOTE 1: Various mechanisms can be applied to recognize the need for priority treatment in the P-CSCF (e.g., based on the dialled digits), according to national regulation and network configuration, as stated in 3GPP TS 24.229 [32].

NOTE 2: Highest user priority level (lowest numerical resource value of the SIP Resource-Priority header field) is mapped to the highest enumerated value of the "resPrio" attribute.

If the P-CSCF supports the SBI Message Priority mechanism for an MPS session, the P-CSCF shall include the "3gpp-Sbi-Message-Priority" custom HTTP header with a priority value based on the value of the "resPrio" attribute. The highest "resPrio" value is mapped to the corresponding lowest value of the "3gpp-Sbi-Message-Priority" custom HTTP header.

Upon reception of a request that requires MPS treatment, the PCF shall derive the PCC rules corresponding to the MPS session, as appropriate. The PCF shall take specific actions on the corresponding PDU session to ensure that the MPS session is prioritized, as described in 3GPP TS 29.512 [8], subclause 4.2.6.2.12.3.

When the P-CSCF detects that the MPS session has ended, the P-CSCF deletes in the PCF the "Individual Application Session Context" resource corresponding to the MPS session. The PCF shall delete the PCC rules corresponding to the MPS session and shall revoke the actions related to the prioritization of the MPS session in the corresponding PDU session, as described in 3GPP TS 29.512 [8], subclause 4.2.6.2.12.3.

Annex C (normative): Flow identifiers: Format definition and examples

C.1 Format of a flow identifier

C.1.1 General

A flow identifier is expressed as a 2-tuple as follows:

<The ordinal number of the position of the media component description in the SDI. The ordinal number of the IP flow(s) within the media component description assigned in the order of increasing downlink port numbers as detailed below.>

where both are numbered starting from 1. The encoding of the flow identifier is as indicated in 3GPP TS 24.008 [36].

The rules for the allocation of flow identifiers to IP flows are defined in 3GPP TS 29.214 [20], Annex B.1.1. Derivation of flow identifiers from SDP are described in 3GPP TS 29.214 [20], Annex B.1.2, and examples are covered in 3GPP TS 29.214 [20], Annex B2, B3, B4 and B5.

Annex D (normative): Wireless and wireline convergence access support

D.1 Scope

This annex provides the stage 3 definition of the Policy Authorization Service for wireless and wireline convergence access support for 5GS.

The stage 2 definition and procedures of the Policy Authorization Service for wireless and wireline convergence access support for 5GS are contained in 3GPP TS 23.316 [44].

D.2 Npcf_PolicyAuthorization Service

D.2.1 Service Description

D.2.1.1 Overview

The overview defined in subclause 4.1.1 applies with the exception that the UE is replaced by the 5G-RG and the W-AGF, which is acting as a UE towards the 5GC on behalf of the FN-RG.

D.2.1.2 Service Architecture

The service architecture defined in subclause 4.1.2 applies.

D.2.1.3 Network Functions

D.2.1.3.1 Policy Control Function (PCF)

The PCF functionality defined in subclause 4.1.3.1 shall apply with the following modifications for W-5GAN and for the Npcf_PolicyAuthorization service:

- The 5G-RG and the W-AGF, acting as a UE towards the 5GC on behalf of the FN-RG, replace the UE.
- The PCF provides Policy Authorization as described in this Annex.

D.2.1.3.2 NF Service Consumers

The AF functionality defined in subclause 4.1.3.2 shall apply with the following exceptions for the traffic of a PDU session over wireline access:

- Indication that the QoS targets can no longer (or can again) be guaranteed does not apply.
- Invocation of Multimedia Priority Services does not apply in this release of the specification.
- Indication of PLMN change does not apply.
- Indication of TSN 5GS Bridge Information does not apply.
- Reporting RAN/NAS Release Cause over wireline does not apply.
- The Maximum Packet Loss Rate for UL and DL is not forwarded to the wireline access. CHEM feature does not apply.

D.3 Service Operations

D.3.1 Introduction

Service procedures covered in subclause 4.2.1 shall apply.

D.3.2 Npcf_PolicyAuthorization_Create Service Operation

D.3.2.1 General

The procedures specified in subclause 4.2.2 shall apply with the following differences:

- Subscriptions to notifications of Service Data Flow QoS targets are not supported. Subclause 4.2.2.6 does not apply for the traffic of a PDU session over wireline access.
- Invocation of Multimedia Priority Services is not supported. Subclause 4.2.2.12 does not apply for the traffic of a PDU session over wireline access.
- The PEI that may be returned as available user information within the "ueIds" attribute described in subclause 4.2.2.18 shall have one of the following representations:
 - i. When the UE supports only wireline access, the PEI shall be a MAC address.
 - ii. When the UE supports at least one 3GPP access technology, the PEI shall be the allocated IMEI or IMEISV.
- Subscription and notification of PLMN change does not apply for the traffic of a PDU session over wireline access.
- Indication of TSN 5GS Bridge Information does not apply. Subclauses 4.2.2.24, 4.2.2.25 and 4.2.2.31 do not apply.
- The Maximum Packet Loss Rate for UL and DL is not forwarded to the wireline access. Subclause 4.2.2.28, Support of CHEM feature, does not apply for the traffic of a PDU session over wireline access.
- When the AF subscribes to the Access Type Change event, the event is met, and the 5G-RG or FN-RG is connected to the 5GC via wireline access, the reported wireline transmission technology is encoded in the "ratType" attribute, within either the EventsNotification data type or the AdditionalAccessInfo data type, as applicable.

D.3.3 Npcf_PolicyAuthorization_Update Service Operation

D.3.3.1 General

The procedures specified in subclause 4.2.3 shall apply with the following differences:

- Subscriptions to notifications of Service Data Flow QoS targets are not supported. Subclause 4.2.3.6 does not apply for the traffic of a PDU session over wireline access.
- Invocation of Multimedia Priority Services is not supported. Subclause 4.2.3.12 does not apply for the traffic of a PDU session over wireline access.
- Subscription and notification of PLMN change does not apply for the traffic of a PDU session over wireline access.
- Indication of TSN 5GS Bridge Information does not apply. Subclauses 4.2.3.24, and 4.2.3.25 do not apply.
- The Maximum Packet Loss Rate for UL and DL is not forwarded to the wireline access. Subclause 4.2.3.27, Support of CHEM feature, does not apply for the traffic of a PDU session over wireline access.

- When the AF subscribes to the Access Type Change event, the event is met, and the 5G-RG or FN-RG is connected to the 5GC via wireline access, the reported wireline transmission technology is encoded in the "ratType" attribute, within either the EventsNotification data type or the AdditionalAccessInfo data type, as applicable.

D.3.4 Npcf_PolicyAuthorization_Delete Service Operation

D.3.4.1 General

The procedures specified in subclause 4.2.4 shall apply with the following differences:

- When the report of access network information described in subclause 4.2.4.6 includes the user location information, the "n3gaLocation" attribute shall be included in the "ueLoc" attribute and shall encode:
 - a) if the UE connects via W-5GBAN access, the Global Line Identifier in the "gli" attribute; or
 - b) if the UE connects via W-5GCAN access, the HFC Node Identifier in the "hfcNodeId" attribute.
- Reporting RAN/NAS Release Cause over wireline does not apply. Subclause 4.2.4.10 does not apply.

D.3.5 Npcf_PolicyAuthorization_Notify Service Operation

D.3.5.1 General

The procedures specified in subclause 4.2.5 shall apply with the following differences:

- Subscriptions to notifications of Service Data Flow QoS targets are not supported. Subclause 4.2.5.4 does not apply for the traffic of a PDU session over wireline access.
- Invocation of Multimedia Priority Services is not supported. Subclause 4.2.4.5 does not apply for the traffic of a PDU session over wireline access.
- When the report of access network information described in subclause 4.2.5.11 includes the user location information, the "n3gaLocation" attribute shall be included in the "ueLoc" attribute and shall encode:
 - a) if the UE connects via W-5GBAN access, the Global Line Identifier in the "gli" attribute; or
 - b) if the UE connects via W-5GCAN access, the HFC Node Identifier in the "hfcNodeId" attribute.
- Notification of PLMN changes does not apply for the traffic of a PDU session over wireline access.
- Indication of TSN 5GS Bridge Information does not apply. Subclauses 4.2.5.13 and 4.2.5.16 do not apply.
- Reporting RAN/NAS Release Cause over wireline does not apply. Subclauses 4.2.5.5 and 4.2.5.10 do not apply.
- When the 5G-RG or FN-RG connects to the 5GC via W-5GAN, and the Access Type Change event is met, the reported wireline transmission technology is encoded in the "ratType" attribute, within either the EventsNotification data type or the AdditionalAccessInfo data type, as applicable.

D.3.6 Npcf_PolicyAuthorization_Subscribe Service Operation

D.3.6.1 General

The procedures specified in subclause 4.2.6 shall apply with the following differences:

- When the AF subscribes to the Access Type Change event, the event is met, and the 5G-RG or FN-RG is connected to the 5GC via wireline access, the reported wireline transmission technology is encoded in the "ratType" attribute, within either the EventsNotification data type or the AdditionalAccessInfo data type, as applicable.

- Subscription to PLMN change does not apply for the traffic of a PDU session over wireline access.D.3.7
Npcf_PolicyAuthorization_Unsubscribe Service Operation

D.3.7.1 General

The procedures specified in subclause 4.2.7 shall apply.

Annex E (informative): Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Cat	Subject/Comment	New version
2017-10						TS skeleton of Policy Authorization Service specification	0.0.0
2017-03	CT3#92					Inclusion of pCRs agreed during CT3#92	0.1.0
2018-01	CT3#94					Inclusion of documents agreed in CT3#94: C3-180036, C3-180038, C3-180212, C3-180213, C3-180214, C3-180217, C3-180218, C3-180243, C3-180313, C3-180314, C3-180315, C3-180316.	0.2.0
2018-03	CT3#95					Inclusion of documents agreed in CT3#95: C3-181229, C3-181338, C3-181231, C3-181232, C3- 181339, C3-181323	0.3.0
2018-04	CT3#96					Inclusion of documents agreed in CT3#96: C3-182057, C3-182333, C3-182235, C3-182334, C3-182474, C3-182336, C3-182337, C3-182338, C3-182339, C3-182245, C3-182475, C3-182247, C3-182248, C3-182249, C3-182250, C3-182251	0.4.0
2018-06	CT3#97					Inclusion of documents agreed in CT3#97: C3-183220, C3-183222, C3-183230, C3-183233, C3-183234, C3-183239, C3-183281, C3-183300, C3-183301, C3-183517, C3-183518, C3-183520, C3-183521, C3-183522, C3-183523, C3-183524, C3-183525, C3-183526, C3-183577, C3-183579, C3-183580, C3-183581, C3-183582, C3-183583, C3-183584, C3-183585, C3-183586, C3-183587, C3-183588, C3-183589, C3-183590, C3-183591, C3-183592, C3-183820, C3-183821, C3-183822, C3-183879, C3-183882.	0.5.0
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	2	F	DNAI change notification type	15.1.0
2018-09	CT#81	CP-182015	0002	1	F	Definition of FlowStatus data type	15.1.0
2018-09	CT#81	CP-182015	0003	2	F	Temporal validity update	15.1.0
2018-09	CT#81	CP-182015	0004	-	F	Modification of Traffic Routing Information provided at AF session level	15.1.0
2018-09	CT#81	CP-182015	0005	1	F	Missing AF Transaction Identifier	15.1.0
2018-09	CT#81	CP-182015	0006	2	B	Solution to IPv4 overlapping	15.1.0
2018-09	CT#81	CP-182015	0007	2	B	Subscription and notification of resources allocation outcome, data model	15.1.0
2018-09	CT#81	CP-182015	0008	1	B	Subscription to resources allocation outcome, service procedures	15.1.0
2018-09	CT#81	CP-182101	0009	3	B	Notification of resource allocation outcome, service procedures	15.1.0
2018-09	CT#81	CP-182015	0010	2	B	Subscription and notification of out of credit events, data model	15.1.0
2018-09	CT#81	CP-182015	0011	1	B	Subscription to out of credit notification, service procedures	15.1.0
2018-09	CT#81	CP-182015	0012	3	B	Out of credit notification, service procedures	15.1.0
2018-09	CT#81	CP-182015	0013	1	F	References to Data Types defined in 5G Technical Specifications	15.1.0
2018-09	CT#81	CP-182015	0014	1	F	Removal of error UNAUTHORIZED_TRAFFIC_ROUTING_REQUEST	15.1.0
2018-09	CT#81	CP-182015	0015	3	F	OpenAPI corrections	15.1.0
2018-09	CT#81	CP-182015	0016	1	F	Description of Structured data types	15.1.0
2018-08	CT#81	CP-182015	0017	-	F	Correction on TemporalValidity	15.1.0
2018-08	CT#81	CP-182015	0018	2	F	Resource structure presentation	15.1.0
2018-08	CT#81	CP-182015	0019	-	F	Corrections related to Feature negotiation	15.1.0
2018-08	CT#81	CP-182040	0020	1	F	Cardinality of optional arrays and maps	15.1.0
2018-08	CT#81	CP-182015	0021	-	F	Application Error: SUBSCRIPTION_NOT_FOUND	15.1.0
2018-08	CT#81	CP-182015	0022	2	F	Completion and clarification of non-3GPP access location information	15.1.0
2018-08	CT#81	CP-182015	0023	1	B	Support of Priority Services	15.1.0
2018-08	CT#81	CP-182015	0024	3	F	Correction of PRA information	15.1.0
2018-08	CT#81	CP-182015	0025	1	F	Updates in clause 4.2.6.3 to detail session binding	15.1.0
2018-08	CT#81	CP-182100	0026	2	B	Support of content versioning for a media component, service procedures	15.1.0

2018-08	CT#81	CP-182015	0027	-	B	Support of content versioning for a media component, data model	15.1.0
2018-08	CT#81	CP-182103	0028	2	B	Updates of QoS Notification Control description and data model	15.1.0
2018-08	CT#81	CP-182015	0029	2	B	Requested Service Temporarily not authorized	15.1.0
2018-08	CT#81	CP-182102	0030	2	B	Support of notification of content version during service data flow deactivation	15.1.0
2018-08	CT#81	CP-182015	0031	1	F	Transfer of RouteToLocation Data Type to TS 29.571	15.1.0
2018-08	CT#81	CP-182015	0032	2	F	Addition of FlowUsage Information	15.1.0
2018-08	CT#81	CP-182015	0033	-	F	Correction of evsNotif attribute	15.1.0
2018-08	CT#81	CP-182015	0034	1	F	Completing definition of re-used data types	15.1.0
2018-08	CT#81	CP-182015	0035	-	F	Correction of AppSessionContextReqData	15.1.0
2018-08	CT#81	CP-182015	0036	-	F	Correction of evNotif array attribute	15.1.0
2018-08	CT#81	CP-182015	0037	-	F	Removal of Editor's note in subclause 5.6.2.6	15.1.0
2018-08	CT#81	CP-182015	0038	-	F	Corrections on TosTrafficClass data type	15.1.0
2018-12	CT#82	CP-183205	0043		F	Usage of EventsSubscReqData data type	15.2.0
2018-12	CT#82	CP-183205	0044		F	Reference update: RFC 7396	15.2.0
2018-12	CT#82	CP-183205	0045		F	Supported content types	15.2.0
2018-12	CT#82	CP-183205	0046		F	Update of sponsored data connectivity indication	15.2.0
2018-12	CT#82	CP-183205	0047	3	F	Npcf_PolicyAuthorization API Authorization based on OAuth2	15.2.0
2018-12	CT#82	CP-183205	0050	1	F	Removal of references to 3GPP TS 29.508	15.2.0
2018-12	CT#82	CP-183205	0051	1	F	Correction of 404 error	15.2.0
2018-12	CT#82	CP-183205	0052		F	Corrections on Spatial Validity in OpenAPI	15.2.0
2018-12	CT#82	CP-183125	0053	2	F	Corrections on Data Types	15.2.0
2018-12	CT#82	CP-183205	0054	5	F	Adding "nullable" property to OpenAPI definitions of data types	15.2.0
2018-12	CT#82	CP-183205	0055		F	Correction of figure 4.2.4.2-1 to include 204 status code	15.2.0
2018-12	CT#82	CP-183125	0056	1	F	Corrections on OpenAPI file	15.2.0
2018-12	CT#82	CP-183205	0058	1	F	Adding the externalDocs field in the OpenAPI	15.2.0
2018-12	CT#82	CP-183205	0059		F	Default value for apiRoot	15.2.0
2018-12	CT#82	CP-183205	0060	1	F	Incorrect references	15.2.0
2018-12	CT#82	CP-183205	0061	1	F	OpenAPI: HTTP status codes alignment	15.2.0
2018-12	CT#82	CP-183205	0062		F	OpenAPI: usage of the "tags" keyword	15.2.0
2018-12	CT#82	CP-183205	0063		F	Presence conditions in OpenAPI file	15.2.0
2018-12	CT#82	CP-183205	0064		F	Location header field in OpenAPI	15.2.0
2018-12	CT#82	CP-183205	0065		F	Correction of resource URIs	15.2.0
2018-12	CT#82	CP-183205	0066	1	F	New data type for subscriptions to UP Path management events	15.2.0
2018-12	CT#82	CP-183205	0067	2	F	Mandatory traffic routing information for AF influence on traffic routing	15.2.0
2018-12	CT#82	CP-183205	0068		F	Incorrect use of Link data type	15.2.0
2018-12	CT#82	CP-183125	0069	1	F	Corrections on QNC trigger name	15.2.0
2018-12	CT#82	CP-183205	0070	1	F	Miscellaneous Corrections	15.2.0
2018-12	CT#82	CP-183205	0071		F	Removal of SUBSCRIPTION_NOT_FOUND error from service procedures	15.2.0
2018-12	CT#82	CP-183125	0072		F	Update of supported AF events	15.2.0
2019-03	CT#83	CP-190112	0074		F	Add GPSI in N5	15.3.0
2019-03	CT#83	CP-190112	0077	1	F	Miscellaneous corrections	15.3.0
2019-03	CT#83	CP-190112	0078	2	F	Retry-After header definition in OpenAPI	15.3.0
2019-03	CT#83	CP-190112	0079	1	F	OpenAPI Version number update	15.3.0
2019-03	CT#83	CP-190070	0076	1	F	Indication of acceptable service information	16.0.0
2019-03	CT#83	CP-190069	0080	3	F	OpenAPI version update	16.0.0
2019-06	CT#84	CP-191076	0082	1	A	Correction to the encoding of the initial POST request callback URI	16.1.0
2019-06	CT#84	CP-191076	0084		A	Storage of OpenAPI specification file	16.1.0
2019-06	CT#84	CP-191076	0088	2	A	Correction to EthFlowDescriptor data type	16.1.0
2019-06	CT#84	CP-191076	0093	1	A	Precedence of OpenAPI file	16.1.0
2019-06	CT#84	CP-191071	0094	2	B	AF acknowledgement to be expected	16.1.0
2019-06	CT#84	CP-191071	0095	2	B	UE IP address preservation Indication	16.1.0
2019-06	CT#84	CP-191076	0097		A	Missing resPrio attribute	16.1.0
2019-06	CT#84	CP-191076	0101	1	A	Copyright Note in YAML file	16.1.0
2019-06	CT#84	CP-191101	0105	2	F	OpenAPI Version number update	16.1.0

2019-09	CT#85	CP-192155	0109	1	B	Support of "Access Network Charging Correlation Information" notification	16.2.0
2019-09	CT#85	CP-192155	0110	1	B	Support of "Out of credit" notification	16.2.0
2019-09	CT#85	CP-192155	0111		B	Support of the AF charging identifier	16.2.0
2019-09	CT#85	CP-192155	0112		B	Support of "Access Network Information Notification"	16.2.0
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