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Contents

Foreword

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

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1   Scope

The present document specifies the stage 3 protocol and data model for the Nsmf Service Based Interface. It provides stage 3 protocol definitions and message flows, and specifies the API for each service offered by the SMF other than the Session Management Event Exposure service.

The 5G System stage 2 architecture and procedures are specified in 3GPP TS 23.501 [2] and 3GPP TS 23.502 [3].

The Technical Realization of the Service Based Architecture and the Principles and Guidelines for Services Definition are specified in 3GPP TS 29.500 [4] and 3GPP TS 29.501 [5].

The Session Management Event Exposure Service is specified in 3GPP TS 29.508 [6].

2   References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1]   3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2]   3GPP TS 23.501: "System Architecture for the 5G System; Stage 2".

[3]   3GPP TS 23.502: "Procedures for the 5G System; Stage 2".

[4]   3GPP TS 29.500: "5G System; Technical Realization of Service Based Architecture; Stage 3".

[5]   3GPP TS 29.501: "5G System; Principles and Guidelines for Services Definition; Stage 3".

[6]   3GPP TS 29.508: "5G System; Session Management Event Exposure Service; Stage 3".

[7]   3GPP TS 24.501: "Non-Access-Stratum (NAS) protocol for 5G System (5GS); Stage 3".

[8]   3GPP TS 24.007: "Mobile radio interface signalling layer 3; General aspects".

[9]   3GPP TS 38.413: "NG Radio Access Network (NG-RAN); NG Application Protocol (NGAP)".

[10]   IETF RFC 2387: "The MIME Multipart/Related Content-type".

[11]   IETF RFC 8259: "The JavaScript Object Notation (JSON) Data Interchange Format".

[12]   IETF RFC 2045: "Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies".

[13]   3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces; Stage 3".

[14]   IETF RFC 7540: "Hypertext Transfer Protocol Version 2 (HTTP/2)".

[15]   OpenAPI Initiative, "OpenAPI 3.0.0 Specification", https://github.com/OAI/OpenAPI-Specification/blob/master/versions/3.0.0.md

[16]   3GPP TS 29.274: "3GPP Evolved Packet System (EPS); Evolved General Packet Radio Service (GPRS) Tunnelling Protocol for Control plane (GTPv2-C); Stage 3".

[17]   3GPP TS 33.501: "Security architecture and procedures for 5G system".

[18]   IETF RFC 6749: "The OAuth 2.0 Authorization Framework".

[19]   3GPP TS 29.510: "Network Function Repository Services; Stage 3".

[20]   3GPP TS 29.518: "5G System; Access and Mobility Management Service; Stage 3".

[21]   3GPP TS 23.380: "IMS Restoration Procedures".

[22]   3GPP TS 32.422: "Telecommunication management; Subscriber and equipment trace; Trace control and configuration management".

[23]   IETF RFC 7807: "Problem Details for HTTP APIs".

[24]   3GPP TS 23.527: "5G System; Restoration Procedures".

[25]   3GPP TS 32.255: "Charging management; 5G data connectivity domain charging; stage 2".

[26]   3GPP TS 32.291: "Charging management; 5G system, charging service; Stage 3".

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].

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].

DNN	Data Network Name
HR	Home Routed
JSON	Javascript Object NotationNAS Non-Access Stratum
LADN	Local Area Data Network
SM	Session Management
SMF	Session Management Function

4   Overview

4.1   Introduction

Within the 5GC, the SMF offers services to the AMF, other SMF (V-SMF or H-SMF), PCF and NEF via the Nsmf service based interface (see 3GPP TS 23.501 [2] and 3GPP TS 23.502 [3]).

Figure 4.1-1 provides the reference model (in service based interface representation and in reference point representation), with focus on the SMF and the scope of the present specification.
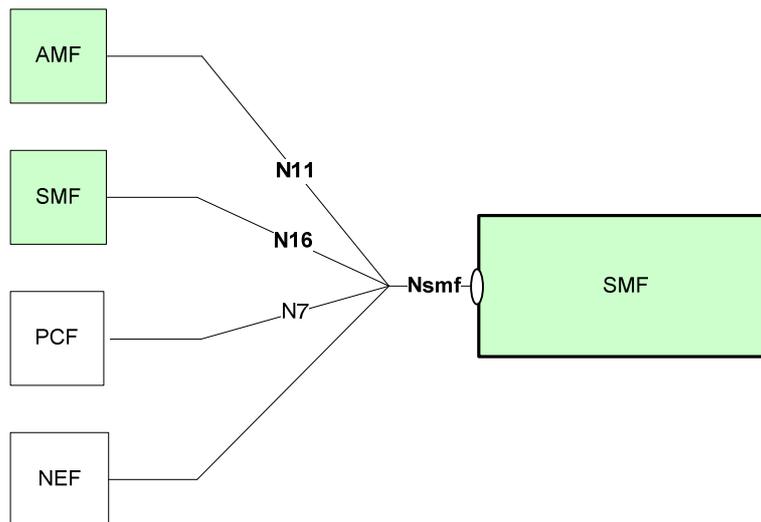
Figure 4.1-1: Reference model – SMF

The functionalities supported by the SMF are listed in subclause 6.2.2 of 3GPP TS 23.501 [2].

5 Services offered by the SMF

5.1 Introduction

The SMF supports the following services.

Table 5.1-1: NF Services provided by SMF

Service Name	Description	Example Consumer
Nsmf_PDUSession	This service manages the PDU sessions and uses the policy and charging rules received from the PCF. The service operations exposed by this NF service allows the consumer NFs to establish, modify and delete the PDU sessions.	V-SMF, H-SMF, AMF
Nsmf_EventExposure	This service exposes the events happening on the PDU sessions to the consumer NFs.	PCF, NEF, AMF

The Nsmf_EventExposure service is specified in 3GPP TS 29.508 [6].

5.2 Nsmf_PDUSession Service

5.2.1 Service Description

The Nsmf_PDUSession service operates on the PDU Sessions. The service operations exposed by this service allow other NFs to establish, modify and release the PDU Sessions. The following are the key functionalities of this NF service:

- Creation, modification and deletion of SM contexts for PDU Sessions upon receiving N1 message notification from AMF carrying the NAS SM messages; an SM context represents an association between the NF Service Consumer (e.g. AMF) and the SMF for a PDU session;

- Retrieval of SM contexts of PDU sessions, e.g. to move PDU sessions towards the EPC using the N26 interface;

- Creation, modification and deletion of PDU sessions between the V-SMF and H-SMF, in HR roaming scenarios;

- Association of policy and charging rules with PDU Sessions and binding the policy and charging rules to flows;

- Interacting with the UPF over N4 for creating, modifying and releasing user plane sessions;

- Process user plane events from the UPF and apply the corresponding policy and charging rules.

The Nsmf_PDUSession service supports the following service operations.

Table 5.2.1-1: Service operations supported by the Nsmf_PDUSession service

Service Operations	Description	Operation Semantics	Example Consumer(s)
Create SM Context	Create an SM context in SMF, or in V-SMF in HR roaming scenarios, for a PDU session.	Request/Response	AMF
Update SM Context	Update the SM context of a PDU session and/or provide the SMF with N1 or N2 SM information received from the UE or from the AN.	Request/Response	AMF
Release SM Context	Release the SM context of a PDU session when the PDU session has been released.	Request/Response	AMF
Notify SM Context Status (see NOTE 1)	Notify the NF Service Consumer about the status of an SM Context of a PDU session (e.g. the SM Context is released within the SMF).	Subscribe/Notify	AMF
Retrieve SM Context (see NOTE 2)	Retrieve an SM context of a PDU session from SMF, or from V-SMF in HR roaming scenarios, for 5GS to EPS mobility.	Request/Response	AMF
Create	Create a PDU session in the H-SMF, in HR roaming scenarios.	Request/Response	V-SMF
Update	Update a PDU session in the H-SMF or V-SMF, in HR roaming scenarios.	Request/Response	V-SMF, H-SMF
Release	Release a PDU session in the H-SMF, in HR roaming scenarios.	Request/Response	V-SMF
Notify Status (see NOTE 3)	Notify the NF Service Consumer about the status of a PDU session (e.g. the PDU session is released due to local reasons within the H-SMF).	Subscribe/Notify	V-SMF
NOTE 1: This corresponds to the SMContextStatusNotify service operation defined in 3GPP TS 23.502 [3]. NOTE 2: This corresponds to the ContextRequest service operation defined in 3GPP TS 23.502 [3]. NOTE 3: This corresponds to the StatusNotify service operation defined in 3GPP TS 23.502 [3].			

5.2.2 Service Operations

5.2.2.1 Introduction

See Table 5.2.1-1 for an overview of the service operations supported by the Nsmf_PDUSession service.

5.2.2.2 Create SM Context service operation

5.2.2.2.1 General

The Create SM Context service operation shall be used to create an individual SM context, for a given PDU session, in the SMF, or in the V-SMF for HR roaming scenarios.

It is used in the following procedures:

- UE requested PDU Session Establishment (see subclause 4.3.2 of 3GPP TS 23.502 [3]);

- EPS to 5GS Idle mode mobility or handover using N26 interface (see subclause 4.11.1 of 3GPP TS 23.502 [3]);

- EPS to 5GS mobility without N26 interface (see subclause 4.11.2.3 3GPP TS 23.502 [3]);

- Handover of a PDU session between 3GPP access and non-3GPP access, when the target AMF does not know the SMF resource identifier of the SM context used by the source AMF, e.g. when the target AMF is not in the PLMN of the N3IWF (see subclause 4.9.2.3.2 of 3GPP TS 23.502 [3]), or when the UE is roaming and the selected N3IWF is in the HPLMN (see subclause 4.9.2.4.2 of 3GPP TS 23.502 [3]);

- Handover from EPS to 5GC-N3IWF (see subclause 4.11.3.1 of 3GPP TS 23.502 [3]);

- Handover from EPC/ePDG to 5GS (see subclause 4.11.4.1 of 3GPP TS 23.502 [3]).

There shall be only one individual SM context per PDU session.

The NF Service Consumer (e.g. AMF) shall create an SM context by using the HTTP POST method as shown in Figure 5.2.2.2.1-1.
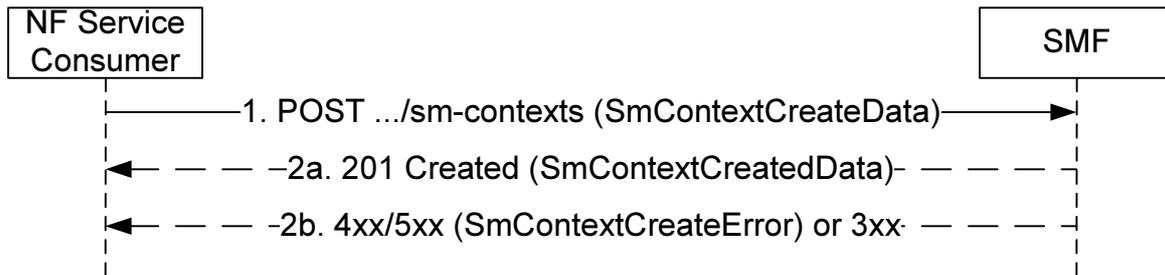
Figure 5.2.2.2.1-1: SM context creation

1. The NF Service Consumer shall send a POST request to the resource representing the SM contexts collection resource of the SMF. The payload body of the POST request shall contain:

   - a representation of the individual SM context resource to be created;

   - the Request Type IE, if it is received from the UE and if the request refers to an existing PDU session or an existing Emergency PDU session; the Request Type IE may be included otherwise;

   - the Old PDU Session ID, if it is received from the UE (i.e. for a PDU session establishment for the SSC mode 3 operation);

   - the indication that the UE is inside or outside of the LADN (Local Area Data Network) service area, if the DNN corresponds to a LADN;

   - a subscription for SM context status notification;

   - the servingNfId identifying the serving AMF;

   - trace control and configuration parameters, if trace is to be activated (see 3GPP TS 32.422 [22]).

   For the UE requested PDU Session Establishment procedure in home routed roaming scenario (see subclause 4.3.2.2.2 of 3GPP TS 23.502 [3]), the NF Service Consumer shall provide the URI of the Nsmf_PDUSession service of the H-SMF in the hSmfUri IE and may provide the URI of the Nsmf_PDUSession service of additional H-SMFs. The V-SMF shall try to create the PDU session using the hSmfUri IE. If due to communication failure on the N16 interface the V-SMF does not receive any response from the H-SMF, then:

   - depending on operator policy, the V-SMF may try reaching the hSmfUri via an alternate path; or

   - if additional H-SMF URI is provided, the V-SMF may try to create the PDU session on one of the additional H-SMF(s) provided.

   The payload body of the POST request may further contain:

   - the name of the AMF service to which SM context status notification are to be sent (see subclause 6.5.2.2 of 3GPP TS 29.500 [4]), encoded in the serviceName attribute.

2a. On success, "201 Created" shall be returned, the payload body of the POST response shall contain the representation describing the status of the request and the "Location" header shall be present and shall contain the URI of the created resource. The authority and/or deployment-specific string of the apiRoot of the created

resource URI may differ from the authority and/or deployment-specific string of the apiRoot of the request URI received in the POST request.

If the Request Type was received in the request and set to EXISTING_PDU_SESSION or EXISTING_EMERGENCY_PDU_SESSION (i.e. indicating that this is a request for an existing PDU session or an existing emergency PDU session), the SMF shall identify the existing PDU session or emergency PDU session based on the PDU Session ID; in this case, the SMF shall not create a new SM context but instead update the existing SM context and provide the representation of the updated SM context in the "201 Created" response to the NF Service Consumer.

The POST request shall be considered as colliding with an existing SM context if:

- it includes the same SUPI, or PEI for an emergency registered UE without a UICC or without an authenticated SUPI, and the same PDU Session ID as for an existing SM context; and

- this is a request to establish a new PDU session, i.e. the RequestType is absent in the request or is present and set to INITIAL_REQUEST or INITIAL_EMERGENCY_REQUEST.

A POST request that collides with an existing SM context shall be treated as a request for a new SM context. Before creating the new SM context, the SMF should delete the existing SM context locally and any associated resources in the UPF and PCF. If the smContextStatusUri of the existing SM context differs from the smContextStatusUri received in the POST request, the SMF shall also send an SM context status notification (see subclause 5.2.2.5) targeting the smContextStatusUri of the existing SM context to notify the release of the existing SM context. For a HR PDU session, if the H-SMF URI in the request is different from the H-SMF URI of the existing PDU session, the V-SMF should also delete the existing PDU session in the H-SMF by invoking the Release service operation (see subclause 5.2.2.9).

If the Request Type was received in the request and indicates this is a request for a new PDU session (i.e. INITIAL_REQUEST) and if the Old PDU Session ID was also included in the request, the SMF shall identify the existing PDU session to release and to which the new PDU session establishment relates, based on the Old PDU Session ID.

2b. If the request does not include the "UE presence in LADN service area" indication and the SMF determines that the DNN corresponds to a LADN, then the SMF shall consider that the UE is outside of the LADN service area. The SMF shall reject the request if the UE is outside of the LADN service area.

On failure, or redirection during a UE requested PDU Session Establishment, one of the HTTP status code listed in Table 6.1.3.2.3.1-3 shall be returned. For a 4xx/5xx response, the message body shall contain an SmContextCreateError structure, including:

- a ProblemDetails structure with the "cause" attribute set to one of the application error listed in Table 6.1.3.2.3.1-3;

- N1 SM information (PDU Session Reject), if the request included N1 SM information, except if the error prevents the SMF from generating a response to the UE (e.g. invalid request format).

5.2.2.2.2 EPS to 5GS Idle mode mobility using N26 interface

The NF Service Consumer (e.g. AMF) shall request the SMF to move a UE EPS PDN connection to 5GS using N26 interface, as follows.
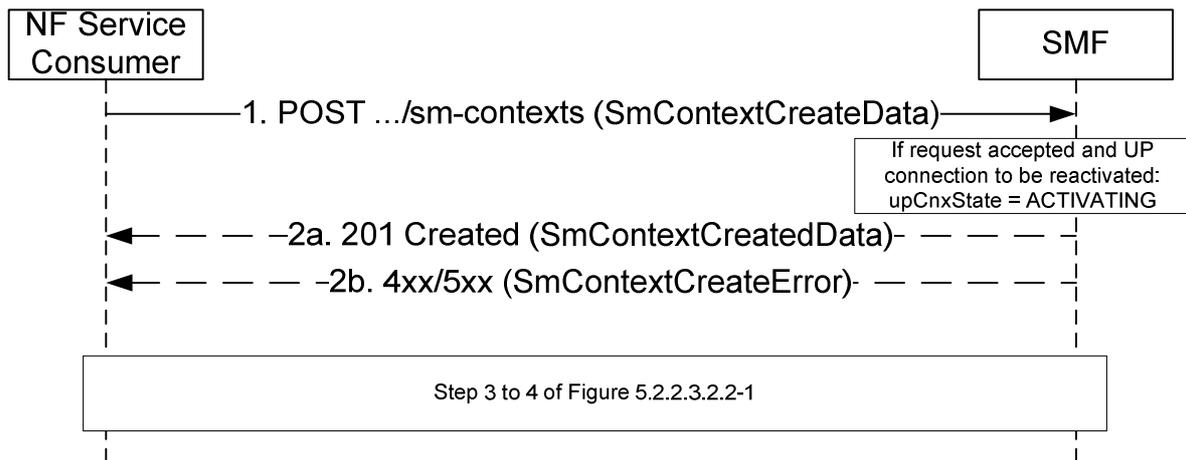
Figure 5.2.2.2.2-1: EPS to 5GS Idle mode mobility using N26 interface

1. The NF Service Consumer shall send a POST request towards the SMF (+PGW-C) of each UE EPS PDN connection, as specified in subclause 5.2.2.2.1, with the following additional information:

   - UE EPS PDN connection, including the EPS bearer contexts, received from the MME, representing the individual SM context resource to be created;

   - pduSessionsActivateList, including the PDU Session ID of all the PDU session(s) to be re-activated.

2a. Upon receipt of such a request, if a corresponding PDU session is found based on the EPS bearer contexts (after invoking a Create service operation towards the H-SMF, for a Home Routed PDU session) and if it is possible to proceed with moving the PDN connection to 5GS, the SMF shall return a 201 Created response including the following information:

   - PDU Session ID corresponding to the default EPS bearer ID of the EPS PDN connection;

   - allocatedEbiList, containing the EBI(s) allocated to the PDU session;

   and, if the PDU session that is derived by the SMF based on the EPS bearer contexts was requested to be re-activated, i.e. if the PDU Session ID was present in the pduSessionsActivateList:

   - upCnxState attribute set to ACTIVATING;

   - N2 SM information to request the 5G-AN to assign resources to the PDU session (see PDU Session Resource Setup Request Transfer IE in subclause 9.3.4.1 of 3GPP TS 38.413 [9]), including (among others) the transport layer address and tunnel endpoint of the uplink termination point for the user plane data for this PDU session (i.e. UPF's GTP-U F-TEID for uplink traffic).

   The "Location" header shall be present in the POST response and shall contain the URI of the created SM context resource.

   The NF Service Consumer (e.g. AMF) shall store the association of the PDU Session ID and the SMF ID, and store the allocated EBI(s) associated to the PDU Session ID.

   NOTE: The behaviour specified in this step also applies if the POST request collides with an existing SM context, i.e. if the POST request includes the same SUPI, or PEI for an emergency registered UE without a UICC or without an authenticated SUPI, and the default EPS bearer ID received in the UE EPS PDN connection is the same as in the existing SM context.

2b. Same as step 2b of figure 5.2.2.2.1-1. Steps 3 to 4 are skipped in this case.

   If the SMF determines that seamless session continuity from EPS to 5GS is not supported for the PDU session, the SMF shall set the "cause" attribute in the ProblemDetails structure to "NO_EPS_5GS_CONTINUITY".

3. Same as step 3 of figure 5.2.2.3.2.2-1, if the SMF returned a 201 Created response with the upConnectionState set to ACTIVATING and N2 SM Information,

4. Same as step 4 of figure 5.2.2.3.2.2-1.

5.2.2.2.3 EPS to 5GS Handover Preparation using N26 interface

The NF Service Consumer (e.g. AMF) shall request the SMF to handover a UE EPS PDN connection to 5GS using N26 interface, as follows.
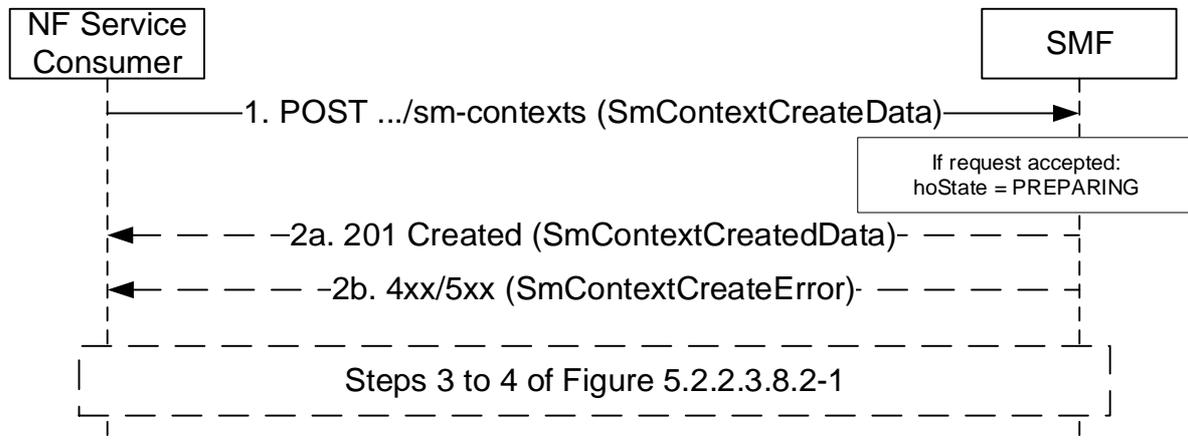
Figure 5.2.2.2.3-1: EPS to 5GS handover using N26 interface

1. The NF Service Consumer shall send a POST request, as specified in subclause 5.2.2.2.1, with the following additional information:

   - UE EPS PDN connection, including the EPS bearer contexts, representing the individual SM context resource to be created;

   - hoState attribute set to PREPARING (see subclause 5.2.2.3.4.1);

   - targetId identifying the target RAN Node ID and TAI received in the Forward Relocation Request from the source MME.

2a. Upon receipt of such a request, if a corresponding PDU session is found based on the EPS bearer contexts (after invoking a Create service operation towards the H-SMF, for a Home Routed PDU session) and it is possible to proceed with handing over the PDN connection to 5GS, the SMF shall return a 201 Created response including the following information:

   - hoState attribute set to PREPARING and N2 SM information to request the target 5G-AN to assign resources to the PDU session, as specified in step 2 of Figure 5.2.2.3.4.2-1;

   - PDU Session ID corresponding to the default EPS bearer ID of the EPS PDN connection;

   - allocatedEbiList, containing the EBI(s) allocated to the PDU session.

   The "Location" header shall be present in the POST response and shall contain the URI of the created SM context resource.

   The NF Service Consumer (e.g. AMF) shall store the association of the PDU Session ID and the SMF ID, and store the allocated EBI(s) associated to the PDU Session ID.

   NOTE: The behaviour specified in this step also applies if the POST request collides with an existing SM context, i.e. if the POST request includes the same SUPI, or PEI for an emergency registered UE without a UICC or without an authenticated SUPI, and the default EPS bearer ID received in the UE EPS PDN connection is the same as in the existing SM context.

2b. Same as step 2b of figure 5.2.2.2.1-1 with the following additions. Steps 3 to 4' are skipped in this case.

   The error response shall include the following additional information:

   - hoState attribute set to NONE.

   If the SMF determines that seamless session continuity from EPS to 5GS is not supported for the PDU session, the SMF shall set the "cause" attribute in the ProblemDetails structure to "NO_EPS_5GS_CONTINUITY".

5.2.2.3 Update SM Context service operation

5.2.2.3.1 General

The Update SM Context service operation shall be used to update an individual SM context and/or provide N1 or N2 SM information received from the UE or the AN, for a given PDU session, towards the SMF, or the V-SMF for HR roaming scenarios.

It is used in the following procedures:

- PDU Session modification (see subclause 4.3.3 of 3GPP TS 23.502 [3]);

- UE or network requested PDU session release (see subclause 4.3.4.2 and subclause 4.3.4.3 of 3GPP TS 23.502 [3]);

- Activation or Deactivation of the User Plane connection of an existing PDU session, i.e. establishment or release of the N3 tunnel between the AN and serving CN (see subclause 5.6.8 of 3GPP TS 23.501 [2] and subclauses 4.2.2.2, 4.2.3 and 4.2.6 of 3GPP TS 23.502 [3]);

- Xn and N2 Handover procedures (see subclauses 4.9.1 of 3GPP TS 23.502 [3]);

- Handover between 3GPP and untrusted non-3GPP access procedures (see subclause 4.9.2 of 3GPP TS 23.502 [3]);

- Inter-AMF change due to AMF planned maintenance or AMF failure (see subclause 5.21.2 of 3GPP TS 23.501 [2]), or inter-AMF mobility in CM-IDLE mode (see subclause 4.2.2.2 of 3GPP TS 23.502 [3]);

- RAN Initiated QoS Flow Mobility (see subclause 4.14.1 of 3GPP TS 23.502 [3] and subclause 8.2.5 of 3GPP TS 38.413 [9]);

- All procedures requiring to provide N1 or N2 SM information to the SMF, e.g. UE requested PDU Session Establishment procedure (see subclause 4.3.2.2 of 3GPP TS 23.502 [3]), session continuity procedure (see subclause 4.3.5 of 3GPP TS 23.502 [3]);

- EPS to 5GS Idle mode mobility or handover using N26 interface (see subclause 4.11 of 3GPP TS 23.502 [3]);

- 5GS to EPS Handover using N26 interface (see subclause 4.11.1.2 of 3GPP TS 23.502 [3]);

- PDU Session Reactivation during P-CSCF Restoration procedure via AMF (see subclause 5.8.4.3 of 3GPP TS 23.380 [21]);

- AMF requested PDU session release due to a change of the set of network slices for a UE where a network slice instance is no longer available (see subclause 4.3.4.2 of 3GPP TS 23.502 [3]);

- AMF receives an "initial request" with PDU Session Id which already exists in PDU session context of the UE (see subclause 5.4.5.2.5 of 3GPP TS 24.501 [7]);

- Secondary RAT Usage Data Reporting (see subclause 4.21 of 3GPP TS 23.502 [3]).

The NF Service Consumer (e.g. AMF) shall update an individual SM context and/or provide N1 or N2 SM information to the SMF by using the HTTP POST method (modify custom operation) as shown in Figure 5.2.2.3.1-1.
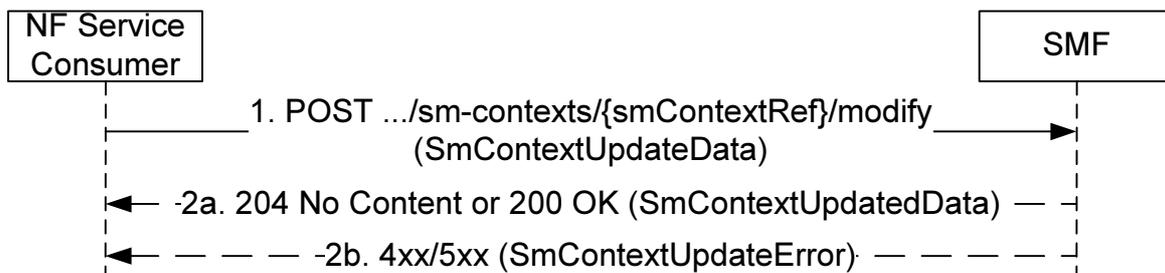
Figure 5.2.2.3.1-1: SM context update

1. The NF Service Consumer shall send a POST request to the resource representing the individual SM context resource in the SMF. The payload body of the POST request shall contain the modification instructions and/or the N1 or N2 SM information. If the request contains EBI(s) to revoke, then the SMF shall disassociate the EBI(s) with the QFI(s) with which they are associated.

2a. On success, "204 No Content" or "200 OK" shall be returned; in the latter case, the payload body of the POST response shall contain the representation describing the status of the request and/or N1 or N2 SM information.

   The SMF may indicate to the NF Service Consumer that it shall release EBI(s) that were assigned to the PDU session by including the releaseEbiList IE, e.g. when a QoS flow is released.

2b. On failure, one of the HTTP status code listed in Table 6.1.3.3.3.2-3 shall be returned. For a 4xx/5xx response, the message body shall contain an SmContextUpdateError structure, including:

   - a ProblemDetails structure with the "cause" attribute set to one of the application error listed in Table 6.1.3.3.3.2-3;

   - N1 SM information, if the SMF needs and can return a response to the UE;

   - N2 SM information, if the SMF needs and can return a response to the NG-RAN.

The following subclauses specify additional requirements applicable to specific scenarios.

5.2.2.3.2 Activation and Deactivation of the User Plane connection of a PDU session

5.2.2.3.2.1 General

The upCnxState attribute of an SM context represents the state of the User Plane connection of the PDU session. The upCnxState attribute may take the following values:

   - ACTIVATED: a N3 tunnel is established between the 5G-AN and UPF (F-TEIDs assigned for both uplink and downlink traffic);

   - DEACTIVATED: no N3 tunnel is established between the 5G-AN and UPF;

   - ACTIVATING: a N3 tunnel is being established (5G-AN's F-TEID for downlink traffic is not assigned yet).

Subclauses 5.2.2.3.2.2 and 5.2.2.3.2.3 specify how the NF Service Consumer (e.g. AMF) request the SMF to activate or deactivate the User Plane connection of the PDU session, e.g. upon receiving a Service Request from the UE requesting to activate a PDU session or upon an AN release procedure respectively.

In scenarios where the SMF takes the initiative to activate or deactivate the User Plane connection of the PDU session, e.g. during a Network Triggered Service Request or CN-initiated selective deactivation of the User Plane connection of a PDU session respectively, the SMF invokes the Namf_N1N2MessageTransfer procedure with the inclusion of N2 SM Information (and optionally of a N1 SM Container) as specified in 3GPP TS 23.502 [3] to request the establishment or release of the PDU session's resources in the 5G-AN. The Update SM Context service operation is then used as specified in subclause 5.2.2.3.1 to transfer the response to the SMF.

Subclause 5.2.2.3.2.4 specifies how the NF Service Consumer (e.g. AMF) indicates to the SMF that the access type of a PDU session can be changed from non-3GPP access to 3GPP access, during a Network Triggered Service Request initiated for a PDU session associated to the non-3GPP access, if the PDU Session for which the UE was paged or notified is in the List Of Allowed PDU Sessions provided by the UE and if the AMF has received N2 SM Information only or N1 SM Container and N2 SM Information for that PDU session from the SMF in step 3a of subclause 4.2.3.3 of 3GPP TS 23.502 [3].

5.2.2.3.2.2 Activation of User Plane connectivity of a PDU session

The NF Service Consumer (e.g. AMF) shall request the SMF to activate the User Plane connection of an existing PDU session, i.e. establish the N3 tunnel between the 5G-AN and UPF, as follows.
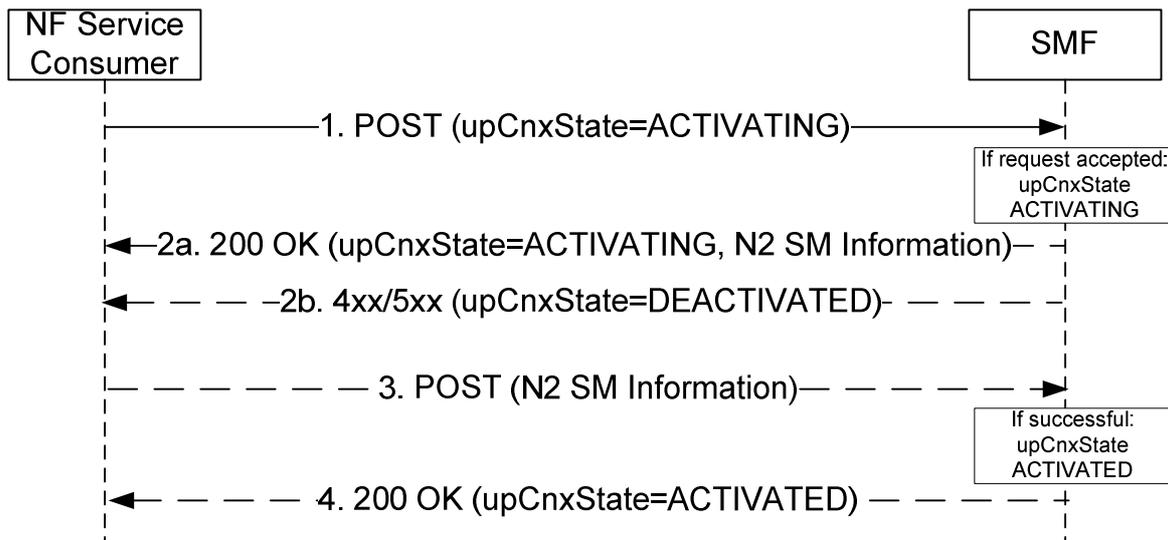
Figure 5.2.2.3.2.2-1: Activation of the User Plane connection of a PDU session

1. The NF Service Consumer shall request the SMF to activate the user plane connection of the PDU session by sending a POST request, as specified in subclause 5.2.2.3.1, with the following information:

   - the upCnxState attribute set to ACTIVATING;

   - the user location and access type associated to the PDU session, if modified;

   - the indication that the UE is inside or outside of the LADN service area, if the DNN of the established PDU session corresponds to a LADN;

   - other information, if necessary.

2a. Upon receipt of such a request, if the SMF can proceed with activating the user plane connection of the PDU session (see subclause 4.2.3 of 3GPP TS 23.501 [2], the SMF shall set the upCnxState attribute to ACTIVATING and shall return a 200 OK response including the following information:

   - upCnxState attribute set to ACTIVATING;

   - N2 SM information to request the 5G-AN to assign resources to the PDU session (see PDU Session Resource Setup Request Transfer IE in subclause 9.3.4.1 of 3GPP TS 38.413 [9]), including the transport layer address and tunnel endpoint of the uplink termination point for the user plane data for this PDU session (i.e. UPF's GTP-U F-TEID for uplink traffic).

   If the SMF finds the PDU session already activated when receiving the request in step 1, the SMF shall delete the N3 tunnel information and update the UPF accordingly (see step 8a of subclause 4.2.3.2 of 3GPP TS 23.502 [3]).

2b. If the request does not include the "UE presence in LADN service area" indication and the SMF determines that the DNN corresponds to a LADN, then the SMF shall consider that the UE is outside of the LADN service area. The SMF shall reject the request if the UE is outside of the LADN service area.

   If the SMF cannot proceed with activating the user plane connection of the PDU session (e.g. if the PDU session corresponds to a PDU session of SSC mode 2 and the SMF decides to change the PDU Session Anchor), the SMF shall return an error response, as specified for step 2b of figure 5.2.2.3.1-1. For a 4xx/5xx response, the SmContextUpdateError structure shall include the following additional information:

   - upCnxState attribute set to DEACTIVATED.

3. If the SMF returned a 200 OK response, the NF Service Consumer (e.g. AMF) shall subsequently update the SM context in the SMF by sending POST request, as specified in subclause 5.2.2.3.1, with the following information:

   - N2 SM information received from the 5G-AN (see PDU Session Resource Setup Response Transfer IE in subclause 9.3.4.2 of 3GPP TS 38.413 [9]), including the transport layer address and tunnel endpoint of one or

two downlink termination point(s) and the associated list of QoS flows for this PDU session (i.e. 5G-AN's GTP-U F-TEID(s) for downlink traffic), if the 5G-AN succeeded in establishing resources for the PDU sessions; or

- N2 SM information received from the 5G-AN (see PDU Session Resource Setup Unsuccessful Transfer IE in subclause 9.3.4.16 of 3GPP TS 38.413 [9]), including the Cause of the failure, if resources failed to be established for the PDU session.

Upon receipt of this request, the SMF shall:

- update the UPF with the 5G-AN's F-TEID(s) and set the upCnxState attribute to ACTIVATED, if the 5G-AN succeeded in establishing resources for the PDU sessions; or

- consider that the activation of the User Plane connection has failed and set the upCnxState attribute to DEACTIVATED" otherwise.

4. The SMF shall then return a 200 OK response including the upCnxState attribute representing the final state of the user plane connection. If the activation of the User Plane connection failed due to insufficient resources, the cause IE shall be included in the response and set to "INSUFFICIENT_UP_RESOURCES".

5.2.2.3.2.3 Deactivation of User Plane connectivity of a PDU session

The NF Service Consumer (e.g. AMF) shall request the SMF to deactivate the User Plane connectivity of an existing PDU session, i.e. release the N3 tunnel, as follows.
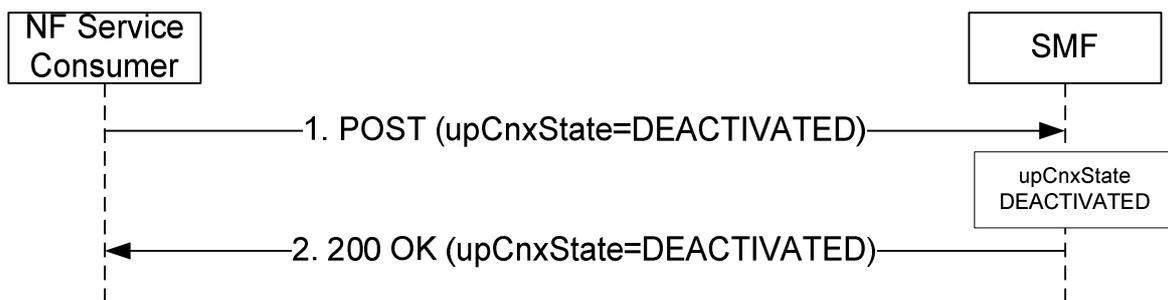
Figure 5.2.2.3.2.2-1: Deactivation of the User Plane connection of a PDU session

1. The NF Service Consumer shall request the SMF to deactivate the user plane connection of the PDU session by sending a POST request, as specified in subclause 5.2.2.3.1, with the following information:

- upCnxState attribute set to DEACTIVATED;

- user location and user location timestamp;

- cause of the user plane deactivation; the cause may indicate a cause received from the 5G-AN or due to an AMF internal event;

- other information, if necessary.

2. Upon receipt of such a request, the SMF shall deactivate release the N3 tunnel of the PDU session, set the upCnxState attribute to DEACTIVATED and return a 200 OK response including the upCnxState attribute set to DEACTIVATED.

5.2.2.3.2.4 Changing the access type of a PDU session from non-3GPP access to 3GPP access during a Service Request procedure

The NF Service Consumer (e.g. AMF) shall indicate to the SMF that the access type of a PDU session can be changed as follows:
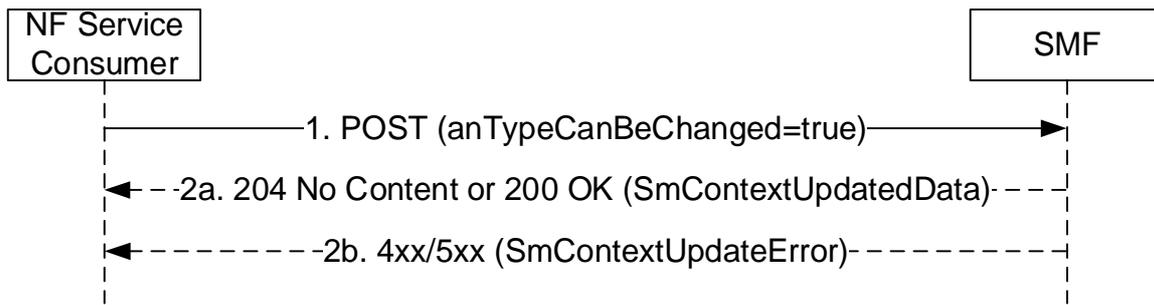
Figure 5.2.2.3.2.4-1: Indicating that the access type of a PDU session can be changed

1.　The NF Service Consumer shall indicate that the access type of a PDU session can be changed by sending a POST request, as specified in subclause 5.2.2.3.1, with the following information:

-　anTypeCanBeChanged attribute set to "true";

-　other information, if necessary.

2a.　Same as step 2a of figure 5.2.2.3.1-1.

2b.　Same as step 2b of figure 5.2.2.3.1-1.

NOTE:　　This is used during a Service Request procedure (see subclause 4.2.3.2 of 3GPP TS 23.502 [3]), in response to paging or NAS notification indicating non-3GPP access, if the PDU Session for which the UE was paged or notified is in the List Of Allowed PDU Sessions provided by the UE and if the AMF has received N2 SM Information only or N1 SM Container and N2 SM Information for that PDU session from the SMF in step 3a of subclause 4.2.3.3 of 3GPP TS 23.502 [3].

If the PDU Session is moved from the non-3GPP access to 3GPP access (i.e. N3 tunnel for the PDU Session is established successfully), the SMF and NF Service Consumer (e.g. AMF) updates the associated access of the PDU Session.

5.2.2.3.3　　　　Xn Handover

The NF Service Consumer (e.g. AMF) shall request the SMF to switch the downlink N3 tunnel of the PDU session towards a new GTP tunnel endpoint as follows.
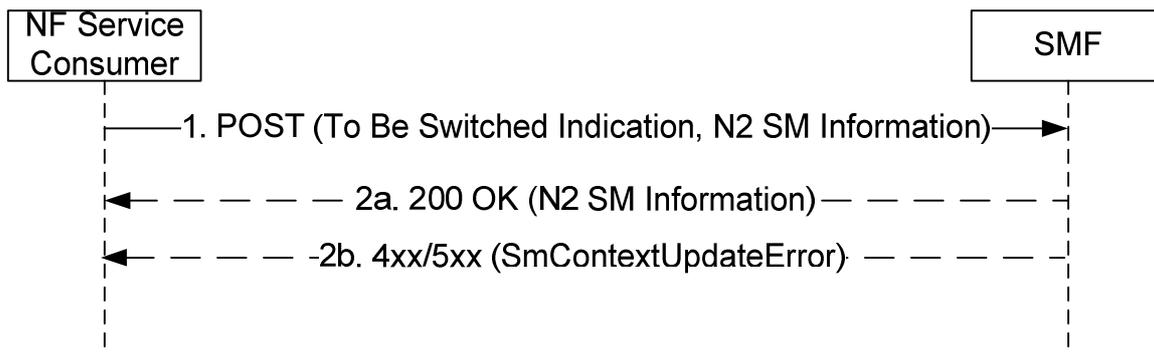
Figure 5.2.2.3.3-1: Xn handover

1.　The NF Service Consumer shall request the SMF to switch the downlink N3 tunnel of the PDU session towards a new GTP tunnel endpoint by sending a POST request, as specified in subclause 5.2.2.3.1, with the following information:

-　the indication that the PDU session is to be switched;

-　N2 SM information received from the target 5G-AN (see Path Switch Request Transfer IE in subclause 9.3.4.8 of 3GPP TS 38.413 [9]), including the new transport layer address and tunnel endpoint of the downlink termination point for the user data for this PDU session (i.e. 5G-AN's GTP-U F-TEID for downlink traffic);

- additional N2 SM information received from the source 5G-AN (see Secondary RAT Usage Report Transfer IE in subclause 9.3.4.x of 3GPP TS 38.413 [9]), if any;

- the user location associated to the PDU session;

- the indication that the UE is inside or outside of the LADN service area, if the DNN of the established PDU session corresponds to a LADN;

- other information, if necessary.

2a. If the SMF can proceed with switching the user plane connection of the PDU session, the SMF shall return a 200 OK response including the following information:

- N2 SM information (see Path Switch Request Acknowledge Transfer IE in subclause 9.3.4.9 of 3GPP TS 38.413 [9]), including the transport layer address and tunnel endpoint of the uplink termination point for the user data for this PDU session (i.e. UPF's GTP-U F-TEID for uplink traffic).

If the request does not include the "UE presence in LADN service area" indication and the SMF determines that the DNN corresponds to a LADN, then the SMF shall consider that the UE is outside of the LADN service area. The SMF shall proceed as specified in subclause 5.6.5 of 3GPP TS 23.501 [2].

2b. If the SMF cannot proceed with switching the user plane connection of the PDU session, the SMF shall return an error response, as specified for step 2b of figure 5.2.2.3.1-1, including:

- N2 SM information (see Path Switch Request Unsuccessul Transfer IE in subclause 9.3.4.20 of 3GPP TS 38.413 [9]), including the cause of the failure.

For a PDU session that is rejected by the target RAN (i.e. a PDU session indicated as failed to setup in the PATH SWITCH REQUEST), the NF Service Consumer (e.g. AMF) shall indicate the failure to setup the PDU session in the target RAN as follows.
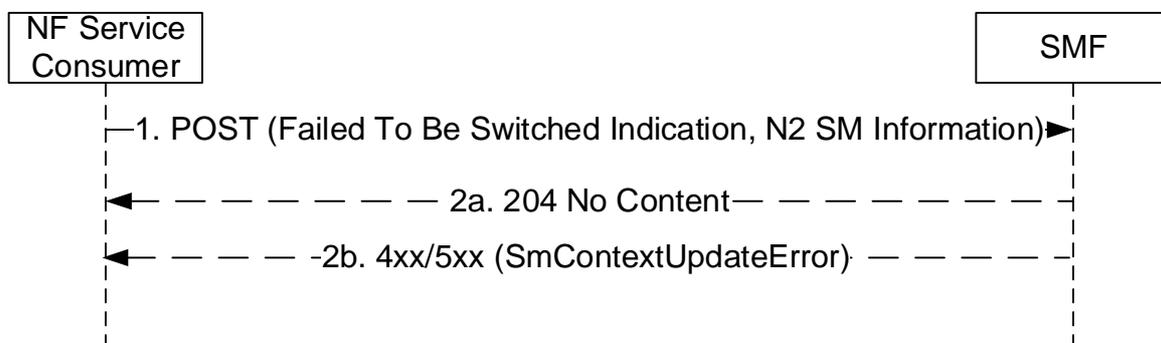
Figure 5.2.2.3.3-2: Xn handover – PDU session rejected by the target RAN

1. The NF Service Consumer shall indicate to the SMF that the PDU session could not be setup in the target RAN by sending a POST request, as specified in subclause 5.2.2.3.1, with the following information:

- the indication that the PDU session failed to be switched;

- N2 SM information received from the target 5G-AN (see Path Switch Request Setup Failed Transfer IE in subclause 9.3.4.15 of 3GPP TS 38.413 [9]), including the cause why the session could not be setup;

- additional N2 SM information received from the source 5G-AN (see Secondary RAT Usage Report Transfer IE in subclause 9.3.4.x of 3GPP TS 38.413 [9]), if any;

- other information, if necessary.

2a. Upon receipt of such a request, the SMF shall return a "204 No Content" response. The SMF shall decide whether to release the PDU session or deactivate the user plane connection of the PDU session, as specified in subclause 4.9.1.2 of 3GPP TS 23.502 [3].

2b. Same as step 2b of figure 5.2.2.3.1-1.

5.2.2.3.4 N2 Handover

5.2.2.3.4.1 General

The hoState attribute of an SM context represents the handover state of the PDU session. The hoState attribute may take the following values:

- NONE: no handover is in progress for the PDU session;

- PREPARING: a handover is in preparation for the PDU session; SMF is preparing the N3 tunnel between the target 5G-AN and UPF, i.e. the UPF's F-TEID is assigned for uplink traffic;

- PREPARED: a handover is prepared for the PDU session; SMF is updated for the N3 tunnel between the target 5G-AN and UPF, with the target 5G-AN's F-TEID to be assigned for downlink traffic upon handover execution;

- COMPLETED: the handover is completed (successfully);

- CANCELLED: the handover is cancelled.

5.2.2.3.4.2 N2 Handover Preparation

The NF Service Consumer (e.g. AMF) shall request the SMF to prepare the handover of an existing PDU session, i.e. prepare the N3 tunnel between the target 5G-AN and UPF, as follows.
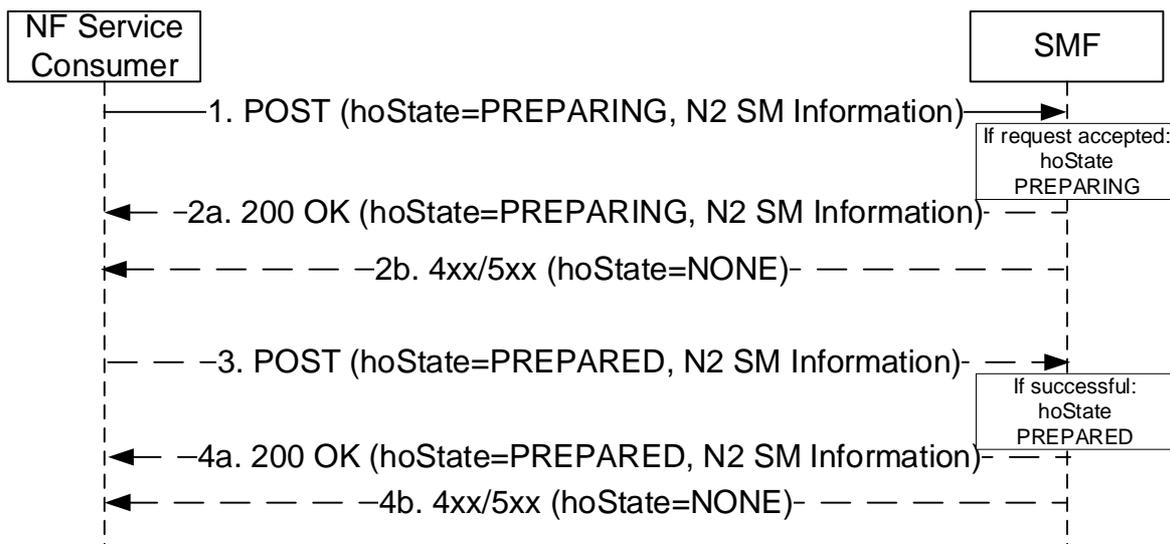
Figure 5.2.2.3.4.2-1: N2 Handover Preparation

1. The NF Service Consumer shall request the SMF to prepare the handover of the PDU session by sending a POST request, as specified in subclause 5.2.2.3.1, with the following information:

    - updating the hoState attribute of the individual SM Context resource in the SMF to PREPARING;

    - targetId identifying the target RAN Node ID and TAI received in the Handover Required from the source NG-RAN;

    - targetServingNfId set to the target AMF Id, for a N2 handover with AMF change;

    - N2 SM information received from the source NG-RAN (see Handover Required Transfer IE in subclause 9.3.4.14 of 3GPP TS 38.413 [9]), indicating whether a direct path is available.

    - other information, if necessary.

2a. Upon receipt of such a request, if the SMF can proceed with preparing the handover of the PDU session (see subclause 4.9.1.3 of 3GPP TS 23.501 [2]), the SMF shall set the hoState attribute to PREPARING and shall return a 200 OK response including the following information:

- hoState attribute set to PREPARING;

- N2 SM information to request the target 5G-AN to assign resources to the PDU session (see PDU Session Resource Setup Request Transfer IE in subclause 9.3.4.1 of 3GPP TS 38.413 [9]), including (among others) the transport layer address and tunnel endpoint of the uplink termination point for the user plane data for this PDU session (i.e. UPF's GTP-U F-TEID for uplink traffic).

The SMF shall store the targetServingNfId, if received in the request, but the SMF shall still consider the AMF (previously) received in the servingNfId IE as the serving AMF for the UE.

2b. If the SMF cannot proceed with preparing the handover of the PDU session (e.g. the UE moves into a non-allowed service area), the SMF shall return an error response, as specified in step 2b of figure 5.2.2.3.1-1. For a 4xx/5xx response, the SmContextUpdateError structure shall include the following additional information:

- hoState attribute set to NONE.

3. If the SMF returned a 200 OK response, the NF Service Consumer (e.g. AMF) shall subsequently update the SM context in the SMF by sending POST request, as specified in subclause 5.2.2.3.1, with the following information:

- hoState attribute set to PREPARED;

- N2 SM information received from the target 5G-AN (see Handover Request Acknowledge Transfer IE in subclause 9.3.4.11 of 3GPP TS 38.413 [9]), including (among others) the transport layer address and tunnel endpoint of the downlink termination point for the user data for this PDU session (i.e. target 5G-AN's GTP-U F-TEID for downlink traffic), if the target 5G-AN succeeded in establishing resources for the PDU session;

- N2 SM information received from the target 5G-AN (see Handover Resource Allocation Unsuccessful Transfer IE in subclause 9.3.4.19 of 3GPP TS 38.413 [9]), including the Cause of the failure, if resources failed to be established for the PDU sessions.

4a. If the target 5G-AN succeeded in establishing resources for the PDU sessions, the SMF shall set the hoState attribute to PREPARED and return a 200 OK response including the following information:

- hoState attribute to PREPARED;

- N2 SM information (see Handover Command Transfer IE in subclause 9.3.4.10 of 3GPP TS 38.413 [9]) containing DL forwarding tunnel information to be sent to the source 5G-AN by the AMF if direct or indirect data forwarding applies (see step 11f of subclause 4.9.1.3.2 of 3GPP TS 23.502 [3]).

4b. If the SMF cannot proceed with preparing the handover of the PDU session (e.g. the target 5G-AN failed to establish resources for the PDU session), the SMF shall set the hoState to NONE, release resources reserved for the handover to the target 5G-AN, and return an error response as specified in step 2b of figure 5.2.2.3.1-1. For a 4xx/5xx response, the SmContextUpdateError structure shall include the following additional information:

- hoState attribute set to NONE;

- N2 SM information (see Handover Preparation Unsuccessful Transfer IE in subclause 9.3.4.18 of 3GPP TS 38.413 [9]) indicating the cause of the failure;

- the cause in the error attribute set to HANDOVER_RESOURCE_ALLOCATION_FAILURE, if the target 5G-AN failed to establish resources for the PDU session.

5.2.2.3.4.3 N2 Handover Execution

The NF Service Consumer (e.g. AMF) shall request the SMF to complete the execution the handover of an existing PDU session, upon being notified by the target 5G-AN that the handover to the target 5G-AN has been successful, as follows.
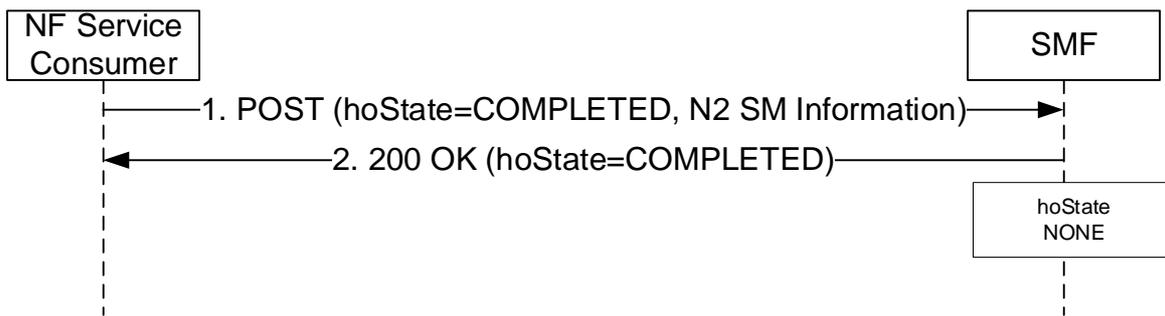
Figure 5.2.2.3.4.3-1: N2 Handover Execution

1. The NF Service Consumer shall request the SMF to complete the execution of the handover of the PDU session by sending a POST request, as specified in subclause 5.2.2.3.1, with the following information:

    -   updating the hoState attribute of the individual SM Context resource in the SMF to COMPLETED;

    -   servingNfId set to the new serving AMF Id, for a N2 handover with AMF change;

    -   the indication that the UE is inside or outside of the LADN service area, if the DNN of the established PDU session corresponds to a LADN;

    -   N2 SM information received from the source 5G-AN (see Secondary RAT Usage Report Transfer IE in subclause 9.3.4.x of 3GPP TS 38.413 [9]), if any;

    -   other information, if necessary.

2. Upon receipt of such a request, the SMF shall return a 200 OK response including the following information:

    -   hoState attribute set to COMPLETED.

    The SMF shall complete the execution of the handover, e.g. switch the PDU session towards the downlink termination point for the user data received from the target 5G-AN (i.e. target 5G-AN's GTP-U F-TEID for downlink traffic), set the hoState to NONE and delete any stored targetServingNfId.

    If the request does not include the "UE presence in LADN service area" indication and the SMF determines that the DNN corresponds to a LADN, then the SMF shall consider that the UE is outside of the LADN service area. The SMF shall proceed as specified in subclause 5.6.5 of 3GPP TS 23.501 [2].

5.2.2.3.4.4   N2 Handover Cancellation

The NF Service Consumer (e.g. AMF) shall request the SMF to cancel the handover of an existing PDU session, e.g. upon receipt of such a request from the source 5G-AN, as follows.
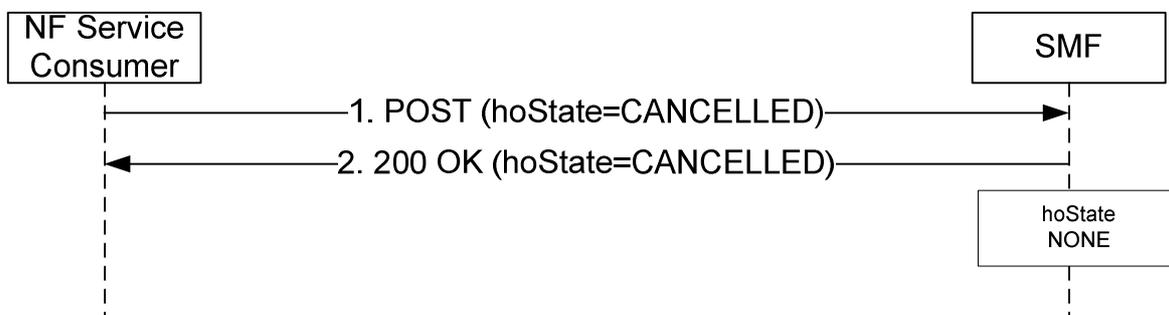
Figure 5.2.2.3.4.3-1: N2 Handover Cancellation

1. The NF Service Consumer shall request the SMF to cancel the execution of the handover of the PDU session by sending a POST request, as specified in subclause 5.2.2.3.1, with the following information:

- updating the hoState attribute of the individual SM Context resource in the SMF to CANCELLED;

- cause information;

- other information, if necessary.

2. Upon receipt of such a request, the SMF return a 200 OK response including the following information:

- hoState attribute set to CANCELLED.

The SMF shall cancel the execution of the handover, e.g. release resources reserved for the handover to the target 5G-AN, set the hoState to NONE and delete any stored targetServingNfId.

5.2.2.3.5 Handover between 3GPP and untrusted non-3GPP access procedures

5.2.2.3.5.1 General

The handover of a PDU session between 3GPP and untrusted non-3GPP access shall be supported as specified in subclause 4.9.2 of 3GPP TS 23.502 [3]. Such a handover may involve:

- the same AMF, or a target AMF in the same PLMN as the source AMF (see subclauses 4.9.2.1, 4.9.2.2, 4.9.2.3.1 and 4.9.2.4.1 of 3GPP TS 23.502 [3]); or

- a target AMF in a different PLMN than the source AMF (see subclauses 4.9.2.3.2 and 4.9.2.4.2 of 3GPP TS 23.502 [3]).

For a Home-Routed PDU session, the target AMF may be located in the VPLMN, or in the HPLMN when the N3IWF is in the HPLMN.

5.2.2.3.5.2 Handover of a PDU session without AMF change or with target AMF in same PLMN

In these scenarios, the same V-SMF is used before and after the handover.

The NF Service Consumer (e.g. AMF) shall request the SMF to handover an existing PDU session from 3GPP access to untrusted non-3GPP access, or vice-versa, as follows.
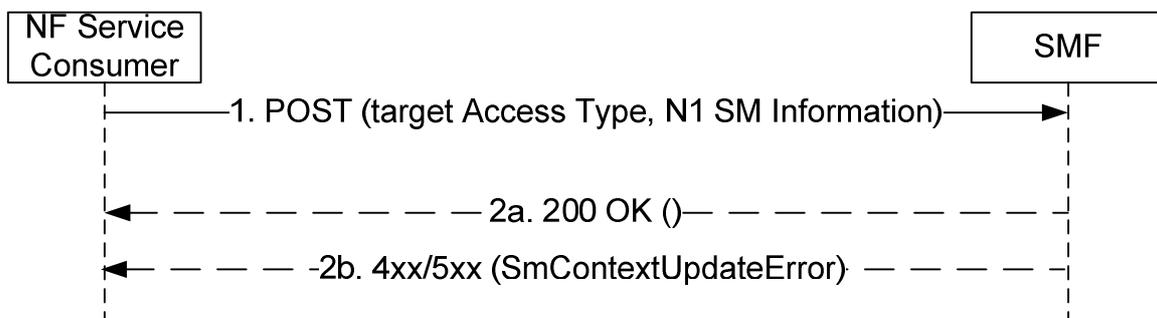
Figure 5.2.2.3.5.2-1: Handover between 3GPP and untrusted non-3GPP access

1. The NF Service Consumer shall request the SMF to handover an existing PDU session from 3GPP access to untrusted non-3GPP access, or vice-versa, by sending a POST request, as specified in subclause 5.2.2.3.1, with the following information:

- updating the anType attribute of the individual SM Context resource in the SMF to the target access type, i.e. to 3GPP_ACCESS or NON_3GPP_ACCESS;

- other information, if necessary.

2a. Same as step 2a of Figure 5.2.2.3.1-1.

2b. If the SMF cannot proceed with handing over the PDU session to the target access type, the SMF shall return an error response, as specified for step 2b of figure 5.2.2.3.1-1. For a 4xx/5xx response, the SmContextUpdateError structure shall include the following additional information:

- N1 SM Information to reject the UE request.

5.2.2.3.6 Inter-AMF change or mobility

The NF Service Consumer (e.g. new AMF) shall inform the SMF that it has taken over the role of serving the UE (e.g. it has taken the responsibility of the signalling towards the UE), when so required by 3GPP TS 23.501 [2] and 3GPP TS 23.502 [3], as follows.
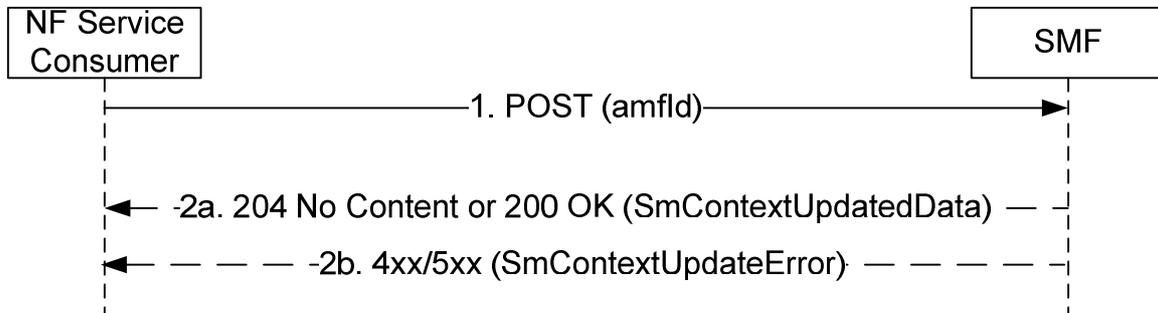
Figure 5.2.2.3.6-1: Inter-AMF change or mobility

1. The NF Service Consumer shall update the SMF with the new serving AMF, by sending a POST request, as specified in subclause 5.2.2.3.1, with the following information:

   - servingNfId set to the new serving AMF Id;

   - other information, if necessary, e.g. to activate the user plane connection of the PDU session (see subclause 5.2.2.3.2.2).

2a. Same as step 2a of Figure 5.2.2.3.1-1.

2b. Same as step 2b of figure 5.2.2.3.1-1.

5.2.2.3.7 RAN Initiated QoS Flow Mobility

The NF Service Consumer (e.g. AMF) shall request the SMF to transfer QoS flows to and from Secondary RAN node, or more generally, handle a NG-RAN PDU Session Resource Modify Indication, as follows.
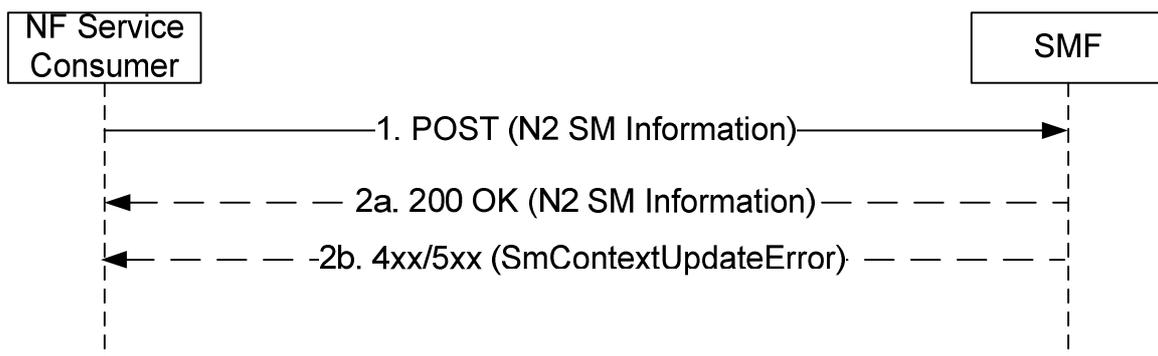
Figure 5.2.2.3.7-1: RAN Initiated QoS Flow Mobility

1. The NF Service Consumer shall request the SMF to modify the PDU session, as requested by the NG-RAN, by sending a POST request, as specified in subclause 5.2.2.3.1, with the following information:

   - N2 SM information received from the 5G-AN (see PDU Session Resource Modify Indication Transfer IE in subclause 9.3.4.6 of 3GPP TS 38.413 [9]), including the transport layer information for the QoS flows of this PDU session (i.e. 5G-AN's GTP-U F-TEIDs for downlink traffic);

   - other information, if necessary.

2a. Upon receipt of such a request, if the SMF can proceed with switching the QoS flows of the PDU session, the SMF shall return a 200 OK response including the following information:

- N2 SM information (see PDU Session Resource Modify Confirm Transfer IE in subclause 9.3.4.7 of 3GPP TS 38.413 [9]), including the list of QoS flows which were modified successfully.

2b. If the SMF cannot proceed with switching the QoS flows of the PDU session, the SMF shall return an error response, as specified for step 2b of figure 5.2.2.3.1-1, including:

- N2 SM information (see PDU Session Resource Modify Confirm Transfer IE in subclause 9.3.4.7 of 3GPP TS 38.413 [9]), including the list of QoS flows which failed to be modified.

5.2.2.3.8 EPS to 5GS Handover using N26 interface

5.2.2.3.8.1 General

The NF Service Consumer (e.g. AMF) shall request the SMF to handover a UE EPS PDN connection to 5GS using N26 interface, following the same requirements as specified for N2 handover in subclause 5.2.2.3.4 with the modifications specified in this subclause.

5.2.2.3.8.2 EPS to 5GS Handover Preparation

The requirements specified in subclause 5.2.2.3.4.2 shall apply with the following modifications.
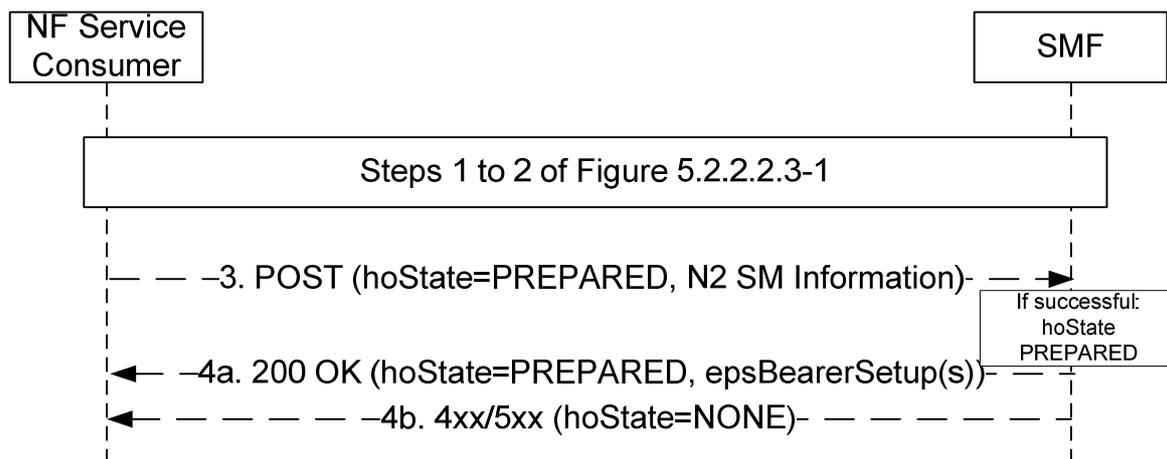
Figure 5.2.2.3.8.2-1: EPS to 5GS Handover Preparation

1. Same as step 1 of Figure 5.2.2.2.3-1.

2a. Same as step 2 of Figure 5.2.2.2.3-1.

2b. Same as step 2b of figure 5.2.2.3.1-1.

3. Same as step 3 of Figure 5.2.2.3.4.2-1.

4a. Same as step 4 of Figure 5.2.2.3.4.2-1, with the following modifications:

The 200 OK response shall not include N2 SM information for DL forwarding tunnel setup, but shall additionally contain:

- the epsBearerSetup IE(s), containing the list of EPS bearer context(s) successfully handed over to the 5GS and the CN tunnel information for data forwarding, generated based on the list of accepted QFI(s) received from the 5G-RAN;

4b. Same as step 2b of figure 5.2.2.3.4.2-1.

5.2.2.3.8.3 EPS to 5GS Handover Execution

The requirements specified in subclause 5.2.2.3.4.3 shall apply, with the following modifications.

In step 2 of Figure 5.2.2.3.4.3-1, for a Home Routed PDU session, the SMF shall complete the execution of the handover by initiating an Update service operation towards the H-SMF in order to switch the PDU session towards the V-UPF (see subclause 5.2.2.8.2.3).

5.2.2.3.8.4 EPS to 5GS Handover Cancellation

The requirements specified in subclause 5.2.2.3.4.4 shall apply.

5.2.2.3.9 5GS to EPS Handover using N26 interface

The NF Service Consumer (e.g. AMF) shall request the SMF to establish indirect data forwarding tunnels during a 5GS to EPS handover, as follows.
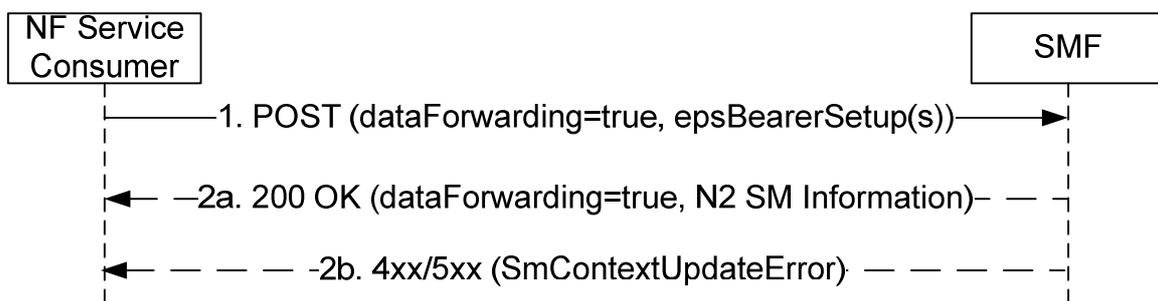
Figure 5.2.2.3.9-1: 5GS to EPS Handover using N26 interface (data forwarding tunnels setup)

1. The NF Service Consumer shall send a POST request, as specified in subclause 5.2.2.3.1, with the following information:

   - dataForwarding IE set to true;

   - EPS bearer contexts received from the MME in the Forward Relocation Response.

2a. Upon receipt of such a request, the SMF shall map the EPS bearers for Data Forwarding to the 5G QoS flows based on the association between the EPS bearer ID(s) and QFI(s) for the QoS flow(s), and shall return a 200 OK response including the following information:

   - N2 SM information providing the 5G-AN with the CN transport layer address and tunnel endpoint (i.e. UPF's GTP-U F-TEID) for Data Forwarding and the QoS flows for Data Forwarding for this PDU session.

2b. If the SMF cannot proceed with the request, the SMF shall return an error response, as specified for step 2b of figure 5.2.2.3.1-1.

The NF Service Consumer (e.g. AMF) shall request the SMF to release indirect data forwarding tunnels, as follows.
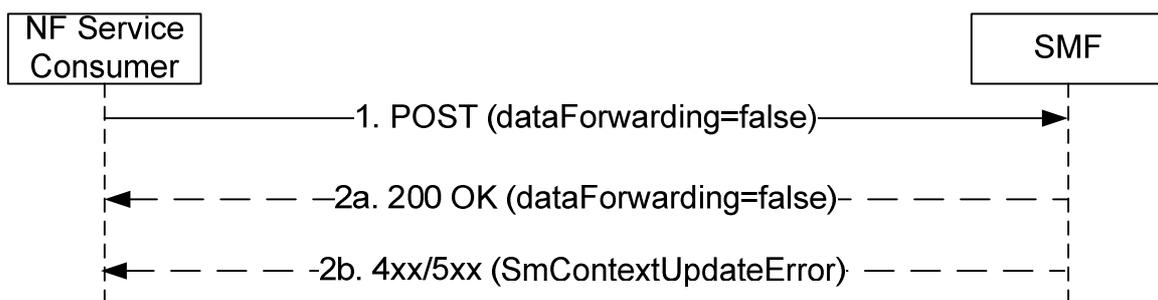
Figure 5.2.2.3.9-2: 5GS to EPS Handover using N26 interface (data forwarding tunnels release)

1. The NF Service Consumer shall send a POST request, as specified in subclause 5.2.2.3.1, with the following information:

    -   dataForwarding IE set to false.

2a. Upon receipt of such a request, the SMF shall release the resources used for indirect data forwarding, and shall return a 200 OK response including the following information:

    -   dataForwarding IE set to false.

2b. If the SMF cannot proceed with the request, the SMF shall return an error response, as specified for step 2b of figure 5.2.2.3.1-1.

If no resources can be assigned in EPS for any PDU session attempted to be handed over, the AMF shall update the SMF with the information that the handover preparation failed by sending a POST request with the cause attribute set to "HO_FAILURE" and with an empty list of EPS bearer contexts (and without the dataForwarding IE). The SMF shall then release the resources prepared for the handover and proceed with the PDU session as if no handover procedure had taken place.

5.2.2.3.10   P-CSCF Restoration Procedure via AMF

The requirements specified in subclause 5.2.2.3.1 shall apply with the following modifications.

1. Same as step 1 of Figure 5.2.2.3.1-1, with the following modifications.

    The POST request shall contain:

    -   the release IE set to true;

    -   the cause IE set to REL_DUE_TO_REACTIVATION.

5.2.2.3.11   AMF requested PDU Session Release due to duplicated PDU Session Id

When the AMF receives an "initial request" with PDU Session Id which already exists in PDU session context of the UE (see subclause 5.4.5.2.5 of 3GPP TS 24.501 [7]), the AMF shall request the SMF to release the existing PDU Session; upon subsequent receipt of an SM context status notification indicating that the SM context has been deleted in the SMF, the AMF shall release the stored context for the PDU session and proceed with the "initial request" with the PDU Session Id.

The requirements for releasing the existing PDU Session specified in subclause 5.2.2.3.1 shall apply with the following modifications.

1. Same as step 1 of Figure 5.2.2.3.1-1, with the following modifications.

    The POST request shall contain:

    -   the release IE set to true;

    -   the cause IE set to REL_DUE_TO_DUPLICATE_SESSION_ID.

    NOTE: The SMF does not send NAS signaling to UE for the PDU session release in this procedure.

5.2.2.3.12   AMF requested PDU Session Release due to slice not available

The requirements specified in subclause 5.2.2.3.1 shall apply with the following modifications.

1. Same as step 1 of Figure 5.2.2.3.1-1, with the following modifications.

    The POST request shall contain:

    -   the release IE set to true;

    -   the cause IE set to REL_DUE_TO_SLICE_NOT_AVAILABLE.

5.2.2.4 Release SM Context service operation

5.2.2.4.1 General

The Release SM Context service operation shall be used to release the SM Context of a given PDU session, in the SMF, or in the V-SMF for HR roaming scenarios, in the following procedures:

- UE initiated Deregistration (see subclause 4.2.2.3.2 of 3GPP TS 23.502 [3]);

- Network initiated Deregistration, e.g. AMF initiated deregistration (see subclause 4.2.2.3.3 of 3GPP TS 23.502 [3]), UDM triggered deregistration by sending Deregistration notification with initial Registration indication (see subclause 4.2.2.2.2 of 3GPP TS 23.502 [3]);

- Network requested PDU session release (see subclause 4.3.4.2 of 3GPP TS 23.502 [3]), e.g. AMF initiated release when:

  - there is a mismatch of the PDU session status between the UE and the AMF or when a required user plane security enforcement cannot be fulfilled by the NG-RAN; or

  - there is a change of the set of network slices for a UE where a network slice instance is no longer available (as described in 3GPP TS 23.501 [2], subclause 5.15.5.2.2) and the PDU session is not activated;

- 5GS to EPS Idle mode mobility or handover for a Home Routed PDU session, to release the SM context in the V-SMF only, for the PDU sessions that are transferred to EPC;

- 5GS to EPS handover using N26 interface and 5GS to EPS Idle mode mobility using N26, to release the PDU session not transferred to EPC (see subclauses 4.11.1.2.1 and 4.11.1.3.2 of 3GPP TS 23.502 [3]).

The NF Service Consumer (e.g. AMF) shall release the SM Context of a given PDU session by using the HTTP "release" custom operation as shown in Figure 5.2.2.4.1-1.
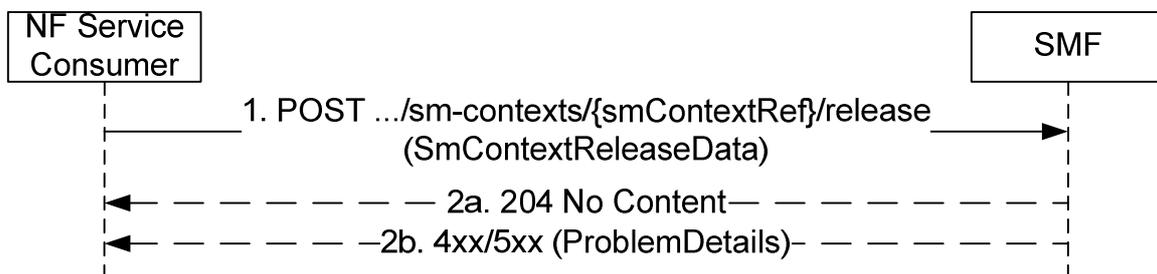
Figure 5.2.2.4.1-1: SM context release

1. The NF Service Consumer shall send a POST request to the resource representing the individual SM context to be deleted. The payload body of the POST request shall contain any data that needs to be passed to the SMF and/or N2 SM information (if Secondary RAT usage data needs to be reported).

   For a 5GS to EPS Idle mode mobility or handover, for a Home Routed PDU session associated with 3GPP access and with assigned EBI(s), the POST request shall contain the vsmfReleaseOnly indication.

   For a 5GS to EPS Idle mode mobility or handover, for a Home Routed PDU session associated with 3GPP access and with no assigned EBI(s), the POST request shall not contain the vsmfReleaseOnly indication to release the PDU session in the V-SMF and H-SMF.

2a. On success, the SMF shall return a "204 No Content" response with an empty payload body in the POST response.

   If the POST request contains a vsmfReleaseOnly indication (i.e. for a 5GS to EPS Idle mode mobility or handover, for a Home Routed PDU session with assigned EBI(s)), the V-SMF shall release its SM context and corresponding PDU session resource locally, i.e. without signalling towards the H-SMF.

2b. On failure, one of the HTTP status code listed in Table 6.1.3.3.4.3.2-2 shall be returned. For a 4xx/5xx response, the message body shall include a ProblemDetails structure with the "cause" attribute set to one of the application error listed in Table 6.1.3.3.4.3.2-2.

5.2.2.5   Notify SM Context Status service operation

5.2.2.5.1   General

The Notify SM Context Status service operation shall be used by the SMF to notify the NF Service Consumer about the status of an SM context related to a PDU session (e.g. when the SM context is released or moved to another system) in the SMF, or the V-SMF for HR roaming scenarios.

It is used in the following procedures:

- UE requested PDU Session Establishment procedure, when the PDU session establishment fails after the Create SM Context response (see subclause 4.3.2.2 of 3GPP TS 23.502 [3]);

- UE or Network requested PDU session release (see subclause 4.3.4.2 of 3GPP TS 23.502 [3]), e.g. SMF initiated release;

- Handover of a PDU Session procedure between untrusted non-3GPP to 3GPP access (see subclauses 4.9.2.3.2 and 4.9.2.4.2 of 3GPP TS 23.502 [3]);

- Interworking procedures without N26 interface, e.g. 5GS to EPS Mobility (see subclause 4.11.2.2 of 3GPP TS 23.502 [3]);

- Handover from 5GC-N3IWF to EPS (see subclause 4.11.3.2 of 3GPP TS 23.502 [3]);

- Handover from 5GS to EPC/ePDG (see subclause 4.11.4.2 of 3GPP TS 23.502 [3]).

The SMF shall notify the NF Service Consumer by using the HTTP POST method as shown in Figure 5.2.2.5.1-1.
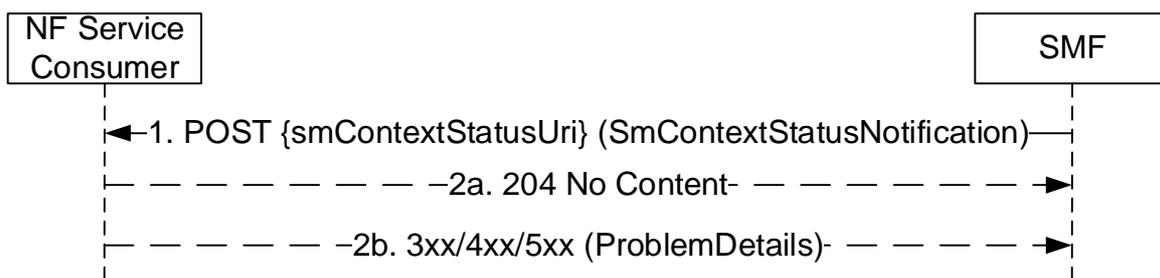
Figure 5.2.2.5.1-1: SM context status notification

1. The SMF shall send a POST request to the SM Context Status callback reference provided by the NF Service Consumer during the subscription to this notification. The payload body of the POST request shall contain the notification payload.

   If the notification is triggered by PDU session handover, the notification payload shall contain the Cause IE with the value "PDU_SESSION_HANDED_OVER".

2a. On success, "204 No Content" shall be returned and the payload body of the POST response shall be empty.

   If the SMF indicated in the request that the SM context resource is released, the NF Service Consumer shall release its association with the SMF for the PDU session and release the EBI(s) that were assigned to the PDU session.

2b. On failure or redirection, one of the HTTP status code listed in Table 6.1.3.7.3.1-2 shall be returned. For a 4xx/5xx response, the message body shall contain a ProblemDetails structure with the "cause" attribute set to one of the application error listed in Table 6.1.3.7.3.1-2.

   If the NF Service Consumer (e.g. AMF) is not able to handle the notification but knows by implementation specific means that another NF Service Consumer (e.g. AMF) is able to handle the notification (e.g. AMF deployment with Backup AMF), it shall reply with an HTTP "307 temporary redirect" error response pointing to the URI of the new NF Service Consumer. If the NF Service Consumer is not able to handle the notification but another unknown NF Service Consumer could possibly handle the notification (e.g. AMF deployment with UDSF), it shall reply with an HTTP "404 Not found" error response.

If the SMF receives a "307 temporary redirect" response, the SMF shall use this URI as Notification URI in subsequent communication and shall resend the notification to that URI.

If the SMF becomes aware that a new NF Service Consumer (e.g. AMF) is requiring notifications (e.g. via the "404 Not found" response or via Namf_Communication service AMFStatusChange Notifications, or via link level failures, see subclause 6.5.2 of 3GPP TS 29.500 [4]), and the SMF knows alternate or backup Address(es) where to send Notifications (e.g. via the GUAMI and/or backupAmfInfo received when the SM context was established or via AMFStatusChange Notifications, or via the Nnrf_NFDiscovery service specified in 3GPP TS 29.510 [19] using the service name and GUAMI or backupAMFInfo obtained during the creation of the SM context, see subclause 6.5.2.2 of 3GPP TS 29.500 [4]), the SMF shall exchange the authority part of the corresponding Notification URI with one of those addresses and shall use that URI in subsequent communication; the SMF shall resend the notification to that URI.

5.2.2.6 Retrieve SM Context service operation

5.2.2.6.1 General

The Retrieve SM Context service operation shall be used to retrieve an individual SM context, for a given PDU session, from the SMF, or from the V-SMF for HR roaming scenarios.

It is used in the following procedures:

- 5GS to EPS handover using N26 interface (see subclause 4.11.1.2.1 of 3GPP TS 23.502 [3]), for PDU sessions associated with 3GPP access;

- 5GS to EPS Idle mode mobility using N26 interface (see subclause 4.11.1.3.2 of 3GPP TS 23.502 [3]), for PDU sessions associated with 3GPP access.

The NF Service Consumer (e.g. AMF) shall retrieve an SM context by using the HTTP POST method (retrieve custom operation) as shown in Figure 5.2.2.6.1-1.
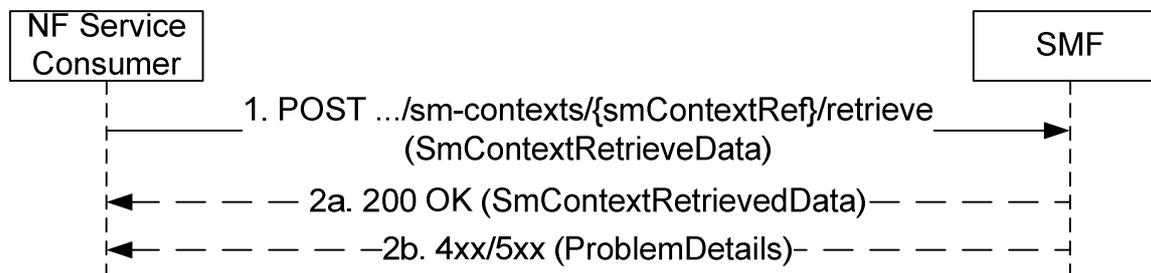
Figure 5.2.2.6.1-1: SM context retrieval

1. The NF Service Consumer shall send a POST request to the resource representing the individual SM context to be retrieved. The POST request may contain a payload body with the following parameters:

   - target MME capabilities, if available, to allow the SMF to determine whether to include EPS bearer contexts for non-IP PDN type or not.

2a. On success, "200 OK" shall be returned; the payload body of the POST response shall contain the mapped EPS bearer contexts.

   If the target MME capabilities were provided in the request parameters, and if the target MME supports the non-IP PDN type, the SMF shall return, for a PDU session with PDU session type "Ethernet" or "Unstructured", an EPS bearer context with the "non-IP" PDN type.

2b. On failure, one of the HTTP status code listed in Table 6.1.3.3.4.4.2-2 shall be returned. For a 4xx/5xx response, the message body shall contain a ProblemDetails structure with the "cause" attribute set to one of the application error listed in Table 6.1.3.3.4.4.2-2.

5.2.2.7 Create service operation

5.2.2.7.1 General

The Create service operation shall be used to create an individual PDU session in the H-SMF for HR roaming scenarios.

It is used in the following procedures:

- UE requested PDU Session Establishment (see subclause 4.3.2.2.2 of 3GPP TS 23.502 [3]);

- EPS to 5GS Idle mode mobility or handover using N26 interface (see subclause 4.11 of 3GPP TS 23.502 [3]);

- EPS to 5GS mobility without N26 interface (see subclause 4.11.2.3 3GPP TS 23.502 [3]);

- Handover of a PDU session between 3GPP access and non-3GPP access, when the target AMF does not know the SMF resource identifier of the SM context used by the source AMF, e.g. when the target AMF is not in the PLMN of the N3IWF (see subclause 4.9.2.3.2 of 3GPP TS 23.502 [3]);

- Handover from EPS to 5GC-N3IWF (see subclause 4.11.3.1 of 3GPP TS 23.502 [3]);

- Handover from EPC/ePDG to 5GS (see subclause 4.11.4.1 of 3GPP TS 23.502 [3]).

The NF Service Consumer (e.g. V-SMF) shall create a PDU session by using the HTTP POST method as shown in Figure 5.2.2.7.1-1.
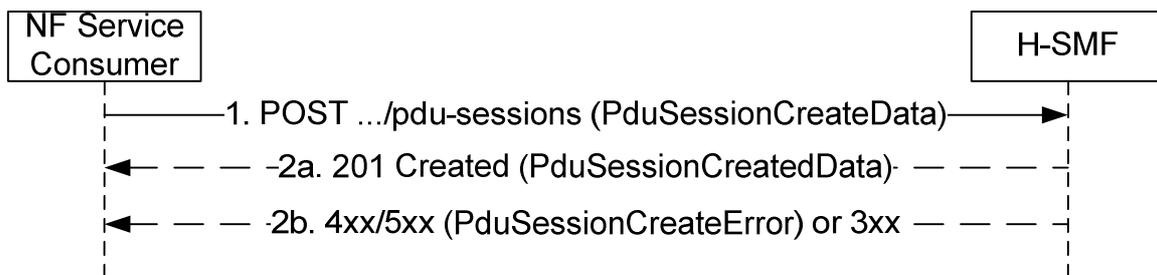
Figure 5.2.2.7.1-1: PDU session creation

1. The NF Service Consumer shall send a POST request to the resource representing the PDU sessions collection resource of the H-SMF. The payload body of the POST request shall contain:

   - a representation of the individual PDU session resource to be created;

   - the Request Type IE, if it is received from the UE and if the request refers to an existing PDU session or an existing Emergency PDU session; the Request Type may be included otherwise;

   - the vsmfId IE identifying the serving SMF;

   - the vcnTunnelInfo;

   - the anType;

   - a URI ({vsmfPduSessionUri}) representing the PDU session resource in the V-SMF, for possible use by the H-SMF to subsequently modify or release the PDU session.

   As specified in subclause 4.3.2.2.2 of 3GPP TS 23.502 [3], the NF Service Consumer shall be able to receive an Update request before receiving the Create Response, e.g. for EPS bearer ID allocation (see subclause 4.11.1.4.1 of 3GPP TS 23.502 [3]) or Secondary authorization/authentication (see subclause 4.3.2.3 of 3GPP TS 23.502 [3]).

2a. On success, "201 Created" shall be returned, the payload body of the POST response shall contain:

   - the representation describing the status of the request;

   - the QoS flow(s) to establish for the PDU session;

- the epsPdnCnxInfo IE and, for each EPS bearer, an epsBearerInfo IE, if the PDU session may be moved to EPS during its lifetime;

- the "Location" header containing the URI of the created resource.

The authority and/or deployment-specific string of the apiRoot of the created resource URI may differ from the authority and/or deployment-specific string of the apiRoot of the request URI received in the POST request.

If an Update Request was sent to the V-SMF before the Create Response, the URI in the "Location" header and in the hsmfPduSessionUri IE of the H-SMF initiated Update Request shall be the same. If the Request Type was received in the request and set to EXISTING_PDU_SESSION or EXISTING_EMERGENCY_PDU_SESSION (i.e. indicating that this is a request for an existing PDU session or an existing emergency PDU session), the SMF shall identify the existing PDU session or emergency PDU session based on the PDU Session ID; in this case, the SMF shall not create a new PDU session or emergency PDU session but instead update the existing PDU session or emergency PDU session and provide the representation of the updated PDU session or emergency PDU session in the response to the NF Service Consumer.

The POST request shall be considered as colliding with an existing PDU session context if:

- it includes the same SUPI, or PEI for an emergency registered UE without a UICC or without an authenticated SUPI, and the same PDU Session ID as for an existing PDU session context; and

- this is a request to establish a new PDU session, i.e. the RequestType is absent in the request or is present and set to INITIAL_REQUEST or INITIAL_EMERGENCY_REQUEST.

A POST request that collides with an existing PDU session context shall be treated as a request for a new PDU session context. Before creating the new PDU session context, the SMF should delete the existing PDU session context locally and any associated resources in the UPF and PCF. If the vsmfPduSessionUri of the existing PDU session context differs from the vsmfPduSessionUri received in the POST request, the SMF shall also send a status notification (see subclause 5.2.2.10) targeting the vsmfPduSessionUri of the existing PDU session context to notify the release of the existing PDU session context.

If the Request Type was received in the request and indicates this is a request for a new PDU session (i.e. INITIAL_REQUEST) and if the Old PDU Session ID was also included in the request, the SMF shall identify the existing PDU session to be released and to which the new PDU session establishment relates, based on the Old PDU Session ID.

The NF Service Consumer shall store any epsPdnCnxInfo and EPS bearer information received from the H-SMF.

If the response received from the H-SMF contains the alwaysOnGranted attribute set to true, the V-SMF shall check and determine whether the PDU session can be established as an always-on PDU session based on local policy.

2b. On failure , or redirection during a UE requested PDU Session Establishment, one of the HTTP status code listed in Table 6.1.3.5.3.1-3 shall be returned. For a 4xx/5xx response, the message body shall contain a PduSessionCreateError structure, including:

- a ProblemDetails structure with the "cause" attribute set to one of the application error listed in Table 6.1.3.5.3.1-3;

- the n1SmCause IE with the 5GSM cause that the H-SMF proposes the V-SMF to return to the UE, if the request included n1SmInfoFromUe;

- n1SmInfoToUe with any information to be sent to the UE (in the PDU Session Establishment Reject).

5.2.2.7.2 EPS to 5GS Idle mode mobility

The requirements specified in subclause 5.2.2.7.1 shall apply with the following modifications.

1. Same as step 1 of Figure 5.2.2.7.1-1, with the following additions.

   The POST request shall contain:

   - the list of EPS Bearer Ids received from the MME;

- the PGW S8-C F-TEID received from the MME.

2a. Same as step 2 of Figure 5.2.2.7.1-1, with the following modifications.

If the H-SMF finds a corresponding PDU session based on the EPS Bearer Ids and PGW S8-C F-TEID received in the request, and if it can proceed with moving the PDN connection to 5GS, the H-SMF shall return a 201 Created response including the following additional information:

- PDU Session ID corresponding to the EPS PDN connection;

- other PDU session parameters, such as PDU Session Type, Session AMBR, QoS flows information.

NOTE: The behaviour specified in this step also applies if the POST request collides with an existing PDU session context, i.e. if the POST request includes the same SUPI, or PEI for an emergency registered UE without a UICC or without an authenticated SUPI, and the received EPS bearer ID is the same as in the existing PDU session context.

2b. Same as step 2b of Figure 5.2.2.7.1-1, with the following additions.

If the H-SMF determines that seamless session continuity from EPS to 5GS is not supported for the PDU session, the H-SMF shall set the "cause" attribute in the ProblemDetails structure to "NO_EPS_5GS_CONTINUITY".

5.2.2.7.3 EPS to 5GS Handover Preparation

The requirements specified in subclause 5.2.2.7.1 shall apply with the following modifications.

1. Same as step 1 of Figure 5.2.2.7.1-1, with the following modifications.

The POST request shall contain:

- the list of EPS Bearer Ids received from the MME;

- the PGW S8-C F-TEID received from the MME;

- the hoPreparationIndication IE set to "true", to indicate that a handover preparation is in progress and the PGW-C/SMF shall not switch the DL user plane of the PDU session yet.

2a. Same as step 2 of Figure 5.2.2.7.1-1, with the following modifications.

If the SMF finds a corresponding PDU session based on the EPS Bearer Ids and PGW S8-C F-TEID received in the request, and if it can proceed with the procedure, the SMF shall return a 201 Created response including the following information:

- PDU Session ID corresponding to the EPS PDN connection;

- other PDU session parameters, such as PDU Session Type, Session AMBR, QoS flows information.

The SMF shall not switch the DL user plane of the PDU session, if the hoPreparationIndication IE was set to "true" in the request.

NOTE: The behaviour specified in this step also applies if the POST request collides with an existing PDU session context, i.e. if the POST request includes the same SUPI, or PEI for an emergency registered UE without a UICC or without an authenticated SUPI, and the received EPS bearer ID is the same as in the existing PDU session context.

2b. Same as step 2b of Figure 5.2.2.7.1-1, with the following additions.

If the H-SMF determines that seamless session continuity from EPS to 5GS is not supported for the PDU session, the H-SMF shall set the "cause" attribute in the ProblemDetails structure to "NO_EPS_5GS_CONTINUITY".

5.2.2.8 Update service operation

5.2.2.8.1 General

The Update service operation shall be used in HR roaming scenarios to:

- update an individual PDU session in the H-SMF and/or provide the H-SMF with information received by the V-SMF in N1 SM signalling from the UE;

- update an individual PDU session in the V-SMF and/or provide information necessary for the V-SMF to send N1 SM signalling to the UE.

It is invoked by the V-SMF in the following procedures:

- UE or visited network requested PDU session modification (see subclause 4.3.3.3 of 3GPP TS 23.502 [3]);

- UE requested PDU session release (see subclause 4.3.4.3 of 3GPP TS 23.502 [3]);

- EPS to 5GS handover execution using N26 interface (see subclause 4.11 of 3GPP TS 23.502 [3]);

- Handover between 3GPP and untrusted non-3GPP access procedures (see subclause 4.9.2 of 3GPP TS 23.502 [3]), for a Home Routed PDU session, without AMF change or with target AMF in same PLMN;

- All procedures requiring to provide the H-SMF with information received by the V-SMF in N1 SM signalling from the UE to the H-SMF.

It is invoked by the H-SMF in the following procedures:

- Home network requested PDU session modification (see subclause 4.3.3.3 of 3GPP TS 23.502 [3]);

- Home network requested PDU session release (see subclause 4.3.4.3 of 3GPP TS 23.502 [3]);

- All procedures requiring to provide information necessary for the V-SMF to send N1 SM signalling to the UE;

- EPS Bearer ID allocation or revocation (see subclauses 4.11.1.4.1 and 4.11.1.4.3 of 3GPP TS 23.502 [3]);

- Secondary authorization/authentication by an DN-AAA server (see subclause 4.3.2.3 of of 3GPP TS 23.502 [3]).

5.2.2.8.2 Update service operation towards H-SMF

5.2.2.8.2.1 General

The NF Service Consumer (e.g. V-SMF) shall update a PDU session in the H-SMF and/or provide the H-SMF with information received by the V-SMF in N1 SM signalling from the UE, by using the HTTP POST method (modify custom operation) as shown in Figure 5.2.2.8.2-1.
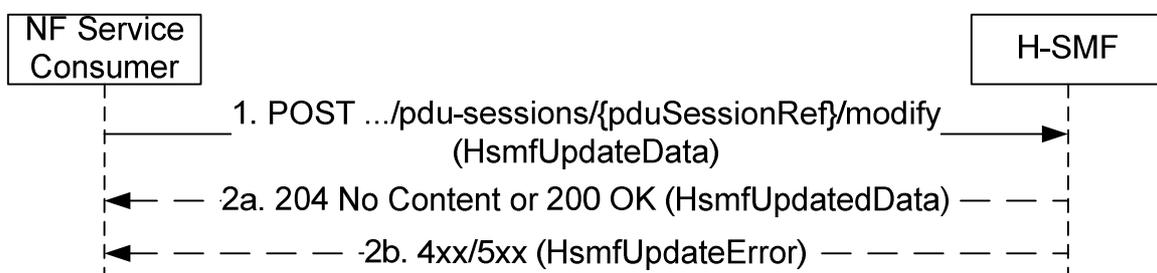
Figure 5.2.2.8.2-1: PDU session update towards H-SMF

1. The NF Service Consumer shall send a POST request to the resource representing the individual PDU session resource in the H-SMF. The payload body of the POST request shall contain:

- the requestIndication IE indicating the request type;

- the modification instructions and/or the information received by the V-SMF in N1 signalling from the UE.

2a. On success, "204 No Content" or "200 OK" shall be returned; in the latter case, the payload body of the POST response shall contain the representation describing the status of the request and/or information necessary for the V-SMF to send N1 SM signalling to the UE.

2b. On failure, one of the HTTP status code listed in Table 6.1.3.3.3.2-3 shall be returned. For a 4xx/5xx response, the message body shall contain a HsmfUpdateError structure, including:

- a ProblemDetails structure with the "cause" attribute set to one of the application error listed in Table 6.1.3.3.3.2-3;

- the n1SmCause IE with the 5GSM cause the H-SMF proposes the V-SMF to return to the UE, if the request included n1SmInfoFromUe;

- n1SmInfoToUe binary data, if the SMF needs to return NAS SM information which the V-SMF does not need to interpret;

- the procedure transaction id that was that received in the request, if this is a response sent to a UE requested PDU session modification.

5.2.2.8.2.2 UE or visited network requested PDU session modification

The requirements specified in subclause 5.2.2.8.2.1 shall apply with the following modifications.

1. Same as step 1 of Figure 5.2.2.8.2-1, with the following modifications.

   The POST request shall contain:

   - the requestIndication set to UE_REQ_PDU_SES_MOD, and the modifications requested by the UE, e.g. UE requested QoS rules or UE requested Qos flow descriptions, in an N1 SM container IE as specified in subclause 5.2.3.1, for a UE requested PDU session modification; or

   - the requestIndication set to NW_REQ_PDU_SES_MOD, and the modifications requested by the visited network or the notifications initiated by the visited network, e.g. to report the release of QoS flow(s) or notifying QoS flow(s) whose targets QoS are no longer fulfilled, or to report that the user plane security enforcement with a value Preferred is not fulfilled or is fulfilled again, for a visited network requested PDU session modification;

5.2.2.8.2.3 UE requested PDU session release

The requirements specified in subclause 5.2.2.8.2.1 shall apply with the following modifications.

1. Same as step 1 of Figure 5.2.2.8.2-1, with the following modifications.

   The POST request shall contain:

   - the requestIndication set to UE_REQ_PDU_SES_REL.

5.2.2.8.2.4 EPS to 5GS Handover Execution

The requirements specified in subclause 5.2.2.8.2.1 shall apply with the following modifications.

1. Same as step 1 of Figure 5.2.2.8.2-1, with the following modifications.

   The POST request shall contain:

   - the list of EPS Bearer Ids successfully handed over to 5GS;

   - the hoPreparationIndication IE set to "false", to indicate that there is no handover preparation in progress anymore and that the PGW-C/SMF shall switch the DL user plane of the PDU session.

2. Same as step 2 of Figure 5.2.2.8.2-1, with the following modifications.

The SMF shall return a 200 OK response. The SMF shall switch the DL user plane of the PDU session using the N9 tunnel information that has been received in the vcnTunnelInfo, if the hoPreparationIndication IE was set to "false" in the request.

If the handover preparation failed (e.g. the target 5G-AN failed to establish resources for the PDU session), the requirements specified in subclause 5.2.2.8.2.1 shall apply with the following modifications.

1. Same as step 1 of Figure 5.2.2.8.2-1, with the following modifications.

   The POST request shall contain:

   - the cause attribute set to "HO_FAILURE";

   - an empty list of EPS Bearer Ids;

   - the hoPreparationIndication IE set to "false", to indicate that there is no handover preparation in progress anymore.

2. Same as step 2 of Figure 5.2.2.8.2-1, with the following modifications.

   The H-SMF shall return a 200 OK response. The H-SMF shall release the resources prepared for the handover.

5.2.2.8.2.5 Handover between 3GPP and untrusted non-3GPP access (Home Routed PDU session)

For Handover between 3GPP and untrusted non-3GPP access procedures, for a Home Routed PDU session, without AMF change or with the target AMF in the same PLMN, the requirements specified in subclause 5.2.2.8.2.1 shall apply with the following modifications.

1. Same as step 1 of Figure 5.2.2.8.2-1, with the following modifications.

   The POST request shall contain the anType set to the target access type, i.e. to 3GPP_ACCESS or NON_3GPP_ACCESS.

   The requestIndication IE shall be set to PDU_SES_MOB.

5.2.2.8.2.6 P-CSCF Restoration Procedure via AMF (Home Routed PDU session)

The requirements specified in subclause 5.2.2.8.2.1 shall apply with the following modifications.

1. Same as step 1 of Figure 5.2.2.8.2-1, with the following modifications:

   The POST request shall contain:

   - the requestIndication IE set to NW_REQ_PDU_SES_REL;

   - the cause IE set to REL_DUE_TO_REACTIVATION.

5.2.2.8.3 Update service operation towards V-SMF

5.2.2.8.3.1 General

The NF Service Consumer (e.g. H-SMF) shall update a PDU session in the V-SMF and/or provide information necessary for the V-SMF to send N1 SM signalling to the UE, or request to allocate or revoke EPS Bearer ID(s) for the PDU session, by using the HTTP "modify" custom operation as shown in Figure 5.2.2.8.3.1-1.
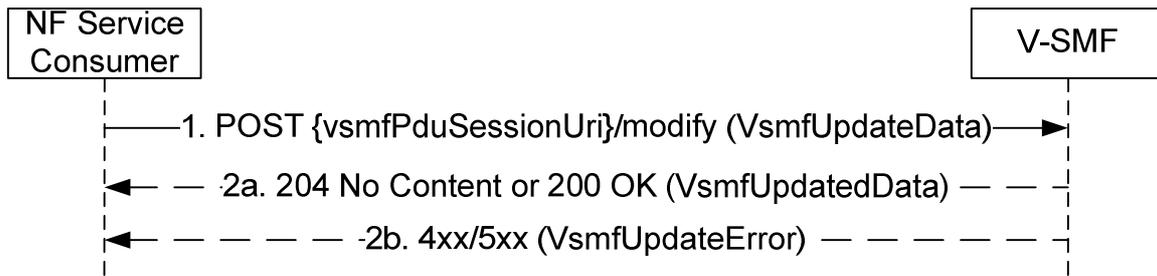
Figure 5.2.2.8.3.1-1: PDU session update towards V-SMF

1. The NF Service Consumer shall send a POST request to the resource representing the individual PDU session resource in the V-SMF. The payload body of the POST request shall contain:

   - the requestIndication IE indicating the request type;

   - the modification instructions and/or the information necessary for the V-SMF to send N1 SM signalling to the UE;

   - the hsmfPduSessionUri IE if the Update Request is sent to the V-SMF before the Create Response, and the H-SMF PDU session resource URI has not been previously provided to the V-SMF; in this case, the supportedFeatures IE shall also be included if at least one optional feature defined in subclause 6.1.8 is supported.

2a. On success, "204 No Content" or "200 OK" shall be returned; in the latter case, the payload body of the POST response shall contain the representation describing the status of the request and/or information received by the V-SMF in N1 signalling from the UE.

2b. On failure, one of the HTTP status code listed in Table 6.1.3.7.4.2.2-1 shall be returned. For a 4xx/5xx response, the message body shall contain a VsmfUpdateError structure, including:

   - a ProblemDetails structure with the "cause" attribute set to one of the application error listed in Table 6.1.3.7.4.2.2-1;

   - the n1SmCause IE with the 5GSM cause returned by the UE, if available;

   - n1SmInfoFromUe and/or unknownN1SmInfo binary data, if NAS SM information has been received from the UE that needs to be transferred to the H-SMF or that the V-SMF does not comprehend;

   - the procedure transaction id received from the UE, if available.

5.2.2.8.3.2   Home network requested PDU session modification

The requirements specified in subclause 5.2.2.8.3.1 shall apply with the following modifications.

1. Same as step 1 of Figure 5.2.2.8.3-1, with the following modifications.

   The requestIndication shall be set to NW_REQ_PDU_SES_MOD.

   As part of the modification instructions, the NF Service Consumer may request to modify QoS parameters applicable at the PDU session level (e.g. modify the authorized Session AMBR values) or at the QoS flow level (e.g. modify the MFBR of a particular QoS flow).

   The NF Service Consumer may request to establish, modify and/or release QoS flows by including the qosFlowsAddModifyRequestList IE and/or the qosFlowsReleaseRequestList IE in the payload body.

   The NF Service Consumer may include epsBearerInfo IE(s), if the PDU session may be moved to EPS during its lifetime and the EPS Bearer(s) information has changed (e.g. a new EBI has been assigned or the mapped EPS bearer QoS for an existing EBI has changed).

   The NF Service Consumer may include the revokeEbiList IE to request the V-SMF to release some EBI(s) and delete any corresponding EPS bearer context stored in the V-SMF. The V-SMF shall disassociate the EBI(s) with the QFI(s) with which they are associated.

2. Same as step 2 of Figure 5.2.2.8.3-1, with the following modifications.

   The V-SMF may accept all or only a subset of the QoS flows requested to be created or modified within the request.

   The list of QoS flows which have been successfully setup or modified, and those which failed to be so, if any, shall be included in the qosFlowsAddModifyList IE and/or the qosFlowsFailedtoAddModifyList IE respectively.

   If the NG-RAN rejects the establishment of a voice QoS flow due to EPS Fallback for IMS voice (see subclause 4.13 of 3GPP TS 23.502 [3]), the V-SMF shall return the cause indicating that "mobility due to EPS fallback for IMS voice is on-going" for the corresponding flow in the qosFlowsFailedtoAddModifyList IE.

   The list of QoS flows which have been successfully released, and those which failed to be so, if any, shall be included in the qosFlowsReleaseList and/or qosFlowsFailedtoReleaseList IE respectively.

   For a QoS flow which failed to be modified, the V-SMF shall fall back to the configuration of the QoS flow as it was configured prior to the reception of the PDU session update request from the NF Service Consumer.

   The V-SMF shall store any EPS bearer information received from the H-SMF. If the revokeEbiList IE is present in the request, the V-SMF shall request delete the corresponding EPS bearer contexts and request the AMF to release the EBIs listed in this IE.

   If the request received from the H-SMF contains the alwaysOnGranted attribute set to true, the V-SMF shall check and determine whether the PDU session can be established as an always-on PDU session based on local policy.

5.2.2.8.3.3 Home network requested PDU session release

The requirements specified in subclause 5.2.2.8.3.1 shall apply with the following modifications.

1. Same as step 1 of Figure 5.2.2.8.3-1, with the following modifications.

   The requestIndication shall be set to NW_REQ_PDU_SES_REL.

2. Same as step 2 of Figure 5.2.2.8.3-1, with the following modifications.

   If the requestIndication in the request is set to NW_REQ_PDU_SES_REL, the V-SMF shall initiate the release of RAN resources allocated for the PDU session if any and shall send a PDU session release command to the UE.

   The V-SMF shall not release the SM context for the PDU session.

NOTE: The SM context will be released when receiving Status notification from the H-SMF indicating the PDU session is released in the H-SMF.

5.2.2.8.3.4 Handover between 3GPP and untrusted non-3GPP access, from 5GC-N3IWF to EPS or from 5GS to EPC/ePDG

The requirements specified in subclause 5.2.2.8.3.1 shall apply with the following modifications.

1. Same as step 1 of Figure 5.2.2.8.3-1, with the following modifications.

   The NF Service Consumer shall request the source V-SMF to release the resources in the VPLMN without sending a PDU session release command to the UE, by setting the requestIndication IE to NW_REQ_PDU_SES_REL and the Cause IE indicating "Release due to Handover", in the following scenarios:

   - Handover of a PDU session between 3GPP and untrusted non-3GPP access, when the UE is roaming and the selected N3IWF is in the HPLMN (see subclause 4.9.2.4.2 of 3GPP TS 23.502 [3]);

   - Handover from 5GC-N3IWF to EPS (see subclause 4.11.3.2 of 3GPP TS 23.502 [3]);

   - Handover from 5GS to EPC/ePDG (see subclause 4.11.4.2 of 3GPP TS 23.502 [3]).

2. Same as step 2 of Figure 5.2.2.8.3-1, with the following modifications.

If the requestIndication in the request is set to NW_REQ_PDU_SES_REL and if the Cause IE indicates "Release due to Handover", the V-SMF shall initiate the release of RAN resources reserved for the PDU session if any but shall not send a PDU session release command to the UE.

The V-SMF shall not release the SM context for the PDU session.

NOTE: The SM context will be released when receiving Status notification from the H-SMF indicating the PDU session is released in the H-SMF.

5.2.2.8.3.5 EPS Bearer ID assignment

The requirements specified in subclause 5.2.2.8.3.1 shall apply with the following modifications.

1. Same as step 1 of Figure 5.2.2.8.3-1, with the following modifications.

    The requestIndication shall be set to EBI_ASSIGNMENT_REQ.

    The NF Service Consumer may include the assignEbiList IE to request the allocation of EBI(s). The NF Service Consumer may include the revokeEbiList IE to request the V-SMF to release some EBI(s) and delete any corresponding EPS bearer context stored in the V-SMF. The V-SMF shall disassociate the EBI(s) with the QFI(s) with which they are associated.

    Upon receipt of this request, the V-SMF shall request the AMF to assign (and release if required) EBIs (see subclause 5.2.2.6 of 3GPP TS 29.518 [20].

2a. Same as step 2a of Figure 5.2.2.8.3-1, with the following modifications.

    If the AMF has successfully assigned all or part of the requested EBIs, the SMF shall respond with the status code 200 OK, and include the list of EBIs successfully allocated, those which failed to be so if any, and the list of EBIs released for this PDU session at AMF if any, in the assignedEbiList IE, the failedtoAssignEbiList IE and/or the releasedEbiList IE respectively.

2b. Same as step 2b of Figure 5.2.2.8.3-1, with the following modifications.

    For a 4xx/5xx response, the message body shall contain a VsmfUpdateError structure, including the list of EBIs which failed to be allocated in the failedtoAssignEbiList IE.

5.2.2.9 Release service operation

5.2.2.9.1 General

The Release service operation shall be used to request an immediate and unconditional deletion of an invidual PDU session resource in the H-SMF, in HR roaming scenarios.

It is invoked by the V-SMF in the following procedures:

- UE initiated Deregistration (see subclause 4.2.2.3.2 of 3GPP TS 23.502 [3]);

- Network initiated Deregistration (see subclause 4.2.2.3.2 of 3GPP TS 23.502 [3]), e.g. AMF initiated deregistration;

- visited network requested PDU Session release (see subclause 4.3.4.3 of 3GPP TS 23.502 [3]), e.g. AMF initiated release when there is a mismatch of the PDU session status between the UE and the AMF or when a required user plane security enforcement cannot be fulfilled by the NG-RAN;

- 5GS to EPS handover using N26 interface and 5GS to EPS Idle mode mobility using N26, to release the PDU session not transferred to EPC (see subclauses 4.11.1.2.1 and 4.11.1.3.2 of 3GPP TS 23.502 [3]).

The NF Service Consumer (e.g. V-SMF) shall release a PDU session in the H-SMF by using the HTTP "release" custom operation as shown in Figure 5.2.2.9.1-1.
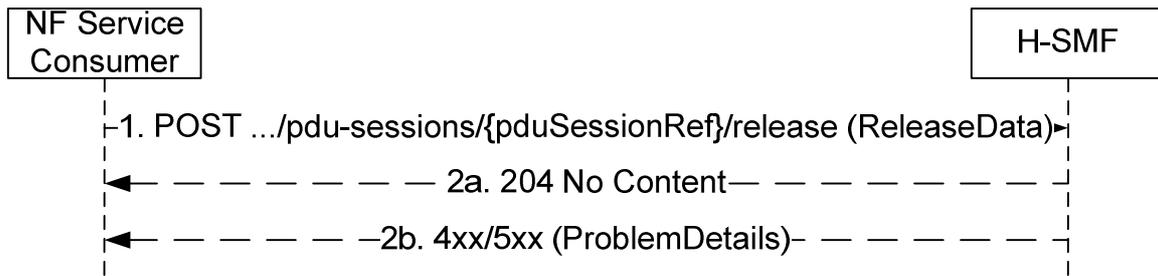
Figure 5.2.2.9.1-1: Pdu session release

1. The NF Service Consumer shall send a POST request to the resource representing the individual PDU session resource in the H-SMF. The payload body of the POST request shall contain any data that needs to be passed to the H-SMF.

2a. On success, the H-SMF shall return a "204 No Content" response with an empty payload body in the POST response.

2b. On failure, one of the HTTP status code listed in Table 6.1.3.6.4.3.2-2 shall be returned. For a 4xx/5xx response, the message body shall contain a ProblemDetails structure with the "cause" attribute set to one of the application error listed in Table 6.1.3.6.4.3.2-2.

5.2.2.10 Notify Status service operation

5.2.2.10.1 General

The Notify Status service operation shall be used to notify the NF Service Consumer about the status of a PDU session (e.g. when the PDU session is released or moved to another system), in HR roaming scenarios.

It is used in the following procedures:

- Home network requested PDU Session release (see subclause 4.3.4.3 of 3GPP TS 23.502 [3]), e.g. H-SMF initiated release.

- Handover of a PDU Session procedure from 3GPP to untrusted non-3GPP access (see subclause 4.9.2.4.2 of 3GPP TS 23.502 [3]);

- Interworking procedures without N26 interface, e.g. 5GS to EPS Mobility (see subclause 4.11.2.2 of 3GPP TS 23.502 [3]);

- Handover from 5GC-N3IWF to EPS (see subclause 4.11.3.2 of 3GPP TS 23.502 [3]);

- Handover from 5GS to EPC/ePDG (see subclause 4.11.4.2 of 3GPP TS 23.502 [3]);

The H-SMF shall notify the NF Service Consumer (e.g. V-SMF) by using the HTTP POST method as shown in Figure 5.2.2.10-1.
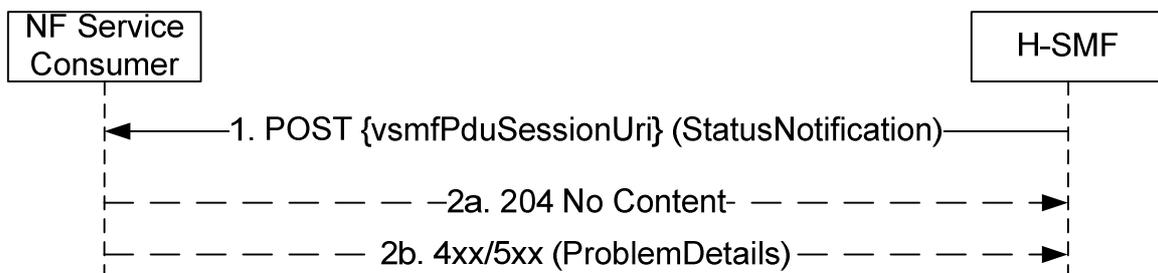
Figure 5.2.2.10-1: PDU session status notification

1. The H-SMF shall send a POST request to the resource representing the individual PDU session resource in the V-SMF. The payload body of the POST request shall contain the notification payload, with the status information.

> If the notification is triggered by PDU session handover, the notification payload shall contain the Cause IE with value "PDU_SESSION_HANDED_OVER".

2a. On success, "204 No Content" shall be returned and the payload body of the POST response shall be empty.

> If the H-SMF indicated in the request that the PDU session in the H-SMF is released, the NF Service Consumer (i.e. the V-SMF) shall release the SM context for the PDU session.

2b. On failure, one of the HTTP status code listed in Table 6.1.3.7.3.1-2 shall be returned. For a 4xx/5xx response, the message body shall contain a ProblemDetails structure with the "cause" attribute set to one of the application error listed in Table 6.1.3.7.3.1-2.

5.2.3 General procedures

5.2.3.1 Transfer of NAS SM information between UE and H-SMF for Home Routed PDU sessions

5.2.3.1.1 General

As specified in subclause 4.3.1 of 3GPP TS 23.502 [3], for Home Routed PDU sessions, there is NAS SM information that the V-SMF and H-SMF need to interpret, and NAS SM information that the V-SMF only needs to transfer between the UE and H-SMF but which it does not need to interpret.

NAS SM information that only needs to be transferred between the UE and H-SMF by the V-SMF can be extended in later versions or releases of the NAS specification, e.g. defining new fields or values within existing IEs, and the extensions should not impact the V-SMF.

Besides, in HR roaming scenarios, the V-SMF and H-SMF can comply to different versions or releases of the NAS specification. It should be possible to support new SM features only requiring support from the H-SMF without impacting the V-SMF, when the H-SMF complies with a more recent release than the V-SMF, e.g. defining new NAS SM IEs in signalling from the UE to the H-SMF and/or signalling from the H-SMF to the UE.

5.2.3.1.2 V-SMF Behaviour

The V-SMF shall transfer NAS SM information that it only needs to transfer to the H-SMF (i.e. known IEs, and IEs that have an unknown value not set to "reserved" according to the release to which the V-SMF complies, that only need to be forwarded by the V-SMF) in n1SmInfoFromUe binary data within the HTTP payload. This carries N1 SM IE(s), encoded as specified in 3GPP TS 24.501 [7], including the Type field and, for TLV or TLV-E IEs, the Length field.

> NOTE 1: N1 SM IEs defined without a Type field need to be defined over N16 as specific IEs.

The V-SMF shall transfer NAS SM information that it does not comprehend (i.e. unknown IEs, or known IEs to be interpreted by the V-SMF that have an unknown value not set to "reserved" according to the release to which the V-SMF complies) in unknownN1SmInfo binary data within the HTTP payload. This carries N1 SM IE(s), encoded as specified in 3GPP TS 24.501 [7], including the Type field and, for TLV or TLV-E IEs, the Length field.

When receiving n1SmInfoToUe binary data in the HTTP payload from the H-SMF, the V-SMF shall parse all the N1 SM IEs received in the binary data and construct the NAS SM message to the UE according to 3GPP TS 24.501 [7]. The V-SMF shall append unknown NAS SM IEs received in the binary data at the end of the NAS SM message it sends to the UE.

> NOTE 2: The V-SMF can infer the length of an unknown IE based on the IEI value. See subclause 11.2.4 of 3GPP TS 24.007 [8].

The V-SMF shall comprehend, and be able to encode at their right place in a given NAS message, all the IEs of the version of the NAS specification it implements that do not need to be interpreted by the V-SMF and which precede the last interpreted IE that the V-SMF implements in a NAS message.

> NOTE 3: The V-SMF encodes comprehended IEs at their right place in the NAS SM message

5.2.3.1.3 H-SMF Behaviour

When receiving unknownN1SmInfo binary data in the HTTP payload from the V-SMF, the H-SMF shall process any N1 SM IE received in this binary data that do not require to be interpreted by the V-SMF. Other N1 SM IEs shall be dropped, e.g. IEs that the H-SMF comprehends but which require to be interpreted by the V-SMF.

The H-SMF shall transfer NAS SM information which the V-SMF does not need to interpret (i.e. that it only needs to transfer to the UE) in n1SmInfoToUe binary data within the HTTP payload. This carries N1 SM IE(s), encoded as specified in 3GPP TS 24.501 [7], including the Type field and, for TLV or TLV-E IEs, the Length field.

NOTE 1: N1 SM IEs defined without a Type field need to be defined over N16 as specific IEs.

The NAS SM IEs in n1SmInfoToUe binary data shall be encoded in the same order as specified in 3GPP TS 24.501 [7].

N1 SM information which does not require to be interpreted by the V-SMF is information that is not defined as specific IEs over N16.

6 API Definitions

6.1 Nsmf_PDUSession Service API

6.1.1 API URI

URIs of this API shall have the following root:

{apiRoot}/{apiName}/{apiVersion}/

where "apiRoot" is defined in subclause 4.4.1 of 3GPP TS 29.501 [5], the "apiName" shall be set to "nsmf-pdusession" and the "apiVersion" shall be set to "v1" for the current version of this specification.

6.1.2 Usage of HTTP

6.1.2.1 General

HTTP/2, as defined in IETF RFC 7540 [14], shall be used as specified in clause 5 of 3GPP TS 29.500 [4].

HTTP/2 shall be transported as specified in subclause 5.3 of 3GPP TS 29.500 [4].

HTTP messages and bodies for the Nsmf_PDUSession service shall comply with the OpenAPI [15] specification contained in Annex A.

6.1.2.2 HTTP standard headers

6.1.2.2.1 General

The usage of HTTP standard headers shall be supported as specified in subclause 5.2.2 of 3GPP TS 29.500 [4].

6.1.2.2.2 Content type

The following content types shall be supported:

- the JSON format (IETF RFC 8259 [11]). The use of the JSON format shall be signalled by the content type "application/json". See also subclause 5.4 of 3GPP TS 29.500 [4].

- the Problem Details JSON Object (IETF RFC 7807 [23]). The use of the Problem Details JSON object in a HTTP response body shall be signalled by the content type "application/problem+json".

NOTE: "application/json" is used in a response that includes a payload body containing an application-specific data structure, see subclause 4.8 of 3GPP TS 29.501 [5].

Multipart messages shall also be supported (see subclause 6.1.2.4) using the content type "multipart/related", comprising:

- one JSON body part with the "application/json" content type; and

- one or two binary body parts with 3gpp vendor specific content subtypes.

The 3gpp vendor specific content subtypes defined in Table 6.1.2.2.2-1 shall be supported.

Table 6.1.2.2.2-1: 3GPP vendor specific content subtypes

content subtype	Description
vnd.3gpp.ngap	Binary encoded payload, encoding NG Application Protocol (NGAP) IEs, as specified in subclause 9.3 of 3GPP TS 38.413 [9] (ASN.1 encoded).
vnd.3gpp.5gnas	Binary encoded payload, encoding a 5GS NAS message or 5G NAS IEs, as specified in 3GPP TS 24.501 [7].
NOTE: Using 3GPP vendor content subtypes allows to describe the nature of the opaque payload (e.g. NGAP or 5GS NAS information) without having to rely on metadata in the JSON payload.	

See subclause 6.1.2.4 for the binary payloads supported in the binary body part of multipart messages.

6.1.2.3   HTTP custom headers

6.1.2.3.1   General

In this release of the specification, no specific custom headers are defined for the Nsmf_PDUSession service.

For 3GPP specific HTTP custom headers used across all service based interfaces, see subclause 5.2.3 of 3GPP TS 29.500 [4].

6.1.2.4   HTTP multipart messages

HTTP multipart messages shall be supported, to transfer opaque N1 and/or N2 SMpayloads, in the following service operations (and HTTP messages):

- Create SM Context Request and Response (POST);

- Update SM Context Request and Response (POST);

- Release SM Context Request (POST);

- Create Request and Response (POST);

- Update Request and Response (POST (modify)).

HTTP multipart messages shall include one JSON body part and one or two binary body parts comprising:

- an N1 SM payload, an N2 SM payload or both, over N11 (see subclause 6.1.6.4);

- one or two N1 SM payloads, over N16 (see subclause 6.1.6.4);

- one or two N2 SM payloads over N11 (see subclause 5.2.2.3.3).

The JSON body part shall be the "root" body part of the multipart message. It shall be encoded as the first body part of the multipart message. The "Start" parameter does not need to be included.

The multipart message shall include a "type" parameter (see IETF RFC 2387 [10]) specifying the media type of the root body part, i.e. "application/json".

NOTE: The "root" body part (or "root" object) is the first body part the application processes when receiving a multipart/related message, see IETF RFC 2387 [10]. The default root is the first body within the multipart/related message. The "Start" parameter indicates the root body part, e.g. when this is not the first body part in the message.

For each binary body part in a HTTP multipart message, the binary body part shall include a Content-ID header (see IETF RFC 2045 [12]), and the JSON body part shall include an attribute, defined with the RefToBinaryData type, that contains the value of the Content-ID header field of the referenced binary body part.

Examples of multipart/related messages can be found in Annex B.

6.1.2.5 HTTP/2 request retries

The principles specified in subclause 5.2.8 of 3GPP TS 29.500 [4] shall be applied with the following modifications.

The NF Service Consumer may retry any HTTP POST request on the same resource through a new TCP connection after a TCP connection failure.

The SMF shall support handling repeated retries successfully.

    NOTE: See subclauses 5.2.2.2 and 5.2.2.7 for the handling by the SMF of an HTTP POST request that would have already been processed by the SMF and that would be retried by the NF Service Consumer.

HTTP conditional requests are not supported by the Nsmf_PDUSession service in this version of the API.

6.1.3 Resources

6.1.3.1 Overview

Figure 6.1.3.1-1 describes the resource URI structure of the Nsmf_PDUSession API.
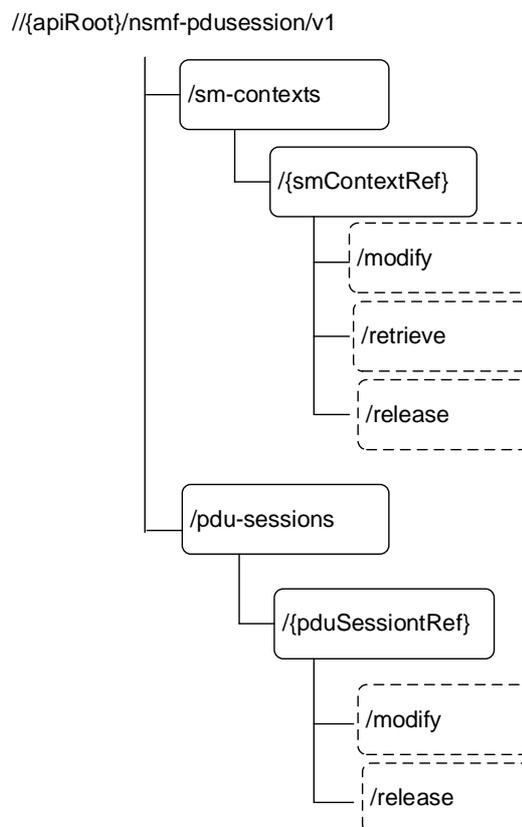
Figure 6.1.3.1-1: Resource URI structure of the Nsmf_PDUSession API

    NOTE: The sm-contexts and pdu-sessions collection resources can be distributed on different processing instances or hosts. Thus, the authority and/or deployment-specific string of the apiRoot of the created individual sm context and pdu-session resources' URIs can differ from the authority and/or deployment-specific string of the apiRoot of the sm-contexts and pdu-sessions distributed collections' URIs.

Table 6.1.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 6.1.3.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method or custom operation	Description (service operation)
SM contexts collection	{apiRoot}/nsmf-pdusession/v1/sm-contexts	POST	Create SM Context
Individual SM context	{apiRoot}/nsmf-pdusession/v1/sm-contexts/{smContextRef}/retrieve	retrieve (POST)	Retrieve SM Context
	{apiRoot}/nsmf-pdusession/v1/sm-contexts/{smContextRef}/modify	modify (POST)	Update SM Context
	{apiRoot}/ nsmf-pdusession/v1/sm-contexts/{smContextRef}/release	release (POST)	Release SM Context
PDU sessions collection (H-SMF)	{apiRoot}/nsmf-pdusession/v1/pdu-sessions	POST	Create
Individual PDU session (H-SMF)	{apiRoot}/nsmf-pdusession/v1/pdu-sessions/{pduSessionRef}/modify	modify (POST)	Update (initiated by V-SMF)
	{apiRoot}/nsmf-pdusession/v1/pdu-sessions/{pduSessionRef}/release	release (POST)	Release
Individual PDU session (V-SMF)	{vsmfPduSessionUri}/modify	modify (POST)	Updated (initiated by H-SMF)
	{vsmfPduSessionUri}	POST	Notify Status

6.1.3.2 Resource: SM contexts collection

6.1.3.2.1 Description

This resource represents the collection of the individual SM contexts created in the SMF.

This resource is modelled with the Collection resource archetype (see subclause C.2 of 3GPP TS 29.501 [5]).

6.1.3.2.2 Resource Definition

Resource URI: **{apiRoot}/nsmf-pdusession/v1/sm-contexts**

This resource shall support the resource URI variables defined in table 6.1.3.2.2-1.

Table 6.1.3.2.2-1: Resource URI variables for this resource

Name	Definition
apiRoot	See subclause 6.1.1.

6.1.3.2.3 Resource Standard Methods

6.1.3.2.3.1 POST

This method creates an individual SM context resource in the SMF, or in V-SMF in HR roaming scenarios.

This method shall support the URI query parameters specified in table 6.1.3.2.3.1-1.

Table 6.1.3.2.3.1-1: 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 6.1.3.2.3.1-2 and the response data structures and response codes specified in table 6.1.3.2.3.1-3.

Table 6.1.3.2.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
SmContextCreate Data	M	1	Representation of the SM context to be created in the SMF.

Table 6.1.3.2.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SmContextCreatedData	M	1	201 Created	Successful creation of an SM context.
			307 Temporary Redirect	Temporary redirection, during a UE requested PDU Session Establishment. The response should include a Location header field containing a different URI. The URI shall be an alternative URI of the SMF that was selected by the AMF.
			308 Permanent Redirect	Permanent redirection, during a UE requested PDU Session Establishment. The response should include a Location header field containing a different URI. The URI shall be an alternative URI of the SMF that was selected by the AMF.
SmContextCreateError	M	1	400 Bad Request	The "cause" attribute shall be set to one of the errors defined in Table 5.2.7.2-1 of 3GPP TS 29.500 [4].
SmContextCreateError	M	1	403 Forbidden	The "cause" attribute shall be set to one of the following application error: - N1_SM_ERROR - SNSSAI_DENIED - DNN_DENIED - PDUTYPE_DENIED - SSC_DENIED - SUBSCRIPTION_DENIED - DNN_NOT_SUPPORTED - PDUTYPE_NOT_SUPPORTED - SSC_NOT_SUPPORTED - HOME_ROUTED_ROAMING_REQUIRED - OUT_OF_LADN_SERVICE_AREA - NO_EPS_5GS_CONTINUITY - INTEGRITY_PROTECTED_MDR_NOT_ACCEPTABLE See table 6.1.7.3-1 for the description of these errors.
SmContextCreateError	M	1	404 Not Found	The "cause" attribute shall be set to one of the following application error: - CONTEXT_NOT_FOUND See table 6.1.7.3-1 for the description of these errors.
SmContextCreateError	M	1	500 Internal Server Error	The "cause" attribute shall be set to one of the errors defined in Table 5.2.7.2-1 of 3GPP TS 29.500 [4] or to one of the following application errors: - INSUFFICIENT_RESOURCES_SLICE - INSUFFICIENT_RESOURCES_SLICE_DNN See table 6.1.7.3-1 for the description of these errors.
SmContextCreateError	M	1	503 Service Unavailable	The "cause" attribute shall be set to one of the errors defined in Table 5.2.7.2-1 of 3GPP TS 29.500 [4] or to one of the following application errors: - DNN_CONGESTION - S-NSSAI_ CONGESTION See table 6.1.7.3-1 for the description of these errors.
SmContextCreateError	M	1	504 Gateway Timeout	The "cause" attribute shall be set to one of the following application error: - PEER_NOT_RESPONDING - NETWORK_FAILURE See table 6.1.7.3-1 for the description of these errors.
NOTE: The mandatory HTTP error status codes for the POST method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] other than those specified in the table above also apply, with a ProblemDetails data type (see subclause 5.2.7 of 3GPP TS 29.500 [4]).				

6.1.3.2.4 Resource Custom Operations

None.

6.1.3.3   Resource: Individual SM context

6.1.3.3.1   Description

This resource represents an individual SM context created in the SMF.

This resource is modelled with the Document resource archetype (see subclause C.1 of 3GPP TS 29.501 [5]).

6.1.3.3.2   Resource Definition

Resource URI: **{apiRoot}/nsmf-pdusession/v1/sm-contexts/{smContextRef}**

This resource shall support the resource URI variables defined in table 6.1.3.3.2-1.

Table 6.1.3.3.2-1: Resource URI variables for this resource

Name	Definition
apiRoot	See subclause 6.1.1.
smContextRef	SM context reference assigned by the SMF during the Create SM Context service operation.

6.1.3.3.3   Resource Standard Methods

None.

6.1.3.3.4   Resource Custom Operations

6.1.3.3.4.1   Overview

Table 6.1.3.3.4.1-1: Custom operations

Custom operaration URI	Mapped HTTP method	Description
{resourceUri}/modify	POST	Update SM Context service operation.
{resourceUri}/release	POST	Release SM Context service operation.
{resourceUri}/retrieve	POST	Retrieve SM Context service operation

6.1.3.3.4.2   Operation: modify

6.1.3.3.4.2.1   Description

6.1.3.3.4.2.2   Operation Definition

This custom operation updates an individual SM context resource and/or provide N1 or N2 SM information received from the UE or the AN, for a given PDU session, towards the SMF, or in V-SMF in HR roaming scenario.

This operation shall support the request data structures specified in table 6.1.3.3.4.2.2-1 and the response data structure and response codes specified in table 6.1.3.3.4.2.2-2.

Table 6.1.3.3.4.2.2-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
SmContextUpdateData	M	1	Representation of the updates to apply to the SM context.

Table 6.1.3.3.4.2.2-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SmContextUpdatedData	C	0..1	200 OK	Successful update of the SM context, when the SMF needs to return information in the response.
			204 No Content	Successful update of the SM context, when the SMF does not need to return information in the response.
SmContextUpdateError	M	1	400 Bad Request	The "cause" attribute shall be set to one of the errors defined in Table 5.2.7.2-1 of 3GPP TS 29.500 [4].
SmContextUpdateError	M	1	403 Forbidden	The "cause" attribute shall be set to one of the following application error: - N1_SM_ERROR - N2_SM_ERROR - SUBSCRIPTION_DENIED - OUT_OF_LADN_SERVICE_AREA - PRIORITIZED_SERVICES_ONLY - PDU_SESSION_ANCHOR_CHANGE See table 6.1.7.3-1 for the description of these errors.
SmContextUpdateError	M	1	404 Not Found	The "cause" attribute shall be set to one of the following application error: - CONTEXT_NOT_FOUND See table 6.1.7.3-1 for the description of these errors.
SmContextUpdateError	M	1	500 Internal Server Error	The "cause" attribute shall be set to one of the errors defined in Table 5.2.7.2-1 of 3GPP TS 29.500 [4].
SmContextUpdateError	M	1	503 Service Unavailable	The "cause" attribute shall be set to one of the errors defined in Table 5.2.7.2-1 of 3GPP TS 29.500 [4] or to one of the following application errors: - DNN_CONGESTION - S-NSSAI_ CONGESTION See table 6.1.7.3-1 for the description of these errors.
NOTE:	The mandatory HTTP error status codes for the POST method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] other than those specified in the table above also apply, with a ProblemDetails data type (see subclause 5.2.7 of 3GPP TS 29.500 [4]).			

6.1.3.3.4.3   Operation: release

6.1.3.3.4.3.1   Description

6.1.3.3.4.3.2   Operation Definition

This custom operation releases an individual SM context resource in the SMF, or in V-SMF in HR roaming scenario

This operation shall support the request data structures specified in table 6.1.3.3.4.3.2-1 and the response data structure and response codes specified in table 6.1.3.3.4.3.2-2.

Table 6.1.3.3.4.3.2-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
SmContextReleaseData	C	0..1	Representation of the data to be sent to the SMF when releasing the SM context.

Table 6.1.3.3.4.3.2-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
			204 No Content	Successful release of an SM context.
NOTE: The mandatory HTTP error status codes for the POST method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] other than those specified in the table above also apply, with a ProblemDetails data type (see subclause 5.2.7 of 3GPP TS 29.500 [4]).				

6.1.3.3.4.4 Operation: retrieve

6.1.3.3.4.4.1 Description

6.1.3.3.4.4.2 Operation Definition

This custom operation retrieves an individual SM context resource from the SMF, or from the V-SMF in HR roaming scenario.

This operation shall support the request data structures specified in table 6.1.3.3.4.4.2-1 and the response data structure and response codes specified in table 6.1.3.3.4.4.2-2.

Table 6.1.3.3.4.4.2-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
SmContextRetrieveData	O	0..1	Optional parameters used to retrieve the SM context, e.g. target MME capabilities.

Table 6.1.3.3.4.4.2-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SmContextRetrievedData	M	1	200 OK	Successful retrieval of the SM context.
ProblemDetails	M	1	403 Forbidden	The "cause" attribute shall be set to one of the following application error: - TARGET_MME_CAPABILITY See table 6.1.7.3-1 for the description of these errors.
NOTE: The mandatory HTTP error status codes for the POST method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] other than those specified in the table above also apply, with a ProblemDetails data type (see subclause 5.2.7 of 3GPP TS 29.500 [4]).				

6.1.3.5 Resource: PDU sessions collection (H-SMF)

6.1.3.5.1 Description

This resource represents the collection of the individual PDU sessions created in the H-SMF.

This resource is modelled with the Collection resource archetype (see subclause C.2 of 3GPP TS 29.501 [5]).

6.1.3.5.2 Resource Definition

Resource URI: **{apiRoot}/nsmf-pdusession/v1/pdu-sessions**

This resource shall support the resource URI variables defined in table 6.1.3.5.2-1.

Table 6.1.3.5.2-1: Resource URI variables for this resource

Name	Definition
apiRoot	See subclause 6.1.1.

6.1.3.5.3 Resource Standard Methods

6.1.3.5.3.1 POST

This method creates an individual PDU session resource in the H-SMF.

This method shall support the URI query parameters specified in table 6.1.3.5.3.1-1.

Table 6.1.3.5.3.1-1: 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 6.1.3.5.3.1-2 and the response data structures and response codes specified in table 6.1.3.5.3.1-3.

Table 6.1.3.5.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
PduSessionCreateData	M	1	Representation of the PDU session to be created in the H-SMF.

Table 6.1.3.5.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
PduSessionCreatedData	M	1	201 Created	Successful creation of a PDU session.
			307 Temporary Redirect	Temporary redirection, during a UE requested PDU Session Establishment. The response should include a Location header field containing a different URI. The URI shall be an alternative URI of the SMF that was selected by the AMF.
			308 Permanent Redirect	Permanent redirection, during a UE requested PDU Session Establishment. The response should include a Location header field containing a different URI. The URI shall be an alternative URI of the SMF that was selected by the AMF.
PduSessionCreateError	M	1	400 Bad Request	The "cause" attribute shall be set to one of the errors defined in Table 5.2.7.2-1 of 3GPP TS 29.500 [4].
PduSessionCreateError	M	1	403 Forbidden	The "cause" attribute shall be set to one of the following application error: - N1_SM_ERROR - SNSSAI_DENIED - DNN_DENIED - PDUTYPE_DENIED - SSC_DENIED - SUBSCRIPTION_DENIED - DNN_NOT_SUPPORTED - PDUTYPE_NOT_SUPPORTED - SSC_NOT_SUPPORTED - NO_EPS_5GS_CONTINUITY - INTEGRITY_PROTECTED_MDR_NOT_ACCEPTABLE See table 6.1.7.3-1 for the description of these errors.
PduSessionCreateError	M	1	404 Not Found	The "cause" attribute shall be set to one of the following application error: - CONTEXT_NOT_FOUND See table 6.1.7.3-1 for the description of these errors.
PduSessionCreateError	M	1	500 Internal Server Error	The "cause" attribute shall be set to one of the errors defined in Table 5.2.7.2-1 of 3GPP TS 29.500 [4] or to one of the following application errors: - INSUFFIC_RESOURCES_SLICE - INSUFFIC_RESOURCES_SLICE_DNN See table 6.1.7.3-1 for the description of these errors.
PduSessionCreateError	M	1	503 Service Unavailable	The "cause" attribute shall be set to one of the errors defined in Table 5.2.7.2-1 of 3GPP TS 29.500 [4] or to one of the following application errors: - DNN_CONGESTION - S-NSSAI_ CONGESTION See table 6.1.7.3-1 for the description of these errors.
PduSessionCreateError	M	1	504 Gateway Timeout	The "cause" attribute shall be set to one of the following application error: - PEER_NOT_RESPONDING - NETWORK_FAILURE See table 6.1.7.3-1 for the description of these errors.
NOTE: The mandatory HTTP error status codes for the POST method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] other than those specified in the table above also apply, with a ProblemDetails data type (see subclause 5.2.7 of 3GPP TS 29.500 [4]).				

6.1.3.5.4   Resource Custom Operations

6.1.3.5.4.1 Overview

Table 6.1.3.5.4.1-1: Custom operations

Custom operaration URI	Mapped HTTP method	Description
n/a		

6.1.3.6   Resource: Individual PDU session (H-SMF)

6.1.3.6.1   Description

This resource represents an individual PDU session created in the H-SMF.

This resource is modelled with the Document resource archetype (see subclause C.1 of 3GPP TS 29.501 [5]).

6.1.3.6.2   Resource Definition

Resource URI: **{apiRoot}/nsmf-pdusession/v1/pdu-sessions/{pduSessionRef}**

This resource shall support the resource URI variables defined in table 6.1.3.6.2-1.

Table 6.1.3.6.2-1: Resource URI variables for this resource

Name	Definition
apiRoot	See subclause 6.1.1.
pduSessionRef	PDU session reference assigned by the H-SMF during the Create service operation.

6.1.3.6.3   Resource Standard Methods

None.

6.1.3.6.4   Resource Custom Operations

6.1.3.6.4.1 Overview

Table 6.1.3.6.4.1-1: Custom operations

Custom operation URI	Mapped HTTP method	Description
{resourceUri}/modify	POST	Update service operation.
{resourceUri}/release	POST	Release service operation.

6.1.3.6.4.2 Operation: modify

6.1.3.6.4.2.1   Description

6.1.3.6.4.2.2   Operation Definition

This custom operation updates an individual PDU session resource in the H-SMF and/or provide the H-SMF with information received by the V-SMF in N1 SM signalling from the UE.

This operation shall support the request data structures specified in table 6.1.3.6.4.2.2-1 and the response data structure and response codes specified in table 6.1.3.6.4.2.2-2.

Table 6.1.3.6.4.2.2-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
HsmfUpdateData	M	1	Representation of the updates to apply to the PDU session.

Table 6.1.3.6.4.2.2-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
HsmfUpdatedData	C	0..1	200 OK	This case represents a successful update of the PDU session, when the H-SMF needs to return information in the response.
			204 No Content	This case represents a successful update of the PDU session, when the H-SMF does not need to return information in the response.
HsmfUpdateError	M	1	400 Bad Request	The "cause" attribute shall be set to one of the errors defined in Table 5.2.7.2-1 of 3GPP TS 29.500 [4].
HsmfUpdateError	M	1	403 Forbidden	The "cause" attribute shall be set to one of the following application errors: - N1_SM_ERROR - SUBSCRIPTION_DENIED - PDU_SESSION_ANCHOR_CHANGE See table 6.1.7.3-1 for the description of these errors.
HsmfUpdateError	M	1	404 Not Found	The "cause" attribute shall be set to one of the following application error: - CONTEXT_NOT_FOUND See table 6.1.7.3-1 for the description of these errors.
HsmfUpdateError	M	1	500 Internal Server Error	The "cause" attribute shall be set to one of the errors defined in Table 5.2.7.2-1 of 3GPP TS 29.500 [4].
HsmfUpdateError	M	1	503 Service Unavailable	The "cause" attribute shall be set to one of the errors defined in Table 5.2.7.2-1 of 3GPP TS 29.500 [4] or to one of the following application errors: - DNN_CONGESTION - S-NSSAI_ CONGESTION See table 6.1.7.3-1 for the description of these errors.
NOTE: The mandatory HTTP error status codes for the POST method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] other than those specified in the table above also apply, with a ProblemDetails data type (see subclause 5.2.7 of 3GPP TS 29.500 [4]).				

6.1.3.6.4.3   Operation: release

6.1.3.6.4.3.1   Description

6.1.3.6.4.3.2   Operation Definition

This custom operation releases an individual PDU session resource in the H-SMF, in HR roaming scenario.

This operation shall support the request data structures specified in table 6.1.3.6.4.3.2-1 and the response data structure and response codes specified in table 6.1.3.6.4.3.2-2.

Table 6.1.3.6.4.3.2-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
ReleaseData	C	0..1	Representation of the data to be sent to the H-SMF when releasing the PDU session.

Table 6.1.3.6.4.3.2-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
			204 No Content	Successful release of a PDU session.
NOTE:	The mandatory HTTP error status codes for the POST method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] other than those specified in the table above also apply, with a ProblemDetails data type (see subclause 5.2.7 of 3GPP TS 29.500 [4]).			

6.1.3.7 Resource: Individual PDU session (V-SMF)

6.1.3.7.1 Description

This resource represents an individual PDU session created in the V-SMF.

This resource is modelled with the Document resource archetype (see subclause C.1 of 3GPP TS 29.501 [5]).

6.1.3.7.2 Resource Definition

Resource URI: **{vsmfPduSessionUri}**

This resource shall support the resource URI variables defined in table 6.1.3.7.2-1.

Table 6.1.3.7.2-1: Resource URI variables for this resource

Name	Definition
vsmfPduSessionUri	PDU session reference assigned by the V-SMF during the Create service operation.

6.1.3.7.3 Resource Standard Methods

6.1.3.7.3.1 POST

This method sends a status notification to the NF Service Consumer.

This method shall support the URI query parameters specified in table 6.1.3.7.3.1-1.

Table 6.1.3.7.3.1-1: 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 6.1.3.7.3.1-2 and the response data structures and response codes specified in table 6.1.3.7.3.1-3.

Table 6.1.3.7.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
StatusNotification	M	1	Representation of the status notification.

Table 6.1.3.7.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
			204 No Content	Successful notification of status change
NOTE: The mandatory HTTP error status codes for the POST method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] other than those specified in the table above also apply, with a ProblemDetails data type (see subclause 5.2.7 of 3GPP TS 29.500 [4]).				

6.1.3.7.4 Resource Custom Operations

6.1.3.7.4.1 Overview

Table 6.1.3.7.4.1-1: Custom operations

Custom operation URI	Mapped HTTP method	Description
{vsmfPduSessionUri}/modify	POST	Update service operation (initiated by H-SMF)

6.1.3.7.4.2 Operation: modify

6.1.3.7.4.2.1 Description

6.1.3.7.4.2.2 Operation Definition

This custom operation modifies an individual PDU session resource in the V-SMF, in HR roaming scenario.

This operation shall support the request data structures specified in table 6.1.3.7.4.2.2-1 and the response data structure and response codes specified in table 6.1.3.7.4.2.2-2.

Table 6.1.3.7.4.2.2-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
VsmfUpdateData	M	1	Representation of the updates to apply to the PDU session.

Table 6.1.3.7.4.2.2-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
VsmfUpdatedData	M	1	200 OK	This case represents a successful update of the PDU session, when the V-SMF needs to return information in the response.
			204 No Content	This case represents a successful update of the PDU session, when the V-SMF does not need to return information in the response.
VsmfUpdateError	M	1	400 Bad Request	The "cause" attribute shall be set to one of the errors defined in Table 5.2.7.2-1 of 3GPP TS 29.500 [4].
VsmfUpdateError	M	1	403 Forbidden	The "cause" attribute shall be set to one of the following application errors: - N1_SM_ERROR - UNABLE_TO_PAGE_UE - UE_NOT_RESPONDING - REJECTED_BY_UE - REJECTED_DUE_VPLMN_POLICY - HO_TAU_IN_PROGRESS - EBI_EXHAUSTED - EBI_REJECTED_LOCAL_POLICY, if the EBI allocation was rejected due to local policies at the AMF as specified in subclause 4.11.1.4.1 of 3GPP TS 23.502 [3]. - EBI_REJECTED_NO_N26, if the EBI allocation was rejected when the AMF is in a serving PLMN that does not support 5GS-EPS interworking procedures with N26 interface as specified in subclause 5.17.2.3.1 of 3GPP TS 23.501 [2]. See table 6.1.7.3-1 for the description of these errors.
VsmfUpdateError	M	1	404 Not Found	The "cause" attribute shall be set to one of the following application error: - CONTEXT_NOT_FOUND See table 6.1.7.3-1 for the description of these errors.
VsmfUpdateError	M	1	500 Internal Server Error	The "cause" attribute shall be set to one of the errors defined in Table 5.2.7.2-1 of 3GPP TS 29.500 [4].
VsmfUpdateError	M	1	503 Service Unavailable	The "cause" attribute shall be set to one of the errors defined in Table 5.2.7.2-1 of 3GPP TS 29.500 [4].
VsmfUpdateError	M	1	504 Gateway Timeout	The "cause" attribute shall be set to one of the following application errors: - PEER_NOT_RESPONDING - NETWORK_FAILURE See table 6.1.7.3-1 for the description of these errors.
NOTE:		The mandatory HTTP error status codes for the POST method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] other than those specified in the table above also apply, with a ProblemDetails data type (see subclause 5.2.7 of 3GPP TS 29.500 [4]).		

6.1.4 Custom Operations without associated resources

None.

6.1.5 Notifications

6.1.5.1 General

This subclause specifies the notifications provided by the Nsmf_PDUSession service.

The delivery of notifications shall be supported as specified in subclause 6.2 of 3GPP TS 29.500 [4] for Server-initiated communication.

Table 6.1.5.1-1: Notifications overview

Notification	Resource URI	HTTP method or custom operation	Description (service operation)
SM context status notification	{smContextStatusUri} (NF Service Consumer provided callback reference)	POST	Notify SM Context Status

6.1.5.2   SM Context Status Notification

6.1.5.2.1   Description

If the NF Service Consumer (e.g AMF) has provided the callback URI for getting notified about change of SM context status, the SMF shall notify the NF Service Consumer when the SM context status information is updated.

6.1.5.2.2   Notification Definition

The POST method shall be used for SM context status notification and the URI shall be the callback reference provided by the NF Service Consumer during the subscription to this notification.

Resource URI: **{smContextStatusUri}**

Support of URI query parameters is specified in table 6.1.5.2.2-1.

Table 6.1.5.2.2-1: URI query parameters supported by the POST method

Name	Data type	P	Cardinality	Description
n/a				

Support of request data structures is specified in table 6.1.5.2.2-2, and support of response data structures and response codes is specified in table 6.1.5.2-3.

Table 6.1.5.2.2-2: Data structures supported by the POST Request Body

Data type	P	Cardinality	Description
SmContextStatus Notification	M	1	Representation of the SM context status notification.

Table 6.1.5.2.2-3: Data structures supported by the POST Response Body

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	Successful notification of the SM context status change
n/a			307 Temporary Redirect	The NF service consumer shall generate a Location header field containing a URI pointing to another NF service consumer to which the notification should be send.
NOTE:	The mandatory HTTP error status codes for the POST method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] other than those specified in the table above also apply, with a ProblemDetails data type (see subclause 5.2.7 of 3GPP TS 29.500 [4]).			

6.1.6   Data Model

6.1.6.1   General

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

Table 6.1.6.1-1 specifies the data types defined for the Nsmf service based interface protocol.

Table 6.1.6.1-1: Nsmf specific Data Types

Data type	Section defined	Description
SmContextCreateData	6.1.6.2.2	Information within Create SM Context Request
SmContextCreatedData	6.1.6.2.3	Information within Create SM Context Response
SmContextUpdateData	6.1.6.2.4	Information within Update SM Context Request
SmContextUpdatedData	6.1.6.2.5	Information within Update SM Context Response
SmContextReleaseData	6.1.6.2.6	Information within Release SM Context Request
SMContextRetrieveData	6.1.6.2.7	Information within Retrieve SM Context Request
SmContextStatusNotification	6.1.6.2.8	Information within Notify SM Context Status Request
PduSessionCreateData	6.1.6.2.9	Information within Create Request
PduSessionCreatedData	6.1.6.2.10	Information within Create Response
HsmfUpdateData	6.1.6.2.11	Information within Update Request towards H-SMF
HsmfUpdatedData	6.1.6.2.12	Information within Update Response from H-SMF
ReleaseData	6.1.6.2.13	Information within Release Request
HsmfUpdateError	6.1.6.2.14	Error within Update Response from H-SMF
VsmfUpdateData	6.1.6.2.15	Information within Update Request towards V-SMF
VsmfUpdatedData	6.1.6.2.16	Information within Update Response from V-SMF
StatusNotification	6.1.6.2.17	Information within Notify Status Request
QosFlowItem	6.1.6.2.18	Individual QoS flow
QosFlowSetupItem	6.1.6.2.19	Individual QoS flow to setup
QosFlowAddModifyRequestItem	6.1.6.2.20	Individual QoS flow requested to be created or modified
QosFlowReleaseRequestItem	6.1.6.2.21	Individual QoS flow requested to be released
QosFlowProfile	6.1.6.2.22	QoS flow profile
GbrQosFlowInformation	6.1.6.2.23	GBR QoS flow information
QosFlowNotifyItem	6.1.6.2.24	Notification related to a QoS flow
SMContextRetrievedData	6.1.6.2.27	Information within Retrieve SM Context Response
TunnelInfo	6.1.6.2.28	Tunnel Information
StatusInfo	6.1.6.2.29	Status of SM context or of PDU session
VsmfUpdateError	6.1.6.2.30	Error within Update Response from V-SMF
EpsPdnCnxInfo	6.1.6.2.31	EPS PDN Connection Information from H-SMF to V-SMF
EpsBearerInfo	6.1.6.2.32	EPS Bearer Information from H-SMF to V-SMF
PduSessionNotifyItem	6.1.6.2.33	Notification related to a PDU session
EbiArpMapping	6.1.6.2.34	EBI to ARP mapping
SmContextCreateError	6.1.6.2.35	Error within Create SM Context Response
SmContextUpdateError	6.1.6.2.36	Error within Update SM Context Response
PduSessionCreateError	6.1.6.2.37	Error within Create Response
MmeCapabilities	6.1.6.2.38	MME capabilities
GtpTeid	6.1.6.3.2	GTP Tunnel Endpoint Identifier
ProcedureTransactionId	6.1.6.3.2	Procedure Transaction Identifier
EpsPdnCnxContainer	6.1.6.3.2	UE EPS PDN Connection container from SMF to AMF
EpsBearerId	6.1.6.3.2	EPS Bearer Id
EpsBearerContainer	6.1.6.3.2	EPS Bearer container from SMF to AMF
UpCnxState	6.1.6.3.3	User Plane Connection State
HoState	6.1.6.3.4	Handover State
RequestType	6.1.6.3.5	Request Type in Create (SM context) service operation.
RequestIndication	6.1.6.3.6	Request Indication in Update (SM context) service operation.
NotificationCause	6.1.6.3.7	Cause for generating a notification
Cause	6.1.6.3.8	Cause information
ResourceStatus	6.1.6.3.9	Status of SM context or PDU session resource
DnnSelectionMode	6.1.6.3.10	DNN Selection Mode
EpsInterworkingIndication	6.1.6.3.11	EPS Interworking Indication
N2SmInfoType	6.1.6.3.12	N2 SM Information Type
MaxIntegrityProtectedDataRate	6.1.6.3.13	Maximum Integrity Protected Data Rate

Table 6.1.6.1-2 specifies data types re-used by the Nsmf 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 Nsmf service based interface.

Table 6.1.6.1-2: Nsmf re-used Data Types

Data type	Reference	Comments
Uint32	3GPP TS 29.571 [13]	Unsigned 32-bit integers
Ipv4Addr	3GPP TS 29.571 [13]	IPv4 Address
Ipv6Prefix	3GPP TS 29.571 [13]	IPv6 Prefix
Uri	3GPP TS 29.571 [13]	Uniform Resource Identifier
Supi	3GPP TS 29.571 [13]	Subscription Permanent Identifier
Pei	3GPP TS 29.571 [13]	Permanent Equipment Identifier
Gpsi	3GPP TS 29.571 [13]	General Public Subscription Identifier
AccessType	3GPP TS 29.571 [13]	Access Type (3GPP or non-3GPP access)
SupportedFeatures	3GPP TS 29.571 [13]	Supported features
Qfi	3GPP TS 29.571 [13]	QoS Flow Identifier
pduSessionId	3GPP TS 29.571 [13]	PDU Session Identifier
pduSessionType	3GPP TS 29.571 [13]	PDU Session Type
Ambr	3GPP TS 29.571 [13]	PDU Session Aggregate Maximum Bit Rate
5Qi	3GPP TS 29.571 [13]	5G QoS Identifier
Arp	3GPP TS 29.571 [13]	Allocation and Retention Priority
ReflectiveQoSAttribute	3GPP TS 29.571 [13]	Reflective QoS Attribute
Dynamic5Qi	3GPP TS 29.571 [13]	QoS characteristics for a 5QI that is neither standardized nor pre-configured.
NonDynamic5Qi	3GPP TS 29.571 [13]	QoS characteristics that replace the default QoS characteristics for a standardized or pre-configured 5QI.
PacketLossRate	3GPP TS 29.571 [13]	Packet Loss Rate
NotificationControl	3GPP TS 29.571 [13]	Notification Control
Dnn	3GPP TS 29.571 [13]	Data Network Name
Snssai	3GPP TS 29.571 [13]	Single Network Slice Selection Assistance Information
NfInstanceId	3GPP TS 29.571 [13]	NF Instance Identifier
UserLocation	3GPP TS 29.571 [13]	User Location
TimeZone	3GPP TS 29.571 [13]	Time Zone
ProblemDetails	3GPP TS 29.571 [13]	Error description
UpSecurity	3GPP TS 29.571 [13]	User Plane Security Policy Enforcement information
RefToBinaryData	3GPP TS 29.571 [13]	Cross-Reference to binary data encoded within a binary body part in an HTTP multipart message.
Guami	3GPP TS 29.571 [13]	Globally Unique AMF ID
BackupAmfInfo	3GPP TS 29.571 [13]	Backup AMF Information
PresenceState	3GPP TS 29.571 [13]	Indicates the UE presence in or out of a LADN service area
TraceData	3GPP TS 29.571 [13]	Trace control and configuration parameters
PlmnId	3GPP TS 29.571 [13]	PLMN Identity
RatType	3GPP TS 29.571 [13]	RAT Type
NgApCause	3GPP TS 29.571 [13]	NGAP Cause
5GMmCause	3GPP TS 29.571 [13]	5G MM Cause
DurationSec	3GPP TS 29.571 [13]	Duration in units of seconds
AdditionalQosFlowInfo	3GPP TS 29.571 [13]	Additional QoS Flow Information
NfGroupId	3GPP TS 29.571 [13]	Network Function Group Id
SecondaryRatUsageReport	3GPP TS 29.571 [13]	Secondary RAT Usage Report
ServiceName	3GPP TS 29.510 [19]	Service Name
NgRanTargetId	3GPP TS 29.518 [20]	NG-RAN Target Id
RoamingChargingProfile	3GPP TS 32.291 [26]	Roaming Charging Profile

6.1.6.2 Structured data types

6.1.6.2.1 Introduction

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

6.1.6.2.2   Type: SmContextCreateData

Table 6.1.6.2.2-1: Definition of type SmContextCreateData

Attribute name	Data type	P	Cardinality	Description
supi	Supi	C	0..1	This IE shall be present, except if the UE is emergency registered and UICCless. When present, it shall contain the subscriber permanent identify.

unauthenticatedSupi	boolean	C	0..1	This IE shall be present if the SUPI is present in the message but is not authenticated and is for an emergency registered UE.
				When present, it shall be set as follows:
				    - true: unauthenticated SUPI;
				
				    - false (default): authenticated SUPI.

pei	Pei	C	0..1	This IE shall be present if the UE is emergency registered and it is either UICIless or the SUPI is not authenticated. For all other cases, this IE shall be present if it is available. When present, it shall contain the permanent equipment identifier.
gpsi	Gpsi	C	0..1	This IE shall be present if it is available. When present, it shall contain the user's GPSI.
pduSessionId	PduSessionId	C	0..1	This IE shall be present, except during an EPS to 5GS Idle mode mobility or handover using the N26 interface. When present, it shall contain the PDU Session ID.
dnn	Dnn	C	0..1	This IE shall be present, except during an EPS to 5GS Idle mode mobility or handover using the N26 interface. When present, it shall contain the requested DNN.
sNssai	Snssai	C	0..1	This IE shall be present during the PDU session establishment procedure. In this case, it shall contain the requested S-NSSAI for the serving PLMN. This corresponds to an S-NSSAI from the allowed NSSAI. This IE shall also be present during an EPS to 5GS idle mode mobility or handover using the N26 interface. In this case, it shall contain the S-NSSAI configured in the AMF for EPS interworking.
hplmnSnssai	Snssai	C	0..1	This IE shall be present for a HR PDU session, except during an EPS to 5GS idle mode mobility or handover using the N26 interface. When present, it shall contain the requested S-NSSAI for the HPLMN. This corresponds to an S-NSSAI from the subscribed S-NSSAI corresponding to the SNSSAI value included in the sNssai IE.
servingNfId	NfInstanceId	M	1	This IE shall contain the identifier of the serving NF (e.g. serving AMF).
guami	Guami	C	0..1	This IE shall contain the serving AMF's GUAMI. It shall be included if the NF service consumer is an AMF.
serviceName	ServiceName	O	0..1	When present, this IE shall contain the name of the AMF service to which SM context status notifications are to be sent (see subclause 6.5.2.2 of 3GPP TS 29.500 [4]). This IE may be included if the NF service consumer is an AMF.
servingNetwork	PlmnId	M	1	This IE shall contain the serving core network operator PLMN ID.
requestType	RequestType	C	0..1	This IE shall be present if the request relates to an existing PDU session or an existing emergency PDU session, except during an EPS to 5GS idle mode mobility or handover using the N26 interface. It may be present otherwise. When present, it shall indicate whether the request refers to a new PDU session or emergency PDU session, or to an existing PDU session or emergency PDU session.

n1SmMsg	RefToBinaryData	C	0..1	This IE shall be present and reference the N1 SM Message binary data (see subclause 6.1.6.4.2), except during an EPS to 5GS Idle mode mobility or handover using N26.
anType	AccessType	M	1	This IE shall indicate the Access Network Type to which the PDU session is to be associated.
ratType	RatType	C	0..1	This IE shall be present and indicate the RAT Type used by the UE, if available.
presenceInLadn	PresenceState	C	0..1	This IE shall be present if the DNN corresponds to a LADN. When present, it shall be set to "IN" or "OUT" to indicate that the UE is in or out of the LADN service area.
ueLocation	UserLocation	C	0..1	This IE shall contain the UE location information, if it is available. See NOTE.
ueTimeZone	TimeZone	C	0..1	This IE shall contain the UE Time Zone, if it is available.
addUeLocation	UserLocation	O	0..1	Additional UE location. This IE may be present, if anType indicates a non-3GPP access and valid 3GPP access user location information is available. When present, it shall contain: - the last known 3GPP access user location; and - the timestamp, if available, indicating the UTC time when the addUeLocation information was acquired. (NOTE)
smContextStatusUri	Uri	M	1	This IE shall include the callback URI to receive notification of SM context status.
hSmfUri	Uri	C	0..1	This IE shall be present in HR roaming scenarios. When present, it shall contain the URI of the Nsmf_PDUSession service of the selected H-SMF. The URI shall be formatted as specified in subclause 6.1.1.
oldPduSessionId	PduSessionId	C	0..1	This IE shall be present if this information is received from the UE. When present, it shall contain the old PDU Session ID received from the UE. See subclauses 4.3.2.2.1 and 4.3.5.2 of 3GPP TS 23.502 [3].
pduSessionsActivateList	array(PduSessionId)	C	1..N	This IE shall be present, during an EPS to 5GS Idle mode mobility using the N26 interface, if the UE indicated PDU session(s) to be activated in the Registration Request. When present, it shall indicate all the PDU session(s) requested to be re-activated by the UE.
ueEpsPdnConnection	EpsPdnCnxContainer	C	0..1	This IE shall be present, during an EPS to 5GS Idle mode mobility or handover using the N26 interface. When present, it shall contain an MME/SGSN UE EPS PDN connection including the EPS bearer context(s).
hoState	HoState	C	0..1	This IE shall be present during an EPS to 5GS handover using N26 interface, to request the preparation of a handover of the PDU session. When present, it shall be set as specified in subclause 5.2.2.2.3.
additionalHsmfUri	array(Uri)	O	1..N	This IE may be present in HR roaming scenarios. When present, it shall contain an array of URI of the Nsmf_PDUSession service of the additional H-SMFs discovered by the AMF for the given DNN, hplmnSnssai and for this PDU session. If provided, the V-SMF shall use these additional H-SMF(s) if the V-SMF is not able to receive any response from the H-SMF identified by hSmfUri. The URI shall be formatted as specified in subclause 6.1.1.

pcfId	NfInstanceId	O	0..1	When present, this IE shall contain the identifier of the PCF selected by the AMF for the UE (for Access and Mobility Policy Control); it shall be the V-PCF in LBO roaming and the H-PCF in HR roaming.
nrfUri	Uri	O	0..1	This IE may be present to indicate the NRF to use for PCF selection within the same network slice instance. When present, the SMF shall use the NRF URI to select the PCF.
supportedFeatures	SupportedFeatures	C	0..1	This IE shall be present if at least one optional feature defined in subclause 6.1.8 is supported.
selMode	DnnSelectionMode	C	0..1	This IE shall be present if it is available. When present, it shall indicate whether the requested DNN corresponds to an explicitly subscribed DNN or to the usage of a wildcard subscription.

backupAmfInfo	array(BackupAmfInfo)	C	1..N	This IE shall be included if the NF service consumer is an AMF and the AMF supports the AMF management without UDSF for the following cases:
				  - First interaction with SMF.
				
				  - Modification of the BackupAmfInfo.

traceData	TraceData	C	0..1	This IE shall be included if trace is required to be activated (see 3GPP TS 32.422 [22]).
udmGroupId	NfGroupId	O	0..1	When present, it shall indicate the identity of the UDM group serving the UE.
routingIndicator	string	O	0..1	When present, it shall indicate the Routing Indicator of the UE.
epsInterworkingInd	EpsInterworkingIndication	O	0..1	The AMF may provide the indication when a PGW-C+SMF is selected to serve the PDU Session. When present, this IE shall indicate whether the PDU session may possibly be moved to EPS and whether N26 interface to be used during EPS interworking procedures. The AMF may derive the value of the indication from different sources, like UE radio capabilities (e.g. "S1 mode supported"), UE subscription data (e.g. "Core Network Type Restriction to EPC" and "Interworking with EPS Indication" for the DNN) and configurations.

indirectForwardingFlag	boolean	C	0..1	The AMF shall include this indication during N26 based Handover procedure from EPS to 5GS (see 3GPP TS 23.502 [3], subclause 4.11.1.2.2), to inform the SMF of the applicability or non-applicability of indirect data forwarding.
				When present, it shall be set as follows:
				  - True: indirect data forwarding is applicable
				  - False: indirect data forwarding is not applicable

targetId	NgRanTargetId	C	0..1	This IE shall be present during an EPS to 5GS handover preparation using the N26 interface, when the hoState IE is set to the value "PREPARING". When present, it shall contain the Target ID identifying the target RAN Node ID and TAI received in the Forward Relocation Request from the Source MME.
NOTE:	In shared networks, when the message is sent from the VPLMN to the HPLMN, the PLMN ID that is communicated in this IE shall be that of the selected Core Network Operator. In shared networks, when the AMF and SMF pertain to the same PLMN, the Primary PLMN ID shall be communicated in the ECGI or NCGI to the SMF. The Core Network Operator PLMN ID shall be communicated in the TAI and the Serving Network.			

6.1.6.2.3 Type: SMContextCreatedData

Table 6.1.6.2.3-1: Definition of type SmContextCreatedData

Attribute name	Data type	P	Cardinality	Description
hsmfUri	Uri	C	0..1	This IE shall be present in HR roaming scenarios if the additionalHsmfUri IE was received in the request and the V-SMF established the PDU session towards an alternative SMF listed in the additionalHsmfUri IE. When present, it shall contain the URI of the H-SMF towards which the PDU session was established.
pduSessionId	PduSessionId	C	0..1	This IE shall be present, during an EPS to 5GS Idle mode mobility or handover using the N26 interface. When present, it shall be set to the PDU Session ID.
sNssai	Snssai	C	0..1	This IE shall be present during an EPS to 5GS Idle mode mobility or handover using the N26 interface. When present, it shall contain the S-NSSAI assigned to the PDU session.
upCnxState	UpCnxState	C	0..1	This IE shall be present if the SMF was requested to activate the user plane connection of the PDU session in the corresponding request. When present, it shall be set as specified in subclause 5.2.2.2.2.
n2SmInfo	RefToBinaryData	C	0..1	This IE shall be present if N2 SM Information needs to be sent to the AN.
n2SmInfoType	N2SmInfoType	C	0..1	This IE shall be present if "n2SmInfo" attribute is present. When present, this IE shall indicate the NG AP IE type for the NG AP SMF related IE container carried in "n2SmInfo" attribute.
allocatedEbiList	array(EbiArpmapping)	C	1..N	This IE shall be present if the consumer NF is an AMF and Inter-system mobility happens. When present, it shall contain an array of EBI to ARP mappings currently allocated to the PDU session.
hoState	HoState	C	0..1	This IE shall be present if the SMF was requested to prepare an EPS to 5GS handover for the PDU session in the corresponding request. When present, it shall be set as specified in subclause 5.2.2.2.3.
smfServiceInstanceId	string	O	0..1	When present, this IE shall contain the serviceInstanceId of the SMF service instance serving the PDU session Context. This IE may be used by the AMF to identify PDU session contexts affected by a failure or restart of the SMF service instance (see subclause 6.2 of 3GPP TS 23.527 [24]).
recoveryTime	DateTime	O	0..1	Timestamp when the SMF service instance serving the PDU session was (re)started (see subclause 6.3 of 3GPP TS 23.527 [24]).
supportedFeatures	SupportedFeatures	C	0..1	This IE shall be present if at least one optional feature defined in subclause 6.1.8 is supported.

6.1.6.2.4   Type: SMContextUpdateData

Table 6.1.6.2.4-1: Definition of type SmContextUpdateData

Attribute name	Data type	P	Cardinality	Description
pei	Pei	C	0..1	This IE shall be present if it is available and has not been provided earlier to the SMF. When present, this IE shall contain the permanent equipment identifier.
gpsi	Gpsi	C	0..1	This IE shall be present if it is available and has not been provided earlier to the SMF or if it has changed. When present, it shall contain the user's GPSI.
servingNfId	NfInstanceId	C	0..1	This IE shall be present upon inter-AMF change or mobility, or upon a N2 handover execution with AMF change. When present, it shall contain the identifier of the serving NF (e.g. AMF).
smContextStatusUri	Uri	C	0..1	This IE shall be present if the servingNfId IE is present. It may be present otherwise. When present, this IE shall include the callback URI to receive notification of SM context status.
guami	Guami	C	0..1	This IE shall be present if the servingNfId of AMF is present. When present, it shall contain the serving AMF's GUAMI.
servingNetwork	PlmnId	C	0..1	This IE shall be present if the servingNfId IE is present. When present, it shall contain the serving core network operator PLMN ID.
backupAmfInfo	array(BackupAmfInfo)	C	1..N	This IE shall be included for the modification of the BackupAmfInfo if the NF service consumer is an AMF and the AMF supports the AMF management without UDSF. For deleting the backupAmfInfo, it shall contain the Null value.
anType	AccessType	C	0..1	This IE shall be present upon a change of the Access Network Type associated to the PDU session, e.g. during a handover of the PDU session between 3GPP access and untrusted non-3GPP access (see subclause 5.2.2.3.5.2). When present, this IE shall indicate the Access Network Type to which the PDU session is to be associated.
ratType	RatType	C	0..1	This IE shall be present and indicate the RAT Type used by the UE, if available, upon a change of RAT Type.
presenceInLadn	PresenceState	C	0..1	This IE shall be present during a Service Request procedure (see subclause 5.2.2.3.2.2)), an Xn handover (see subclause 5.2.2.3.3) or a N2 handover execution (see subclause 5.2.2.3.4.3), if the DNN of the PDU session corresponds to a LADN. When present, it shall be set to "IN" or "OUT" to indicate that the UE is in or out of the LADN service area.
ueLocation	UserLocation	C	0..1	This IE shall be present if it is available and if it needs to be reported to the SMF (e.g. the user location has changed or the user plane of the PDU session is deactivated). When present, this IE shall contain: - the UE location information; and - the timestamp, if available, indicating the UTC time when the UeLocation information was acquired. See NOTE.
ueTimeZone	TimeZone	C	0..1	This IE shall be present if it is available, the UE Time Zone has changed and needs to be reported to the SMF. When present, this IE shall contain the UE Time Zone.

addUeLocation	UserLocation	O	0..1	Additional UE location. This IE may be present, if anType indicates a non-3GPP access and a valid 3GPP access user location information is available. When present, it shall contain: - the last known 3GPP access user location; and - the timestamp, if available, indicating the UTC time when the addUeLocation information was acquired. See NOTE.
upCnxState	UpCnxState	C	0..1	This IE shall be present to request the activation or the deactivation of the user plane connection of the PDU session. When present, it shall be set as specified in subclause 5.2.2.3.2.
hoState	HoState	C	0..1	This IE shall be present to request the preparation, execution or cancellation of a handover of the PDU session. When present, it shall be set as specified in subclause 5.2.2.3.4.
toBeSwitched	boolean	C	0..1	This IE shall be present during an Xn Handover (see subclause 5.2.2.3.3) to request to switch the PDU session to a new downlink N3 tunnel endpoint. When present, it shall be set as follows: - true: request to switch to the PDU session. - false (default): no request to switch the PDU session.
failedToBeSwitched	boolean	C	0..1	This IE shall be present during an Xn Handover (see subclause 5.2.2.3.3) if the PDU session failed to be setup in the target RAN. When present, it shall be to true to indicate that the PDU session failed to be setup in the target RAN.
n1SmMsg	RefToBinaryData	C	0..1	This IE shall be present if N1 SM Information has been received from the UE. When present, this IE shall reference the N1 SM Message binary data (see subclause 6.1.6.4.2).
n2SmInfo	RefToBinaryData	C	0..1	This IE shall be present if N2 SM Information has been received from the AN. When present, this IE shall reference the N2 SM Information binary data (see subclause 6.1.6.4.3).
n2SmInfoType	N2SmInfoType	C	0..1	This IE shall be present if "n2SmInfo" attribute is present. When present, this IE shall indicate the NG AP IE type for the NG AP SMF related IE container carried in "n2SmInfo" attribute.
targetId	NgRanTargetId	C	0..1	This IE shall be present during a N2 handover preparation, when the hoState IE is set to the value "PREPARING". When present, it shall contain the Target ID identifying the target RAN Node ID and TAI received in the Handover Required from the Source RAN.
targetServingNfId	NfInstanceId	C	0..1	This IE shall be present during a N2 handover preparation with AMF change, when the hoState IE is set to the value "PREPARING". When present, it shall contain the identifier of the target serving NF (e.g. AMF).

dataForwarding	boolean	C	0..1	This IE shall be present and set as specified in subclause 5.2.2.3.9 during a 5GS to EPS handover. When present, it shall be set as follows: - true: setup the indirect data forwarding tunnels; - false (default): indirect data forwarding tunnels are not required to be setup or are required to be released (see subclause 5.2.2.3.9).
epsBearerSetup	array(EpsBearer Container)	C	0..N	This IE shall be present during a 5GS to EPS handover using the N26 interface. When present, it shall include the EPS bearer context(s) successfully setup in EPS. The array shall be empty if no resource was successfully allocated in EPS for any PDU session.
revokeEbiList	array(EpsBearerI d)	C	1..N	This IE shall be present to request the SMF to revoke some EBIs (see subclause 4.11.1.4.1 of 3GPP TS 23.502 [3]). When present, it shall contain the EBIs to revoke.
release	boolean	C	0..1	This IE shall be used to indicate a network initiated PDU session release is requested. This IE shall be present and set as specified in subclause 5.2.2.3.10 during P-CSCF restoration procedure, in subclause 5.2.2.3.11 during AMF requested PDU Session Release due to duplicated PDU Session Id, and in subclause 5.2.2.3.12 during AMF requested PDU Session Release due to slice not available. When present, it shall be set as follows: - true: PDU session release is required; - false (default): PDU session release is not required.
cause	Cause	O	0..1	When present, this IE shall indicate the cause for the requested modification, e.g. the NF Service Consumer cause for requesting to deactivate the user plane connection of the PDU session.
ngApCause	NgApCause	C	0..1	This IE shall be present, if the information is available. When present, this IE shall indicate the cause for the requested modification, e.g. the NGAP cause for requesting to deactivate the user plane connection of the PDU session.
5gMmCauseValue	5GMmCause	C	0..1	This IE shall be included if the AMF received a 5GMM cause code from the UE during any network initiated PDU session modification or release procedure. (e.g 5GMM Status message in response to a Downlink NAS Transport message carrying 5GSM payload).
sNssai	Snssai	C	0..1	This IE shall be present, during an EPS to 5GS idle mode mobility or handover using the N26 interface, if the S-NSSAI for the serving PLMN derived from the S-NSSAI of the home PLMN differs from the S-NSSAI provided in the Create SM Context Request. When present, it shall contain the S-NSSAI for the serving PLMN.
traceData	TraceData	C	0..1	This IE shall be included if trace is required to be activated, modified or deactivated (see 3GPP TS 32.422 [22]). For trace modification, it shall contain a complete replacement of trace data. For trace deactivation, it shall contain the Null value.

epsInterworkingInd	EpsInterworkingIndication	O	0..1	This IE may be present if the indication has been provided during the PDU session creation, and its value has changed after session creation or last update. When present, this IE shall indicate whether the PDU session may possibly be moved to EPS and whether N26 interface to be used during EPS interworking procedures.
anTypeCanBeChanged	boolean	C	0..1	This IE shall be present and set to true to indicate that the Access Network Type associated to the PDU session can be changed (see subclause 5.2.2.3.2.4), during a Service Request procedure (see subclause 4.2.3.2 of 3GPP TS 23.502 [3])), in response to paging or NAS notification indicating non-3GPP access, when the PDU Session for which the UE was paged or notified is in the List Of Allowed PDU Sessions provided by the UE, and the AMF received N2 SM Information only or N1 SM Container and N2 SM Information from the SMF in step 3a of subclause 4.2.3.3 of 3GPP TS 23.502 [3]. When present, it shall be set as follows: - true: the access type of the PDU session can be changed. - false: the access type of the PDU session cannot be changed (default).
n2SmInfoExt1	RefToBinaryData	C	0..1	This IE shall be present if more than one N2 SM Information has been received from the AN. When present, this IE shall reference the N2 SM Information binary data (see subclause 6.1.6.4.3).
n2SmInfoTypeExt1	N2SmInfoType	C	0..1	This IE shall be present if "n2SmInfoExt1" attribute is present. When present, this IE shall indicate the NG AP IE type for the NG AP SMF related IE container carried in "n2SmInfoExt1" attribute.
NOTE: In shared networks, when the message is sent from the VPLMN to the HPLMN, the PLMN ID that is communicated in this IE shall be that of the selected Core Network Operator. In shared networks, when the AMF and SMF pertain to the same PLMN, the Primary PLMN ID shall be communicated in the ECGI or NCGI to the SMF. The Core Network Operator PLMN ID shall be communicated in the TAI and the Serving Network.				

6.1.6.2.5 Type: SMContextUpdatedData

Table 6.1.6.2.5-1: Definition of type SmContextUpdatedData

Attribute name	Data type	P	Cardinality	Description
upCnxState	UpCnxState	C	0..1	This IE shall be present if the SMF was requested to activate or deactivate the user plane connection of the PDU session in the corresponding request. When present, it shall be set as specified in subclause 5.2.2.3.2.
hoState	HoState	C	0..1	This IE shall be present if the SMF was requested to prepare, execute or cancel a handover for the PDU session in the corresponding request. When present, it shall be set as specified in subclause 5.2.2.3.4.
releaseEbiList	array(EpsBearerId)	C	1..N	This IE shall be present if the SMF determines that some EBIs are not needed. When present, it shall contain the EBIs to be released.
allocatedEbiList	array(EbiArpMapping)	C	1..N	This IE shall be present if the consumer NF is an AMF and Inter-system mobility happens. When present, it shall contain an array of EBI to ARP mappings currently allocated to the PDU session.
modifiedEbiList	array(EbiArpMapping)	C	1..N	This IE shall be present if a PDU session modification procedure resulted in the change of ARP for a QoS flow that was already allocated an EBI.
n1SmMsg	RefToBinaryData	C	0..1	This IE shall be present if N1 SM Information needs to be sent to the UE. When present, this IE shall reference the N1 SM Message binary data (see subclause 6.1.6.4.2).
n2SmInfo	RefToBinaryData	C	0..1	This IE shall be present if N2 SM Information needs to be sent to the AN. When present, this IE shall reference the N2 SM Information binary data (see subclause 6.1.6.4.3).
n2SmInfoType	N2SmInfoType	C	0..1	This IE shall be present if "n2SmInfo" attribute is present. When present, this IE shall indicate the NG AP IE type for the NG AP SMF related IE container carried in "n2SmInfo" attribute.
epsBearerSetup	array(EpsBearerContainer)	C	1..N	This IE shall be present during an EPS to 5GS handover using the N26 interface. When present, it shall include the EPS bearer context(s) successfully handed over to 5GS.
dataForwarding	boolean	C	0..1	This IE shall be present if it was present in the corresponding request. When present, it shall be set as specified in subclause 5.2.2.3.9.
cause	Cause	C	0..1	This IE shall be present if the activation of the User Plane connection failed due to insufficient resources (see subclause 5.2.2.3.2.2).

6.1.6.2.6 Type: SMContextReleaseData

Table 6.1.6.2.6-1: Definition of type SmContextReleaseData

Attribute name	Data type	P	Cardinality	Description
cause	Cause	C	0..1	This IE shall be present, if the information is available. When present, this IE shall indicate the NF Service Consumer cause for the requested SM context release.
ngApCause	NgApCause	C	0..1	This IE shall be present, if the information is available. When present, this IE shall indicate the NGAP cause for the requested SM context release.
5gMmCauseValue	5GMmCause	C	0..1	This IE shall be included if the PDU session is released by the AMF due to any 5GMM failure. When present, this IE shall contain the 5GMM cause code value received from the UE.
ueLocation	UserLocation	C	0..1	This IE shall be present, if available. When present, it shall contain the UE location information. See NOTE.
ueTimeZone	TimeZone	C	0..1	This IE shall be present, if available. When present, it shall contain the UE location information.
addUeLocation	UserLocation	O	0..1	Additional UE location. This IE may be present, if anType previously reported is a non-3GPP access and a valid 3GPP access user location information is available. When present, it shall contain: - the last known 3GPP access user location; and - the timestamp, if available, indicating the UTC time when the addUeLocation information was acquired. See NOTE.
vsmfReleaseOnly	boolean	C	0..1	This IE shall be present and set to "true" during a 5GS to EPS Idle mode mobility or handover, for a Home Routed PDU session associated with 3GPP access and with assigned EBI(s). When present, it shall be set as follows: - true: release the SM context and PDU session in the V-SMF only; - false (default): release the SM context and PDU session in V-SMF and H-SMF.
n2SmInfo	RefToBinaryData	C	0..1	This IE shall be present if N2 SM Information has been received from the AN. When present, this IE shall reference the N2 SM Information binary data (see subclause 6.1.6.4.3).
n2SmInfoType	N2SmInfoType	C	0..1	This IE shall be present if "n2SmInfo" attribute is present. When present, this IE shall indicate the NG AP IE type for the NG AP SMF related IE container carried in "n2SmInfo" attribute.
NOTE: In shared networks, when the message is sent from the VPLMN to the HPLMN, the PLMN ID that is communicated in this IE shall be that of the selected Core Network Operator. In shared networks, when the AMF and SMF pertain to the same PLMN, the Primary PLMN ID shall be communicated in the ECGI or NCGI to the SMF. The Core Network Operator PLMN ID shall be communicated in the TAI and the Serving Network.				

6.1.6.2.7   Type: SMContextRetrieveData

Table 6.1.6.2.7-1: Definition of type SmContextRetrieveData

Attribute name	Data type	P	Cardinality	Description
targetMmeCap	MmeCapabilities	C	0..1	This IE shall be present if it is available. When present, it shall contain the target MME capabilities.

6.1.6.2.8   Type: SMContextStatusNotification

Table 6.1.6.2.8-1: Definition of type SmContextStatusNotification

Attribute name	Data type	P	Cardinality	Description
statusInfo	StatusInfo	M	1	This IE shall contain status information about the SM context.

6.1.6.2.9   Type: PduSessionCreateData

Table 6.1.6.2.9-1: Definition of type PduSessionCreateData

Attribute name	Data type	P	Cardinality	Description
supi	Supi	C	0..1	This IE shall be present, except if the UE is emergency registered and UICCless. When present, it shall contain the subscriber permanent identify.
unauthenticatedSupi	boolean	C	0..1	This IE shall be present if the SUPI is present in the message but is not authenticated and is for an emergency registered UE. When present, it shall be set as follows: - true: unauthenticated SUPI; - false (default): authenticated SUPI.
pei	Pei	C	0..1	This IE shall be present if the UE is emergency registered and it is either UICIless or the SUPI is not authenticated. For all other cases, this IE shall be present if it is available. When present, it shall contain the permanent equipment identifier.
pduSessionId	PduSessionId	C	0..1	This IE shall contain the PDU Session ID, except during an EPS to 5GS Idle mode mobility or handover using the N26 interface.
dnn	Dnn	M	1	This IE shall contain the requested DNN.
sNssai	Snssai	C	0..1	This IE shall be present, except during an EPS to 5GS idle mode mobility or handover using the N26 interface. When present, it shall contain the requested S-NSSAI mapped to the HPLMN S-NSSAI by the VPLMN.
vsmfId	NfInstanceId	M	1	This IE shall contain the identifier of the serving SMF.
servingNetwork	PlmnId	M	1	This IE shall contain the serving core network operator PLMN ID.
requestType	RequestType	C	0..1	This IE shall be present if the request relates to an existing PDU session or an existing emergency PDU session, except during an EPS to 5GS idle mode mobility or handover using the N26 interface. It may be present otherwise. When present, it shall indicate whether the request refers to a new PDU session or emergency PDU session, or to an existing PDU session or emergency PDU session.
epsBearerId	array(EpsBearerId)	C	1..N	This IE shall be present during an EPS to 5GS Idle mode mobility or handover preparation using the N26 interface. When present, it shall contain the list of EPS bearer Id(s) received from the MME.
pgwS8cFteid	Bytes	C	0..1	This IE shall be present during an EPS to 5GS Idle mode mobility or handover preparation using the N26 interface. When present, it shall contain Base64-encoded characters, encoding the PGW S8 F-TEID for Control Plane as specified in Figure 8.22-1 of 3GPP TS 29.274 [16], received from the MME.
vsmfPduSessionUri	Uri	M	1	This IE shall include the URI representing the PDU session in the V-SMF.
vcnTunnelInfo	TunnelInfo	M	1	This IE shall contain the N9 tunnel information on the visited CN side.
anType	AccessType	M	1	This IE shall indicate the Access Network Type to which the PDU session is to be associated.
ratType	RatType	C	0..1	This IE shall be present and indicate the RAT Type used by the UE, if available.
ueLocation	UserLocation	C	0..1	This IE shall contain the UE location information, if it is available. See NOTE.
ueTimeZone	TimeZone	C	0..1	This IE shall contain the UE Time Zone, if it is available.

addUeLocation	UserLocation	O	0..1	Additional UE location. This IE may be present, if anType indicates a non-3GPP access and a valid 3GPP access user location information is available. When present, it shall contain: - the last known 3GPP access user location; and - the timestamp, if available, indicating the UTC time when the addUeLocation information was acquired. See NOTE.
gpsi	Gpsi	C	0..1	This IE shall be present if it is available. When present, it shall contain the user's GPSI.
n1SmInfoFromUe	RefToBinaryData	C	0..1	This IE shall be present if the V-SMF has received known N1 SM information from the UE that does not need to be interpreted by the V-SMF. When present, this IE shall reference the n1SmInfoFromUe binary data (see subclause 6.1.6.4.4).
unknownN1SmInfo	RefToBinaryData	C	0..1	This IE shall be present if the V-SMF has received unknown N1 SM information from the UE. When present, this IE shall reference the unknownN1SmInfo binary data (see subclause 6.1.6.4.4).
supportedFeatures	SupportedFeatures	C	0..1	This IE shall be present if at least one optional feature defined in subclause 6.1.8 is supported.
hPcfId	NfInstanceId	O	0..1	When present, this IE shall contain the identifier of the H-PCF selected by the AMF for the UE (for Access and Mobility Policy Control).
hoPreparationIndication	boolean	C	0..1	This IE shall be present during an EPS to 5GS handover preparation using the N26 interface. When present, it shall be set as follows: - true: an EPS to 5GS handover preparation is in progress; the PGW-C/SMF shall not switch the DL user plane of the PDU session yet. - false: there is no on-going EPS to 5GS handover preparation in progress. If a handover preparation was in progress, the handover has been completed. The PGW-C/SMF shall switch the DL user plane of the PDU session using the N9 tunnel information that has been received in the vcnTunnelInfo. It shall be set to "true" during an EPS to 5GS handover preparation using the N26 interface.
selMode	DnnSelectionMode	C	0..1	This IE shall be present if it is available. When present, it shall indicate whether the requested DNN corresponds to an explicitly subscribed DNN or to the usage of a wildcard subscription.
alwaysOnRequested	boolean	C	0..1	This IE shall be present and set to true if the UE requests to setup an always-on PDU session and this is allowed by local policy in the V-SMF. When present, it shall be set as follows: - true: request for an always-on PDU session - false (default): not a request for an always-on PDU session
udmGroupId	NfGroupId	O	0..1	When present, it shall indicate the identity of the UDM group serving the UE.

routingIndicator	string	O	0..1	When present, it shall indicate the Routing Indicator of the UE.
epsInterworkingInd	EpsInterworkingIndication	O	0..1	This IE may be present if the indication has been received from AMF and is allowed to be forwarded to H-SMF by operator configuration. When present, this IE shall indicate whether the PDU session may possibly be moved to EPS and whether N26 interface to be used during EPS interworking procedures.
vSmfServiceInstanceId	string	O	0..1	When present, this IE shall contain the serviceInstanceId of the V-SMF service instance serving the PDU session. This IE may be used by the H-SMF to identify PDU sessions affected by a failure or restart of the V-SMF service (see subclauses 6.2 and 6.3 of 3GPP TS 23.527 [24]).
recoveryTime	DateTime	O	0..1	Timestamp when the V-SMF service instance serving the PDU session was (re)started (see subclause 6.3 of 3GPP TS 23.527 [24]).
roamingChargingProfile	RoamingChargingProfile	O	0..1	Roaming Charging Profile applicable in the VPLMN (see subclauses 5.1.9.1, 5.2.1.7 and 5.2.2.12.2 of 3GPP TS 32.255 [25]).
chargingId	string	O	0..1	Charging ID (see subclauses 5.1.9.1 of 3GPP TS 32.255 [25]).
oldPduSessionId	PduSessionId	C	0..1	This IE shall be present if this information is received from the UE and the same SMF is selected for SSC mode 3. When present, it shall contain the old PDU Session ID received from the UE. See subclauses 4.3.2.2.1 and 4.3.5.2 of 3GPP TS 23.502 [3].
NOTE: In shared networks, the PLMN ID that is communicated in this IE shall be that of the selected Core Network Operator.				

6.1.6.2.10   Type: PduSessionCreatedData

Table 6.1.6.2.10-1: Definition of type PduSessionCreatedData

Attribute name	Data type	P	Cardinality	Description
pduSessionType	PduSessionType	M	1	This IE shall indicate the selected PDU type.
sscMode	string	M	1	This IE shall indicate the SSC mode applicable to the PDU session. When present, it shall be encoded as one character in hexadecimal representation, taking a value of "0" to "7", representing the 3 bits of the SSC mode value of the SSC mode IE specified in subclause 9.11.4.16 of 3GPP TS 24.501 [7]. Pattern: "^[0-7]$" Example: SSC mode 3 shall be encoded as "3". See NOTE.
hcnTunnelInfo	TunnelInfo	M	1	This IE shall contain the N9 tunnel information on the home CN side.
sessionAmbr	Ambr	M	1	This IE shall contain the Session AMBR granted to the PDU session.
qosFlowsSetupList	array(QosFlowSetupItem)	M	1..N	This IE shall contain the set of QoS flow(s) to establish for the PDU session. It shall contain at least the Qos flow associated to the default Qos rule.
hSmfInstanceId	NfInstanceId	M	1	This IE shall contain the identifier of the home SMF.
pduSessionId	PduSessionId	C	0..1	This IE shall be present during an EPS to 5GS Idle mode mobility or handover preparation using the N26 interface. When present, it shall be set to the PDU Session ID.
sNssai	Snssai	C	0..1	This IE shall be present during an EPS to 5GS Idle mode mobility or handover using the N26 interface. When present, it shall contain the S-NSSAI assigned to the PDU session in the Home PLMN.
enablePauseCharging	boolean	C	0..1	This IE shall be present, based on operator's policy, to enable the use of Pause of Charging for the PDU session (see subclause 4.4.4 of 3GPP TS 23.502 [3]). When present, it shall be set as follows: - true: enable Pause of Charging; - false (default): disable Pause of Charging.
ueIpv4Address	Ipv4Addr	C	0..1	This IE shall be present if the H-SMF assigns a UE IPv4 address to the PDU session.
ueIpv6Prefix	Ipv6Prefix	C	0..1	This IE shall be present if the H-SMF assigns a UE IPv6 prefix to the PDU session.
n1SmInfoToUe	RefToBinaryData	C	0..1	This IE shall be present if the H-SMF needs to send N1 SM information to the UE that does not need to be interpreted by the V-SMF. When present, this IE shall reference the n1SmInfoToUe binary data (see subclause 6.1.6.4.4).
epsPdnCnxInfo	EpsPdnCnxInfo	C	0..1	This IE shall be present if the PDU session may be moved to EPS during its lifetime.
epsBearerInfo	array(EpsBearerInfo)	C	1..N	This IE shall be present if the PDU session may be moved to EPS during its lifetime.
supportedFeatures	SupportedFeatures	C	0..1	This IE shall be present if at least one optional feature defined in subclause 6.1.8 is supported.
maxIntegrityProtectedDataRate	MaxIntegrityProtectedDataRate	C	0..1	This IE shall be present if the upSecurity IE is present and indicates that integrity protection is preferred or required.

alwaysOnGranted	boolean	C	0..1	This IE shall be present if the alwaysOnRequested IE was received in the request or if the H-SMF determines, based on local policy, that the PDU session needs to be established as an always-on PDU session. When present, it shall be set as follows: - true: always-on PDU session granted. - false (default): always-on PDU session not granted.
upSecurity	UpSecurity	O	0..1	When present, this IE shall indicate the security policy for integrity protection and encryption for the user plane of the PDU session.
roamingChargingProfile	RoamingChargingProfile	O	0..1	Roaming Charging Profile selected by the HPLMN (see subclauses 5.1.9.1, 5.2.1.7 and 5.2.2.12.2 of 3GPP TS 32.255 [25]).
hSmfServiceInstanceId	string	O	0..1	When present, this IE shall contain the serviceInstanceId of the H-SMF service instance serving the PDU session. This IE may be used by the V-SMF to identify PDU sessions affected by a failure or restart of the H-SMF service (see subclause 6.2 of 3GPP TS 23.527 [24]).
recoveryTime	DateTime	O	0..1	Timestamp when the H-SMF service instance serving the PDU session was (re)started (see subclause 6.3 of 3GPP TS 23.527 [24]).
NOTE: This IE contains information that the V-SMF only needs to transfer to the UE (without interpretation). It is sent as a separate IE rather than within the n1SmInfoToUE binary data because the Selected SSC mode IE is defined as a "V" IE (i.e. without a Type field) in the NAS PDU Session Establishment Accept message.				

6.1.6.2.11   Type: HsmfUpdateData

Table 6.1.6.2.11-1: Definition of type HsmfUpdateData

Attribute name	Data type	P	Cardinality	Description
requestIndication	RequestIndication	M	1	This IE shall indicate the request type.
pei	Pei	C	0..1	This IE shall be present if it is available and has not been provided earlier to the H-SMF. When present, this IE shall contain the permanent equipment identifier.
vcnTunnelInfo	TunnelInfo	C	1	This IE shall be present if the N9 tunnel information on the visited CN side provided earlier to the H-SMF has changed. When present, this IE shall contain the new N9 tunnel information on the visited CN side.
servingNetwork	PlmnId	C	0..1	This IE shall contain the serving core network operator PLMN ID, if it has changed.
anType	AccessType	C	0..1	This IE shall be present if the Access Network Type provided earlier to the H-SMF has changed, e.g. during a handover of the PDU session between 3GPP access and untrusted non-3GPP access (see subclause 5.2.2.8.2.5). When present, this IE shall indicate the new Access Network Type to which the PDU session is to be associated.
ratType	RatType	C	0..1	This IE shall be present and indicate the RAT Type used by the UE, if available, upon a change of RAT Type.
ueLocation	UserLocation	C	0..1	This IE shall be present if it is available, the UE Location has changed and needs to be reported to the H-SMF. When present, this IE shall contain: - the new UE location information; and - the timestamp, if available, indicating the UTC time when the UeLocation information was acquired. See NOTE.
ueTimeZone	TimeZone	C	0..1	This IE shall be present if it is available, the UE Time Zone has changed and needs to be reported to the H-SMF. When present, this IE shall contain the new UE Time Zone.
addUeLocation	UserLocation	O	0..1	Additional UE location. This IE may be present, if anType indicates a non-3GPP access and a valid 3GPP access user location information is available. When present, it shall contain: - the last known 3GPP access user location; and - the timestamp, if available, indicating the UTC time when the addUeLocation information was acquired. See NOTE.
pauseCharging	boolean	C	0..1	This IE shall be present if the H-SMF enabled the use of Pause Pause of Charging for the PDU session during the PDU session establishment and Pause of Charging needs to be started or stopped (see subclause 4.4.4 of 3GPP TS 23.502 [3]). When present, it shall be set as follows: - true: to Start Pause of Charging; - false: to Stop Pause of Charging.
pti	ProcedureTransactionId	C	0..1	This IE shall be present if the requestIndication indicates a UE requested PDU session modification or release. When present, it shall contain the PTI value received from the UE.

n1SmInfoFromUe	RefToBinaryData	C	0..1	This IE shall be present if the V-SMF has received known N1 SM information from the UE that does not need to be interpreted by the V-SMF. When present, this IE shall reference the n1SmInfoFromUe binary data (see subclause 6.1.6.4.4).
unknownN1SmInfo	RefToBinaryData	C	0..1	This IE shall be present if the V-SMF has received unknown N1 SM information from the UE. When present, this IE shall reference the unknownN1SmInfo binary data (see subclause 6.1.6.4.4).
qosFlowsRelNotifyList	array(QosFlowItem)	C	1..N	This IE shall be present if QoS flows have been released.
qosFlowsNotifyList	array(QosFlowNotifyItem)	C	1..N	This IE shall be present if the QoS targets for GBR QoS flow(s) are not fulfilled anymore or when they are fulfilled again.
NotifyList	array(PduSessionNotifyItem)	C	1..N	Description of notifications related to the PDU session. This IE shall be present if the NG-RAN has established user plane resources for the PDU session that do not fulfil the User Plane Security Enforcement with a value Preferred, or when the user plane security enforcement is fulfilled again.
epsBearerId	array(EpsBearerId)	C	0..N	This IE shall be present during an EPS to 5GS handover execution using the N26 interface. When present, it shall contain the list of EPS bearer Id(s) successfully handed over to 5GS. The array shall be empty if no resource was successfully allocated in 5GS for any PDU session.
hoPreparationIndication	boolean	C	0..1	This IE shall be present during an EPS to 5GS handover preparation and handover execution using the N26 interface. When present, it shall be set as follows: - true: an EPS to 5GS handover preparation is in progress; the PGW-C/SMF shall not switch the DL user plane of the PDU session yet. - false: there is no on-going EPS to 5GS handover preparation in progress. If a handover preparation was in progress, the handover has been completed. The PGW-C/SMF shall switch the DL user plane of the PDU session using the N9 tunnel information that has been received in the vcnTunnelInfo. It shall be set to "true" during an EPS to 5GS handover preparation using the N26 interface. It shall be set to "false" during an EPS to 5GS handover execution using the N26 interface.
revokeEbiList	array(EpsBearerId)	C	1..N	This IE shall be present to request the H-SMF to revoke some EBIs (see subclause 4.11.1.4.1 of 3GPP TS 23.502 [3]). When present, it shall contain the EBIs to revoke.
cause	Cause	C	0..1	This IE shall be present and set as specified in subclause 5.2.2.8.2.6 during P-CSCF restoration procedure for home-routed PDU session. When present, this IE shall indicate the NF Service Consumer cause of the requested modification.
ngApCause	NgApCause	C	0..1	This IE shall be present, if the information is available and if this information is permitted to be sent to the H-SMF operator according to the V-SMF operator's policy. When present, this IE shall indicate the NGAP cause for the requested modification.

5gMmCauseValue	5GMmCause	C	0..1	The V-SMF shall include this IE if it received it from the AMF and if this information is permitted to be sent to the H-SMF operator according to the V-SMF operator's policy.
alwaysOnRequested	boolean	C	0..1	This IE shall be present and set to true if the UE requests to change the PDU session to an always-on PDU session and this is allowed by local policy in the V-SMF. When present, it shall be set as follows: - true: request for an always-on PDU session - false (default): not a request for an always-on PDU session
epsInterworkingInd	EpsInterworkingIndication	O	0..1	This IE may be present if the indication has been received from AMF and is allowed to be forwarded to H-SMF by operator configuration. When present, this IE shall indicate whether the PDU session may possibly be moved to EPS and whether N26 interface to be used during EPS interworking procedures.
secondaryRatUsageReport	array(SecondaryRatUsageReport)	O	1..N	This IE may be present to report usage data for a secondary RAT.
NOTE: In shared networks, the PLMN ID that is communicated in this IE shall be that of the selected Core Network Operator.				

6.1.6.2.12 Type: HsmfUpdatedData

Table 6.1.6.2.12-1: Definition of type HsmfUpdatedData

Attribute name	Data type	P	Cardinality	Description
n1SmInfoToUe	RefToBinaryData	C	0..1	This IE shall be present if the H-SMF needs to send N1 SM information to the UE that does not need to be interpreted by the V-SMF. When present, this IE shall reference the n1SmInfoToUe binary data (see subclause 6.1.6.4.4).

6.1.6.2.13   Type: ReleaseData

Table 6.1.6.2.13-1: Definition of type ReleaseData

Attribute name	Data type	P	Cardinality	Description
cause	Cause	C	0..1	This IE shall be present, if the information is available. When present, this IE shall indicate the NF Service Consumer cause for the requested PDU session release.
ngApCause	NgApCause	C	0..1	This IE shall be present, if the information is available and if this information is permitted to be sent to the H-SMF operator according to the V-SMF operator's policy. When present, this IE shall indicate the NGAP cause for the requested PDU session release.
5gMmCauseValue	5GMmCause	C	0..1	The V-SMF shall include this IE if it received it from the AMF and if this information is permitted to be sent to the H-SMF operator according to the V-SMF operator's policy.
ueLocation	UserLocation	C	0..1	This IE shall be present, if available. When present, it shall contain the UE location information.
ueTimeZone	TimeZone	C	0..1	This IE shall be present, if available. When present, it shall contain the UE location information.
addUeLocation	UserLocation	O	0..1	Additional UE location. This IE may be present, if anType previously reported is a non-3GPP access and a valid 3GPP access user location information is available. When present, it shall contain: - the last known 3GPP access user location; and - the timestamp, if available, indicating the UTC time when the addUeLocation information was acquired.
secondaryRatUsageReport	array(Secondary RatUsageReport)	O	1..N	This IE may be present to report usage data for a secondary RAT.

6.1.6.2.14 Type: HsmfUpdateError

Table 6.1.6.2.14-1: Definition of type HsmfUpdateError

Attribute name	Data type	P	Cardinality	Description
error	ProblemDetails	M	1	More information on the error shall be provided in the "cause" attribute of the "ProblemDetails" structure.
pti	ProcedureTransactionId	C	0..1	This IE shall be present if this is a response sent to a UE requested PDU session modification. When present, it shall contain the PTI value received in the corresponding request.
n1smCause	string	C	0..1	This IE shall be present if the request included n1SmInfoFromUe. When present, it shall contain the 5GSM cause the H-SMF proposes the V-SMF to return to the UE. It shall be encoded as two characters in hexadecimal representation with each character taking a value of "0" to "9" or "A" to "F", and represent the cause value of the 5GSM cause IE specified in subclause 9.11.4.2 of 3GPP TS 24.501 [7]. Pattern: "^[A-F0-9]{2}$" Example: the cause "Invalid mandatory information" shall be encoded as "60". See NOTE.
n1SmInfoToUe	RefToBinaryData	C	0..1	This IE shall be present if the H-SMF needs to send N1 SM information to the UE that does not need to be interpreted by the V-SMF. When present, this IE shall reference the n1SmInfoToUe binary data (see subclause 6.1.6.4.4).
backOffTimer	DurationSec	O	0..1	When present, this IE shall indicate a Back-off timer value, in seconds, that the V-SMF may use when rejecting the NAS message towards the UE.
recoveryTime	DateTime	O	0..1	Timestamp when the H-SMF service instance was (re)started (see subclause 6.3 of 3GPP TS 23.527 [24]).
NOTE: This IE contains information that the V-SMF shall transfer to the UE without interpretation. It is sent as a separate IE rather than within the n1SmInfoToUE binary data because the 5GSM cause IE is defined as a "V" IE (i.e. without a Type field) in the NAS PDU Session Modification Reject message.				

6.1.6.2.15   Type: VsmfUpdateData

Table 6.1.6.2.15-1: Definition of type VsmfUpdateData

Attribute name	Data type	P	Cardinality	Description
requestIndication	RequestIndication	M	1	This IE shall indicate the request type.
sessionAmbr	Ambr	C	1	This IE shall be present if the Session AMBR authorized for the PDU session is modified. When present, it shall contain the new Session AMBR authorized for the PDU session.
qosFlowsAddModRequestList	array(QosFlowAddModifyRequestItem)	C	1..N	This IE shall be present if QoS flows are requested to be established or modified.
qosFlowsRelRequestList	array(QosFlowReleaseRequestItem)	C	1..N	This IE shall be present if QoS flows are requested to be released.
epsBearerInfo	array(EpsBearerInfo)	C	1..N	This IE shall be present if the PDU session may be moved to EPS during its lifetime and the ePSBearerInfo has changed. When present, it shall only include epsBearerInfo IE(s) for new EBI or for EBIs for which the epsBearerInfo has changed. The complete epsBearerInfo shall be provided for an EBI that is included (i.e. the epsBearerInfo newly received for a given EBI replaces any epsBearerInfo previously received for this EBI).
assignEbiList	array(Arp)	C	1..N	This IE shall be present if the H-SMF requests EBIs to be assigned.
revokeEbiList	array(EpsBearerId)	C	1..N	This IE shall be present if the H-SMF requests the V-SMF to revoke some EBI(s). When present, it shall contain the EBIs to revoke.
modifiedEbiList	array(EbiArpMapping)	C	1..N	This IE shall be present if a PDU session modification procedure resulted in the change of ARP for a QoS flow that was already allocated an EBI.
pti	ProcedureTransactionId	C	0..1	This IE shall be present if the request is sent in response to a UE requested PDU session modification or release. When present, it shall contain the PTI value received in the corresponding request.
n1SmInfoToUe	RefToBinaryData	C	0..1	This IE shall be present if the H-SMF needs to send N1 SM information to the UE that does not need to be interpreted by the V-SMF. When present, this IE shall reference the n1SmInfoToUe binary data (see subclause 6.1.6.4.4).
alwaysOnGranted	boolean	C	0..1	This IE shall be present if: - an alwaysOnRequested IE was received in an earlier V-SMF initiated Update request to change the PDU session to an always-on PDU session; or - the H-SMF determines, based on local policy, that the PDU session needs to be established as an always-on PDU session. When present, it shall be set as follows: - true: always-on PDU session granted. - false (default): always-on PDU session not granted.

hsmfPduSessionUri	Uri	C	0..1	This IE shall be included if: - an Update Request is sent to the V-SMF before the Create Response (e.g. for EPS bearer ID allocation as specified in subclause 4.11.1.4.1 of 3GPP TS 23.502 [3], or for Secondary authorization/authentication as specified in subclause 4.3.2.3 of 3GPP TS 23.502 [3]), and - the H-SMF PDU Session Resource URI has not been previously provided to the V-SMF. This IE shall not be included otherwise. When present, this IE shall include the URI representing the PDU session resrouce in the H-SMF.
supportedFeatures	SupportedFeatures	C	0..1	This IE shall be present if "hsmfPduSessionUri" IE is present and at least one optional feature defined in subclause 6.1.8 is supported.
cause	Cause	O	0..1	When present, this IE shall indicate the cause for the requested modification.
n1smCause	string	O	0..1	When present, this IE shall contain the 5GSM cause the H-SMF proposes the V-SMF to send to the UE. It shall be encoded as two characters in hexadecimal representation with each character taking a value of "0" to "9" or "A" to "F", and represent the cause value of the 5GSM cause IE specified in subclause 9.11.4.2 of 3GPP TS 24.501 [7]. Example: the cause "Invalid mandatory information" shall be encoded as "60". See NOTE.
backOffTimer	DurationSec	O	0..1	When present, this IE shall indicate a Back-off timer value, in seconds, that the V-SMF may use when sending the NAS message (PDU Session Release Command) towards the UE.
NOTE: This IE contains information that the V-SMF shall transfer to the UE without interpretation. It is sent as a separate IE rather than within the n1SmInfoToUE binary data because the 5GSM cause IE is defined as a "V" IE (i.e. without a Type field) in the NAS PDU Session Release Command message.				

6.1.6.2.16 Type: VsmfUpdatedData

Table 6.1.6.2.16-1: Definition of type VsmfUpdatedData

Attribute name	Data type	P	Cardinality	Description
qosFlowsAddModList	array(QosFlowItem)	C	1..N	This IE shall be present if QoS flows have been successfully established or modified.
qosFlowsRelList	array(QosFlowItem)	C	1..N	This IE shall be present if QoS flows have been successfully released.
qosFlowsFailedtoAddModList	array(QosFlowItem)	C	1..N	This IE shall be present if QoS flows failed to be established or modified.
qosFlowsFailedtoRelList	array(QosFlowItem)	C	1..N	This IE shall be present if QoS flows failed to be released.
n1SmInfoFromUe	RefToBinaryData	C	0..1	This IE shall be present if the V-SMF has received known N1 SM information from the UE that does not need to be interpreted by the V-SMF. When present, this IE shall reference the n1SmInfoFromUe binary data (see subclause 6.1.6.4.4).
unknownN1SmInfo	RefToBinaryData	C	0..1	This IE shall be present if the V-SMF has received unknown N1 SM information from the UE. When present, this IE shall reference the unknownN1SmInfo binary data (see subclause 6.1.6.4.4).
ueLocation	UserLocation	C	0..1	This IE shall be present if it is available and QoS flows have been successfully established, modified or released. When present, this IE shall contain the UE location information.
ueTimeZone	TimeZone	C	0..1	This IE shall be present if it is available and QoS flows have been successfully established, modified or released. When present, this IE shall contain the new UE Time Zone.
addUeLocation	UserLocation	O	0..1	Additional UE location. This IE may be present, if anType previously reported is a non-3GPP access and a valid 3GPP access user location information is available. When present, it shall contain: - the last known 3GPP access user location; and - the timestamp, if available, indicating the UTC time when the addUeLocation information was acquired.
assignedEbiList	array(EbiArpMapping)	C	1..N	This IE shall be present if the AMF assigned the requested EBI(s). When present, it shall contain the EBIs that were successfully assigned.
failedToAssignEbiList	array(Arp)	C	1..N	This IE shall be present if the AMF failed to assign EBIs for a set of ARPs.
releasedEbiList	array(EpsBearerId)	C	1..N	This IE shall be present if the NF Service Consumer requested the revoke EBI(s) or if the AMF revoked already assigned EBI(s) for this PDU session towards the V-SMF. This IE shall contain the list of EBI(s) released for this PDU session at the AMF.
secondaryRatUsageReport	array(SecondaryRatUsageReport)	O	1..N	This IE may be present to report usage data for a secondary RAT.

6.1.6.2.17 Type: StatusNotification

Table 6.1.6.2.17-1: Definition of type StatusNotification

Attribute name	Data type	P	Cardinality	Description
statusInfo	StatusInfo	M	1	This IE shall contain status information about the PDU session.

6.1.6.2.18   Type: QosFlowItem

Table 6.1.6.2.18-1: Definition of type QosFlowItem

Attribute name	Data type	P	Cardinality	Description
qfi	Qfi	M	1	This IE shall contain the QoS Flow Identifier.
cause	Cause	O	0..1	When present, this IE shall contain cause information.

6.1.6.2.19   Type: QosFlowSetupItem

Table 6.1.6.2.19-1: Definition of type QosFlowSetupItem

Attribute name	Data type	P	Cardinality	Description
qfi	Qfi	M	1	This IE shall contain the QoS Flow Identifier.
qosRules	Bytes	M	1	This IE shall contain the QoS Rule(s) associated to the QoS flow to be sent to the UE. It shall be encoded as the Qos rules IE specified in subclause 9.11.4.13 of 3GPP TS 24.501 [7].
ebi	EpsBearerId	C	0..1	This IE shall be included when an EPS Bearer ID is allocated for the QoS Flow for interworking with EPS. When present, this IE shall contain the allocated EPS Bearer ID.
qosFlowDescription	Bytes	O	0..1	When present, this IE shall contain the description of the QoS Flow level Qos parameters to be sent to the UE. It shall be encoded as the Qos flow descriptions IE specified in subclause 9.11.4.12 of 3GPP TS 24.501 [7], encoding one single Qos flow description for the QoS flow to be set up.
qosFlowProfile	QosFlowProfile	O	0..1	When present, this IE shall contain the description of the QoS Flow level Qos parameters.

6.1.6.2.20   Type: QosFlowAddModifyRequestItem

Table 6.1.6.2.20-1: Definition of type QosFlowAddModifyRequestItem

Attribute name	Data type	P	Cardinality	Description
qfi	Qfi	M	1	This IE shall contain the QoS Flow Identifier.
ebi	EpsBearerId	C	0..1	This IE shall be included when the EPS Bearer ID associated with a QoS Flow is modified. When present, this IE shall contain the EPS Bearer ID.
qosRules	Bytes	O	0..1	When present, this IE shall contain the QoS Rule(s) to be sent to the UE. It shall be encoded as the Qos rules IE specified in subclause 9.11.4.13 of 3GPP TS 24.501 [7].
qosFlowDescription	Bytes	O	0..1	When present, this IE shall contain the description of the QoS Flow level Qos parameters to be sent to the UE. It shall be encoded as the Qos flow descriptions IE specified in subclause 9.11.4.12 of 3GPP TS 24.501 [7], encoding one single Qos flow description for the QoS flow to be added or modified.
qosFlowProfile	QosFlowProfile	O	0..1	When present, this IE shall contain the description of the QoS Flow level QoS parameters. When modifying a QoS flow, the IE shall only contain the QoS Flow profile's attributes which are modified.

6.1.6.2.21 Type: QosFlowReleaseRequestItem

Table 6.1.6.2.21-1: Definition of type QosFlowReleaseRequestItem

Attribute name	Data type	P	Cardinality	Description
qfi	Qfi	M	1	This IE shall contain the QoS Flow Identifier.
qosRules	Bytes	O	0..1	When present, this IE shall contain the QoS Rule(s) to be sent to the UE. It shall be encoded as the Qos rules IE specified in subclause 9.11.4.13 of 3GPP TS 24.501 [7].
qosFlowDescription	Bytes	O	0..1	When present, this IE shall contain the description of the QoS Flow level Qos parameters to be sent to the UE. It shall be encoded as the Qos flow descriptions IE specified in subclause 9.11.4.12 of 3GPP TS 24.501 [7], encoding one single Qos flow description for the QoS flow to be released.

6.1.6.2.22 Type: QosFlowProfile

Table 6.1.6.2.22-1: Definition of type QosFlowProfile

Attribute name	Data type	P	Cardinality	Description
5qi	5Qi	M	1	This IE shall contain the 5G QoS Identifier (5QI) of the QoS flow.
nonDynamic5Qi	NonDynamic5Qi	C	0..1	When present, this IE shall indicate the QoS Characteristics for a standardized or pre-configured 5QI for downlink and uplink. See NOTE 1.
dynamic5Qi	Dynamic5Qi	C	0..1	When present, this IE shall indicate the QoS Characteristics for a Non-standardised or not pre-configured 5QI for downlink and uplink. See NOTE 1.
arp	Arp	C	0..1	This IE shall be present when establishing a QoS flow; it may be present when modifying a QoS flow. When present, this IE shall contain the Allocation and Retention Priority (ARP) assigned to the QoS flow.
gbrQosFlowInfo	GbrQosFlowInformation	C	0..1	This IE shall be present when establishing a GBR QoS flow or if the GBR QoS flow information is modified.
rqa	ReflectiveQoSAttribute	O	0..1	This IE may be present for a non-GBR QoS flow and it shall be ignored otherwise. When present, it shall indicate whether certain traffic on this QoS flow may be subject to Reflective QoS.
additionalQosFlowInfo	AdditionalQosFlowInfo	O	0..1	This IE may be present for a non-GBR QoS flow. When present, this IE indicates that traffic for this QoS flow is likely to appear more often than traffic for other flows established for the PDU session. See subclause 9.3.1.12 of 3GPP TS 38.413 [9].
NOTE 1: Either the nonDynamic5Qi IE or the dynamic5Qi IE may be present when establishing a QoS flow. Either the nonDynamic5Qi IE or the dynamic5Qi IE may be present when modifying a QoS flow; when present, the received nonDynamic5Qi IE or dynamic5Qi IE shall replace any value received previously for this IE.				

6.1.6.2.23   Type: GbrQosFlowInformation

Table 6.1.6.2.23-1: Definition of type GbrQosFlowInformation

Attribute name	Data type	P	Cardinality	Description
maxFbrDl	BitRate	M	1	This IE shall contain the Maximum Bit Rate in Downlink. See 3GPP TS 23.501 [2].
maxFbrUl	BitRate	M	1	This IE shall contain the Maximum Bit Rate in Uplink. See 3GPP TS 23.501 [2].
guaFbrDl	BitRate	M	1	This IE shall contain the Guaranted Bit Rate in Downlink. See 3GPP TS 23.501 [2].
guaFbrUl	BitRate	M	1	This IE shall contain the Guaranted Bit Rate in Uplink. See 3GPP TS 23.501 [2].
notifControl	NotificationControl	O	0..1	When present, this IE shall indicate whether notifications are requested from the RAN when the GFBR can no longer (or again) be fulfilled for a QoS flow during the lifetime of the QoS flow. See 3GPP TS 23.501 [2].
maxPacketLossRateDl	PacketLossRate	O	0..1	When present, this IE shall indicate the maximum rate for lost packets that can be tolerated in the downlink direction. See 3GPP TS 23.501 [2].
maxPacketLossRateUl	PacketLossRate	O	0..1	When present, this IE shall indicatethe maximum rate for lost packets that can be tolerated in the Uplink direction. See 3GPP TS 23.501 [2].

6.1.6.2.24   Type: QosFlowNotifyItem

Table 6.1.6.2.24-1: Definition of type QosFlowNotifyItem

Attribute name	Data type	P	Cardinality	Description
qfi	Qfi	M	1	This IE shall contain the QoS Flow Identifier.
notificationCause	NotificationCause	M	1	

6.1.6.2.25   Type: Void

6.1.6.2.26   Type: Void

6.1.6.2.27   Type: SMContextRetrievedData

Table 6.1.6.2.27-1: Definition of type SmContextRetrievedData

Attribute name	Data type	P	Cardinality	Description
ueEpsPdnConnection	EpsPdnCnxContainer	M	1	This IE shall contain an MME/SGSN UE EPS PDN Connection including the mapped EPS bearer context(s).

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6.1.6.2.28 Type: TunnelInfo

Table 6.1.6.2.28-1: Definition of type TunnelInfo

Attribute name	Data type	P	Cardinality	Description
ipv4Addr	Ipv4Addr	C	0..1	When present, this IE shall contain the GTP tunnel IPv4 address. At least one of the ipv4Addr or ipv6Addr shall be present. Both may be present.
ipv6Addr	Ipv6Addr	C	0..1	When present, this IE shall contain the GTP tunnel IPv6 address. At least one of the ipv4Addr or ipv6Addr shall be present. Both may be present.
gtpTeid	Teid	M	1	This IE shall contain the 4-octet GTP tunnel endpoint identifier. If both ipv4Addr and ipv6Addr are present, the TEID shall be shared by both addresses.

6.1.6.2.29 Type: StatusInfo

Table 6.1.6.2.29-1: Definition of type StatusInfo

Attribute name	Data type	P	Cardinality	Description
resourceStatus	ResourceStatus	M	1	This IE shall indicate the status of the SM context or PDU session resource.
cause	Cause	O	0..1	When present, this IE shall indicate the cause for the resource status change.

6.1.6.2.30 Type: VsmfUpdateError

Table 6.1.6.2.30-1: Definition of type VsmfUpdateError

Attribute name	Data type	P	Cardinality	Description
error	ProblemDetails	M	1	More information on the error shall be provided in the "cause" attribute of the "ProblemDetails" structure.
pti	ProcedureTransactionId	C	0..1	This IE shall be present if available. When present, it shall contain the PTI value received from the UE.
n1smCause	string	C	0..1	This IE shall be present if available. When present, it shall contain the 5GSM cause received from the UE. It shall be encoded as two characters in hexadecimal representation with each character taking a value of "0" to "9" or "A" to "F", and represent the cause value of the 5GSM cause IE specified in subclause 9.11.4.2 of 3GPP TS 24.501 [7]. Pattern: "^[A-F0-9]{2}$" Example: the cause "Invalid mandatory information" shall be encoded as "60". See NOTE.
n1SmInfoFromUe	RefToBinaryData	C	0..1	This IE shall be present if the V-SMF has received known N1 SM information from the UE that does not need to be interpreted by the V-SMF. When present, this IE shall reference the n1SmInfoFromUe binary data (see subclause 6.1.6.4.4).
unknownN1SmInfo	RefToBinaryData	C	0..1	This IE shall be present if the V-SMF has received unknown N1 SM information from the UE. When present, this IE shall reference the unknownN1SmInfo binary data (see subclause 6.1.6.4.4).
failedToAssignEbiList	array(Arp)	C	1..N	This IE shall be present if the AMF failed to assign the requested EBIs.
ngApCause	NgApCause	C	0..1	This IE shall be present, if the information is available and if this information is permitted to be sent to the H-SMF operator according to the V-SMF operator's policy.
5gMmCauseValue	5GMmCause	C	0..1	The V-SMF shall include this IE if it received it from the AMF and if this information is permitted to be sent to the H-SMF operator according to the V-SMF operator's policy.
recoveryTime	DateTime	O	0..1	Timestamp when the V-SMF service instance was (re)started (see subclause 6.3 of 3GPP TS 23.527 [24]).
NOTE: This IE is sent as a separate IE rather than within the n1SmInfoFromUE binary data because the 5GSM cause IE is defined as a "V" IE (i.e. without a Type field) in the NAS PDU Session Modification Command Reject message.				

6.1.6.2.31 Type: EpsPdnCnxInfo

Table 6.1.6.2.31-1: Definition of type EpsPdnCnxInfo

Attribute name	Data type	P	Cardinality	Description
pgwS8cFteid	Bytes	M	1	Base64-encoded characters, encoding the PGW S8 F-TEID for Control Plane as specified in Figure 8.22-1 of 3GPP TS 29.274 [16].
pgwNodeName	Bytes	C	0..1	Base64-encoded characters, encoding the PGW FQDN IE as specified in Figure 8.66-1 of 3GPP TS 29.274 [16]. It shall be present, if it is available.

6.1.6.2.32   Type: EpsBearerInfo

Table 6.1.6.2.32-1: Definition of type EpsBearerInfo

Attribute name	Data type	P	Cardinality	Description
ebi	EpsBearerId	M	1	EPS Bearer ID
pgwS8uFteid	Bytes	M	1	Base64-encoded characters, encoding the PGW S8 F-TEID for User Plane as specified in Figure 8.22-1 of 3GPP TS 29.274 [16].
bearerLevelQoS	Bytes	M	1	Base64-encoded characters, encoding the Bearer QoS IE as specified in Figure 8.15-1 of 3GPP TS 29.274 [16].

6.1.6.2.33   Type: PduSessionNotifyItem

Table 6.1.6.2.33-1: Definition of type PduSessionNotifyItem

Attribute name	Data type	P	Cardinality	Description
notificationCause	NotificationCause	M	1	

6.1.6.2.34   Type: EbiArpMapping

Table 6.1.6.2.34-1: Definition of type EbiArpMapping

Attribute name	Data type	P	Cardinality	Description
epsBearerId	EpsBearerId	M	1	This IE shall contain the EPS bearer identities.
arp	Arp	M	1	This IE shall contain the ARP corresponding to the EBI.

6.1.6.2.35   Type: SmContextCreateError

Table 6.1.6.2.35-1: Definition of type SmContextCreateError

Attribute name	Data type	P	Cardinality	Description
error	ProblemDetails	M	1	More information on the error shall be provided in the "cause" attribute of the "ProblemDetails" structure.
n1SmMsg	RefToBinaryData	C	0..1	This IE shall be present, if an N1 SM information is received in the request and the SMF is able to return N1 SM information to the UE. When present, it shall reference the N1 SM Message binary data (see subclause 6.1.6.4.2).
recoveryTime	DateTime	O	0..1	Timestamp when the SMF service instance was (re)started (see subclause 6.3 of 3GPP TS 23.527 [24]).

6.1.6.2.36   Type: SMContextUpdateError

Table 6.1.6.2.36-1: Definition of type SmContextUpdateError

Attribute name	Data type	P	Cardinality	Description
error	ProblemDetails	M	1	More information on the error shall be provided in the "cause" attribute of the "ProblemDetails" structure.
n1SmMsg	RefToBinaryData	C	0..1	This IE shall be present, if N1 SM information needs to be returned to the UE. When present, it shall reference the N1 SM Message binary data (see subclause 6.1.6.4.2).
n2SmInfo	RefToBinaryData	C	0..1	This IE shall be present, if N2 SM information needs to be returned to the NG-RAN. When present, it shall reference the N2 SM Message binary data (see subclause 6.1.6.4.3).
n2SmInfoType	N2SmInfoType	C	0..1	This IE shall be present if "n2SmInfo" attribute is present. When present, this IE shall indicate the NG AP IE type for the NG AP SMF related IE container carried in "n2SmInfo" attribute.
upCnxState	UpCnxState	C	0..1	This IE shall be present if the SMF was requested to activate or deactivate the user plane connection of the PDU session in the corresponding request. When present, it shall be set as specified in subclause 5.2.2.3.2.
recoveryTime	DateTime	O	0..1	Timestamp when the SMF service instance was (re)started (see subclause 6.3 of 3GPP TS 23.527 [24]).

6.1.6.2.37   Type: PduSessionCreateError

Table 6.1.6.2.37-1: Definition of type PduSessionCreateError

Attribute name	Data type	P	Cardinality	Description
error	ProblemDetails	M	1	More information on the error shall be provided in the "cause" attribute of the "ProblemDetails" structure.
n1smCause	string	C	0..1	This IE shall be present if the request included n1SmInfoFromUe. When present, it shall contain the 5GSM cause the H-SMF proposes the V-SMF to return to the UE. It shall be encoded as two characters in hexadecimal representation with each character taking a value of "0" to "9" or "A" to "F", and represent the cause value of the 5GSM cause IE specified in subclause 9.11.4.2 of 3GPP TS 24.501 [7]. Pattern: "^[A-F0-9]{2}$" Example: the cause "Invalid mandatory information" shall be encoded as "60". (NOTE)
n1SmInfoToUe	RefToBinaryData	C	0..1	This IE shall be present if the H-SMF needs to send N1 SM information to the UE that does not need to be interpreted by the V-SMF. When present, this IE shall reference the n1SmInfoToUe binary data (see subclause 6.1.6.4.4).
backOffTimer	DurationSec	O	0..1	When present, this IE shall indicate a Back-off timer value, in seconds, that the V-SMF may use when rejecting the NAS message towards the UE.
recoveryTime	DateTime	O	0..1	Timestamp when the H-SMF service instance was (re)started (see subclause 6.3 of 3GPP TS 23.527 [24]).
NOTE:	This IE contains information that the V-SMF may transfer to the UE without interpretation. It is sent as a separate IE rather than within the n1SmInfoToUE binary data because the 5GSM cause IE is defined as a "V" IE (i.e. without a Type field) in the NAS PDU Session Establishment Reject message.			

6.1.6.2.38   Type: MmeCapabilities

Table 6.1.6.2.38-1: Definition of type MmeCapabilities

Attribute name	Data type	P	Cardinality	Description
nonIpSupported	boolean	C	0..1	This IE shall be present if non-IP PDN type is supported. It may be present otherwise. When present, this IE shall be set as follows: - true: non-IP PDN type is supported; - false (default): non-IP PDN type is not supported.

6.1.6.2.39   Type: Void

6.1.6.3   Simple data types and enumerations

6.1.6.3.1   Introduction

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

6.1.6.3.2   Simple data types

The simple data types defined in table 6.1.6.3.2-1 shall be supported.

Table 6.1.6.3.2-1: Simple data types

Type Name	Type Definition	Description
ProcedureTransactionId	integer	Unsigned integer representing a Procedure Transaction Identity, within the range 0 to 255, as specified in 3GPP TS 24.007 [8].
EpsBearerId	integer	Integer identifying an EPS bearer, within the range 0 to 15, as specified in subclause 11.2.3.1.5, bits 5 to 8, of 3GPP TS 24.007 [8].
EpsPdnCnxContainer	string	String with format "byte" as defined in OpenAPI Specification [15], i.e. base64-encoded characters, encoding the UeEpsPdnConnection IE specified in Table 7.3.1-2 or Table 7.3.6-2 of 3GPP TS 29.274 [16] for the N26 interface.
EpsBearerContainer	string	String with format "byte" as defined in OpenAPI Specification [15], i.e. base64-encoded characters, encoding the Bearer Context IE specified in Table 7.3.2-2 of 3GPP TS 29.274 [16].
Teid	string	4-octet GTP tunnel endpoint identifier, as defined in 3GPP TS 29.274 [16], 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 TEID shall appear first in the string, and the character representing the 4 least significant bit of the TEID shall appear last in the string. Pattern: "[A-Fa-f0-9]{8}" Example: A GTP TEID 0x5BD60076 shall be encoded as "5BD60076".

6.1.6.3.3   Enumeration: UpCnxState

The enumeration UpCnxState represents the state of the user plane connection of a PDU session. It shall comply with the provisions defined in table 6.1.6.3.3-1.

Table 6.1.6.3.3-1: Enumeration UpCnxState

Enumeration value	Description
"ACTIVATED"	A N3 tunnel is established between the 5G-AN and UPF
"DEACTIVATED"	No N3 tunnel is established between the 5G-AN and UPF.
"ACTIVATING"	A N3 tunnel is being established (the 5G-AN's F-TEID for downlink traffic is not assigned yet).

6.1.6.3.4   Enumeration: HoState

The enumeration HoState represents the handover state of a PDU session. It shall comply with the provisions defined in table 6.1.6.3.4-1.

Table 6.1.6.3.4-1: Enumeration HoState

Enumeration value	Description
"NONE"	No handover is in progress for the PDU session.
"PREPARING"	A handover is in preparation for the PDU session; see subclause 5.2.2.3.4.1.
"PREPARED"	A handover is prepared for the PDU session; see subclause 5.2.2.3.4.1.
"COMPLETED"	The handover is completed.
"CANCELLED"	The handover is cancelled.

6.1.6.3.5 Enumeration: RequestType

The enumeration RequestType indicates the type of a PDU session creation request. It shall comply with the provisions defined in table 6.1.6.3.5-1.

Table 6.1.6.3.5-1: Enumeration RequestType

Enumeration value	Description
"INITIAL_REQUEST"	Request to establish a new PDU session.
"EXISTING_PDU_SESSION"	Request referring to an existing PDU session.
"INITIAL_EMERGENCY_REQUEST"	Request to establish a new PDU session for Emergency Services.
"EXISTING_EMERGENCY_PDU_SESSION"	Request referring to an existing PDU session for Emergency Services.

6.1.6.3.6 Enumeration: RequestIndication

The enumeration RequestIndication indicates the request type. It shall comply with the provisions defined in table 6.1.6.3.6-1.

Table 6.1.6.3.6-1: Enumeration RequestIndication

Enumeration value	Description
"UE_REQ_PDU_SES_MOD"	UE Requested PDU Session Modification
"UE_REQ_PDU_SES_REL"	UE Requested PDU Session Release
"PDU_SES_MOB"	PDU Session Mobility (e.g. between 3GPP and non-3GPP access, or from EPS to 5GS with N26 interface)
"NW_REQ_PDU_SES_AUTH"	Network Requested PDU Session Authentication
"NW_REQ_PDU_SES_MOD"	Network Requested PDU Session Modification
"NW_REQ_PDU_SES_REL"	Network Requested PDU Session Release
"EBI_ASSIGNMENT_REQ"	EPS Bearer ID Assignment Request or EPS Bearer ID Revocation Request

6.1.6.3.7 Enumeration: NotificationCause

The enumeration NotificationCause indicates the cause of a notification. It shall comply with the provisions defined in table 6.1.6.3.7-1.

Table 6.1.6.3.7-1: Enumeration NotificationCause

Enumeration value	Description
"QOS_FULFILLED"	The QoS targets are fulfilled again for the GBR QoS flow.
"QOS_NOT_FULFILLED"	The QoS targets are no longer fulfilled for the GBR QoS flow.
"UP_SEC_FULFILLED"	The user plane security enforcement "Preferred" is fulfilled again for the PDU session.
"UP_SEC_NOT_FULFILLED"	The user plane security enforcement "Preferred" is not fulfilled for the PDU session.

6.1.6.3.8 Enumeration: Cause

The enumeration Cause indicates a cause information. It shall comply with the provisions defined in table 6.1.6.3.8-1.

Table 6.1.6.3.8-1: Enumeration Cause

Enumeration value	Description
"REL_DUE_TO_HO"	Release due to Handover
"EPS_FALLBACK"	Mobility due to EPS fallback for IMS voice is on-going.
"REL_DUE_TO_UP_SEC"	Release due to user plane Security requirements that cannot be fulfilled.
"DNN_CONGESTION"	Release due to the DNN based congestion control.
"S-NSSAI_CONGESTION"	Release due to the S-NSSAI based congestion control.
"REL_DUE_TO_REACTIVATION"	Release due to PDU session reactivation.
"5G_AN_NOT_RESPONDING"	The 5G AN did not respond to the request initiated by the network.
"REL_DUE_TO_SLICE_NOT_AVAILABLE"	Release due to the associated S-NSSAI becomes no longer available.
"REL_DUE_TO_DUPLICATE_SESSION_ID"	Release due to a UE request to establish a new PDU session with an identical PDU session Id.
"PDU_SESSION_STATUS_MISMATCH"	Release due to mismatch of PDU Session status between UE and AMF.
"HO_FAILURE"	Handover preparation failure
"INSUFFICIENT_UP_RESOURCES"	Failure to activate the User Plane connection of a PDU session due to insufficient user plane resources.
"PDU_SESSION_HANDED_OVER"	The PDU session is handed over to another system or access.

6.1.6.3.9   Enumeration: ResourceStatus

The enumeration ResourceStatus indicates the status of an SM context or PDU session resource. It shall comply with the provisions defined in table 6.1.6.3.9-1.

Table 6.1.6.3.9-1: Enumeration ResourceStatus

Enumeration value	Description
"RELEASED"	The SM context or PDU session resource is released.

6.1.6.3.10   Enumeration: DnnSelectionMode

The enumeration DnnSelectionMode indicates whether the DNN of a PDU session being established corresponds to an explicitly subscribed DNN or to the usage of a wildcard subscription. It shall comply with the provisions defined in table 6.1.6.3.10-1.

Table 6.1.6.3.10-1: Enumeration DnnSelectionMode

Enumeration value	Description
"VERIFIED"	UE or network provided DNN, subscription verified
"UE_DNN_NOT_VERIFIED"	UE provided DNN, subscription not verified
"NW_DNN_NOT_VERIFIED"	Network provided DNN, subscription not verified

6.1.6.3.11   Enumeration: EpsInterworkingIndication

The enumeration EpsInterworkingIndication indicates whether and how the PDU session will possibly be moved to EPS.

Table 6.1.6.3.11-1: Enumeration EpsInterworkingIndication

Enumeration value	Description
"NONE"	The PDU session cannot be moved EPS.
"WITH_N26"	The PDU session may possibly be moved to EPS, with N26 interface supported during EPS interworking procedures.
"WITHOUT_N26"	The PDU session may possibly be moved to EPS, without N26 interface supported during EPS interworking procedures.

6.1.6.3.12 Enumeration: N2SmInfoType

Table 6.1.6.3.12-1: Enumeration N2SmInfoType

Enumeration value	Description
"PDU_RES_SETUP_REQ"	PDU Session Resource Setup Request Transfer
"PDU_RES_SETUP_RSP"	PDU Session Resource Setup Response Transfer
"PDU_RES_SETUP_FAIL"	PDU Session Resource Setup Unsuccessful Transfer
"PDU_RES_REL_CMD"	PDU Session Resource Release Command Transfer
"PDU_RES_REL_RSP"	PDU Session Resource Release Response Transfer
"PDU_RES_MOD_REQ"	PDU Session Resource Modify Request Transfer
"PDU_RES_MOD_RSP"	PDU Session Resource Modify Response Transfer
"PDU_RES_MOD_FAIL"	PDU Session Resource Modify Unsuccessful Transfer
"PDU_RES_NTY"	PDU Session Resource Notify Transfer
"PDU_RES_NTY_REL"	PDU Session Resource Notify Released Transfer
"PDU_RES_MOD_IND"	PDU Session Resource Modify Indication Transfer
"PDU_RES_MOD_CFM"	PDU Session Resource Modify Confirm Transfer
"PATH_SWITCH_REQ"	Path Switch Request Transfer
"PATH_SWITCH_SETUP_FAIL"	Path Switch Request Setup Failed Transfer
"PATH_SWITCH_REQ_ACK"	Path Switch Request Acknowledge Transfer
"PATH_SWITCH_REQ_FAIL"	Path Switch Request Unsuccessful Transfer
"HANDOVER_REQUIRED"	Handover Required Transfer
"HANDOVER_CMD"	Handover Command Transfer
"HANDOVER_PREP_FAIL"	Handover Preparation Unsuccessful Transfer
"HANDOVER_REQ_ACK"	Handover Request Acknowledge Transfer
"HANDOVER_RES_ALLOC_FAIL"	Handover Resource Allocation Unsuccessful Transfer
"SECONDARY_RAT_USAGE"	Secondary RAT Usage Report Transfer

6.1.6.3.13 Enumeration: MaxIntegrityProtectedDataRate

Table 6.1.6.3.13-1: Enumeration MaxIntegrityProtectedDataRate

Enumeration value	Description
"64_KBPS"	64 kbps
"MAX_UE_RATE"	Full data rate

6.1.6.4 Binary data

6.1.6.4.1 Introduction

This subclause defines the binary data that shall be supported in a binary body part in an HTTP multipart message (see subclauses 6.1.2.2.2 and 6.1.2.4).

6.1.6.4.2 N1 SM Message

N1 SM Message shall encode a 5GS NAS SM message as specified in 3GPP TS 24.501 [7], using the vnd.3gpp.5gnas content-type.

N1 SM Message may encode any 5GS NAS SM message specified in 3GPP TS 24.501 [7], as summarized in Table 6.1.6.4.2-1.

Table 6.1.6.4.2-1: N1 SM Message content

5GS NAS message	Reference (3GPP TS 24.501 [7])
PDU session establishment request	8.3.1
PDU session establishment accept	8.3.2
PDU session establishment reject	8.3.3
PDU session authentication command	8.3.4
PDU session authentication complete	8.3.5
PDU session authentication result	8.3.6
PDU session modification request	8.3.7
PDU session modification reject	8.3.8
PDU session modification command	8.3.9
PDU session modification complete	8.3.10
PDU session modification command reject	8.3.11
PDU session release request	8.3.12
PDU session release reject	8.3.13
PDU session release command	8.3.14
PDU session release complete	8.3.15
5GSM status	8.3.16

6.1.6.4.3 N2 SM Information

N2 SM Information shall encode NG Application Protocol (NGAP) IEs, as specified in subclause 9.3 of 3GPP TS 38.413 [9] (ASN.1 encoded), using the vnd.3gpp.ngap content-type.

N2 SM Information may encode any NGAP SMF related IE specified in 3GPP TS 38.413 [9], as summarized in Table 6.1.6.4.3-1.

Table 6.1.6.4.3-1: N2 SM Information content

N2 SM IE	Reference (3GPP TS 38.413 [9])	Related NGAP message
PDU Session Resource Setup Request Transfer	9.3.4.1	PDU Session Resource Setup Request Initial Context Setup Request Handover Request
PDU Session Resource Setup Response Transfer	9.3.4.2	PDU Session Resource Setup Response Initial Context Setup Response
PDU Session Resource Setup Unsuccessful Transfer	9.3.4.16	PDU Session Resource Setup Response Initial Context Setup Response
PDU Session Resource Release Command Transfer	9.3.4.12	PDU Session Resource Release Command
PDU Session Resource Release Response Transfer	9.3.4.21	PDU Session Resource Release Response
PDU Session Resource Modify Request Transfer	9.3.4.3	PDU Session Resource Modify Request
PDU Session Resource Modify Response Transfer	9.3.4.4	PDU Session Resource Modify Response
PDU Session Resource Modify Unsuccessful Transfer	9.3.4.17	PDU Session Resource Modify Response
PDU Session Resource Notify Transfer	9.3.4.5	PDU Session Resource Notify
PDU Session Resource Notify Released Transfer	9.3.4.13	PDU Session Resource Notify
PDU Session Resource Modify Indication Transfer	9.3.4.6	PDU Session Resource Modify Indication
PDU Session Resource Modify Confirm Transfer	9.3.4.7	PDU Session Resource Modify Confirm
Path Switch Request Transfer	9.3.4.8	Path Switch Request
Path Switch Request Setup Failed Transfer	9.3.4.15	Path Switch Request
Path Switch Request Acknowledge Transfer	9.3.4.9	Path Switch Request Acknowledge
Path Switch Request Unsuccessful Transfer	9.3.4.20	Path Switch Request Acknowledge Path Switch Request Failure
Handover Required Transfer	9.3.4.14	Handover Required
Handover Request Acknowledge Transfer	9.3.4.11	Handover Request Acknowledge
Handover Resource Allocation Unsuccessful Transfer	9.3.4.19	Handover Request Acknowledge
Handover Command Transfer	9.3.4.10	Handover Command
Handover Preparation Unsuccessful Transfer	9.3.4.18	Handover Command
Secondary RAT Usage Report Transfer	9.3.4.x	Secondary RAT Usage Report Transfer

6.1.6.4.4   n1SmInfoFromUe, n1SmInfoToUe, unknownN1SmInfo

n1SmInfoFromUe, n1SmInfoToUe and unknownN1SmInfo shall encode one or more NAS SM IEs, including the Type and Length fields, as specified in 3GPP TS 24.501 [7], using the vnd.3gpp.5gnas content-type.

Subclause 5.2.3.1 specifies the information that shall be included in these payloads.

n1SmInfoFromUe and n1SmInfoToUe may encode the 5GS NAS IEs listed in tables 6.1.6.4.4-1 and 6.1.6.4.4-2.

Table 6.1.6.4.4-1: n1SmInfoFromUE content

5GS NAS IE	Reference (3GPP TS 24.501 [7])	Related NAS SM message
Message type	9.7	All NAS SM messages
PDU session type	9.11.4.11	PDU Session Establishment Request
SSC mode	9.11.4.16	PDU Session Establishment Request
Maximum number of supported packet filters	9.11.4.9	PDU Session Establishment Request PDU Session Modification Request
Integrity protection maximum data rate	9.11.4.7	PDU Session Establishment Request PDU Session Modification Request
SM PDU DN request container	9.11.4.15	PDU Session Establishment Request
Extended protocol configuration options	9.11.4.6	PDU Session Establishment Request PDU Session Authentication Complete PDU Session Modification Request PDU Session Modification Complete PDU Session Modification Command Reject PDU Session Release Request PDU Session Release Complete
EAP message	9.11.2.2	PDU Session Authentication Complete
Requested QoS rules	9.11.4.13	PDU Session Modification Request
Requested QoS flow descriptions	9.11.4.12	PDU Session Modification Request
5GSM cause	9.11.4.2	PDU Session Modification Request PDU Session Release Request PDU Session Release Complete (NOTE 2)
5GSM capability	9.11.4.1	PDU Session Establishment Request PDU Session Modification Request (NOTE 1)
NOTE 1: The 5GSM capability IE shall be encoded as received from the UE. It may contain UE capabilities that the V-SMF only needs to transfer to the H-SMF, e.g. support of reflective QoS, or support of multi-homed IPv6 PDU session, and/or capabilities to be interpreted and used by the V-SMF.		
NOTE 2: The 5GSM cause IE shall be encoded as received from the UE. This information is defined as a "V" IE (i.e. without a Type field) in other NAS messages, e.g. PDU Session Modification Command Reject message, in which case it shall be sent as a separate n1SmCause IE over N16 and not within the n1SmInfoToUE binary data.		

Table 6.1.6.4.4-2: n1SmInfoToUE parameters

5GS NAS IE	Reference (3GPP TS 24.501 [7])	Related NAS SM message
Message type	9.7	All NAS SM messages
RQ timer value	9.11.2.3	PDU Session Establishment Accept PDU Session Modification Command
EAP message	9.11.2.2	PDU Session Establishment Accept PDU Session Establishment Reject PDU Session Authentication Command PDU Session Authentication Result PDU Session Release Command
Allowed SSC mode	9.11.4.5	PDU Session Establishment Reject
Extended protocol configuration options	9.11.4.6	PDU Session Establishment Accept PDU Session Establishment Reject PDU Session Authentication Command PDU Session Authentication Result PDU Session Modification Reject PDU Session Modification Command PDU Session Release Reject PDU Session Release Command
5GSM cause	9.11.4.2	PDU Session Establishment Accept PDU Session Modification Command See NOTE.
Mapped EPS bearer contexts	9.11.4.8	PDU Session Establishment Accept PDU Session Modification Command
NOTE:	This IE indicates the 5GSM cause the H-SMF requires the V-SMF to send to the UE. The V-SMF shall transfer the received value to the UE without interpretation. This information is defined as a "V" IE (i.e. without a Type field) in other NAS messages, e.g. PDU Session Establishment Reject message, in which case it shall be sent as a separate n1SmCause IE over N16 and not within the n1SmInfoToUE binary data.	

The Message Type shall be present and encoded as the first 5GS NAS IE in any n1SmInfoFromUe, n1SmInfoToUe and unknownN1SmInfo binary data, to enable the receiver to decode the 5GS NAS IEs.

  NOTE: The Information Element Identifier (see subclause 11.2.1.1.3 of 3GPP TS 24.007 [8]) of a 5GS NAS IE uniquely identifies an IE in a given message.

6.1.7   Error Handling

6.1.7.1   General

HTTP error handling shall be supported as specified in subclause 5.2.4 of 3GPP TS 29.500 [4].

6.1.7.2   Protocol Errors

Protocol errors handling shall be supported as specified in subclause 5.2.7 of 3GPP TS 29.500 [4].

6.1.7.3   Application Errors

The common application errors defined in Table 5.2.7.2-1 of 3GPP TS 29.500 [4] may be used for the Nsmf_PDUSession service.

The following application errors listed in Table 6.1.7.3-1 are specific to the Nsmf_PDUSession service.

Table 6.1.7.3-1: Application errors

Application Error	HTTP status code	Description
N1_SM_ERROR	403 Forbidden	This indicates that an error, other than those listed in this table, was detected when processing the N1 SM information received in the request, e.g. N1 SM protocol error.
SNSSAI_DENIED	403 Forbidden	The subscriber does not have the necessary subscription to access the SNSSAI.
DNN_DENIED	403 Forbidden	The subscriber does not have the necessary subscription to access the DNN.
PDUTYPE_DENIED	403 Forbidden	The subscriber does not have the necessary subscription for the requested PDU session type.
SSC_DENIED	403 Forbidden	The subscriber does not have the necessary subscription for the requested SSC mode.
SUBSCRIPTION_DENIED	403 Forbidden	This indicates an error, other than those listed in this table, due to lack of necessary subscription to serve the UE request.
DNN_NOT_SUPPORTED	403 Forbidden	The DNN is not supported by the SMF.
PDUTYPE_NOT_SUPPORTED	403 Forbidden	The requested PDU session type is not supported by the SMF for the PDN corresponding to the DNN.
SSC_NOT_SUPPORTED	403 Forbidden	The requested SSC mode is not supported by the SMF for the PDN corresponding to the DNN.
HOME_ROUTED_ROAMING_REQUIRED	403 Forbidden	It is used in LBO roaming, if the V-SMF is not able to process some part of the N1 SM information that requires Home Routed Roaming.
OUT_OF_LADN_SERVICE_AREA	403 Forbidden	The PDU session corresponds to a LADN and the UE is outside of the LADN Service Area.
N2_SM_ERROR	403 Forbidden	This indicates that an error, other than those listed in this table, was detected when processing the N2 SM information received in the request, e.g. N2 SM protocol error.
PRIORITIZED_SERVICES_ONLY	403 Forbidden	The SMF was notified that the UE is reachable only for regulatory prioritized service and the PDU Session to be activated is not for a regulatory prioritized service.
PDU_SESSION_ANCHOR_CHANGE	403 Forbidden	The SMF decided to change the PDU Session Anchor for the PDU Session.
TARGET_MME_CAPABILITY	403 Forbidden	A request to retrieve an SM context is rejected due to the target MME not capable to support the PDU session.
NO_EPS_5GS_CONTINUITY	403 Forbidden	It is used during an EPS to 5GS Idle mode mobility or handover, if the PDU session does not support seamless session continuity to 5GS.
UNABLE_TO_PAGE_UE	403 Forbidden	The request is rejected due to a temporarily inability to page the UE.
UE_NOT_RESPONDING	403 Forbidden	The UE did not respond to the request initiated by the network, e.g. paging.
REJECTED_BY_UE	403 Forbidden	The request is rejected by the UE.
REJECTED_DUE_VPLMN_POLICY	403 Forbidden	The request is rejected due to VPLMN operator policy.
HO_TAU_IN_PROGRESS	403 Forbidden	The request is rejected temporarily due to a mobilty procedure in progress.

INTEGRITY_PROTECTED_MDR_NOT_ACCEPTABLE	403 Forbidden	The integrity protected maximum data rate value provided by the UE is not acceptable for the PDU session based on local policy at the SMF. This error is applicable when the UP Security Policy for the PDU Session is determined to have Integrity Protection set to "Required". An NF service consumer that receives this error cause may use it for maintaining KPIs.
EBI_EXHAUSTED	403 Forbidden	The allocation of EPS Bearer ID failed due to exhaustion of EBI as the maximum number of EBIs has already been allocated to the UE.
EBI_REJECTED_LOCAL_POLICY	403 Forbidden	The allocation of EPS Bearer ID was rejected due to local policy in the Serving PLMN.
EBI_REJECTED_NO_N26	403 Forbidden	The allocation of EPS Bearer ID was rejected when the AMF is in a serving PLMN that does not support 5GS-EPS interworking procedures with N26 interface.
HANDOVER_RESOURCE_ALLOCATION_FAILURE	403 Forbidden	It is used during a N2 handover preparation or an EPS to 5GS handover preparation, if no resource is allocated by the target NG-RAN for the PDU session.
CONTEXT_NOT_FOUND	404 Not Found	It is used when no context corresponding to the request exists in the SMF.
INSUFFICIENT_RESOURCES_SLICE	500 Internal Server Error	The request cannot be provided due to insufficient resources for the specific slice.
INSUFFICIENT_RESOURCES_SLICE_DNN	500 Internal Server Error	The request cannot be provided due to insufficient resources for the specific slice and DNN.
DNN_CONGESTION	503 Service Unavailable	The SMF has detected congestion for the requested DNN and performs overload control for that DNN which does not allow the PDU session to be established.
S-NSSAI_CONGESTION	503 Service Unavailable	The SMF has detected congestion for the requested S-NSSAI and performs overload control for that S-NSSAI which does not allow the PDU session to be established.
PEER_NOT_RESPONDING	504 Gateway Timeout	No response is received from a remote peer, e.g. from the H-SMF for a HR PDU session.
NETWORK_FAILURE	504 Gateway Timeout	The request is rejected due to a network problem.

6.1.8   Feature Negotiation

The feature negotiation mechanism specified in subclause 6.6 of 3GPP TS 29.500 [4] shall be used to negotiate the optional features applicable between the SMF and the NF Service Consumer, for the Nsmf_PDUSession service, if any.

The NF Service Consumer shall indicate the optional features it supports for the Nsmf_PDUSession service, if any, by including the supportedFeatures attribute in the HTTP POST request when requesting the SMF to create an SM context or a PDU session resource.

The SMF shall determine the supported features for the created SM context or PDU session resource as specified in subclause 6.6 of 3GPP TS 29.500 [4] and shall indicate the supported features by including the supportedFeatures attribute in the representation of the SM context or PDU session resource it returns in the HTTP response confirming the creation of the resource.

The syntax of the supportedFeatures attribute is defined in subclause 5.2.2 of 3GPP TS 29.571 [13].

The following features are defined for the Nsmf_PDUSession service.

Table 6.1.8-1: Features of supportedFeatures attribute used by Nsmf_PDUSession service

Feature Number	Feature	M/O	Description
			ETSI
Feature number: The order number of the feature within the supportedFeatures attribute (starting with 1). Feature: A short name that can be used to refer to the bit and to the feature. M/O: Defines if the implementation of the feature is mandatory ("M") or optional ("O"). Description: A clear textual description of the feature.			

6.1.9 Security

As indicated in 3GPP TS 33.501 [17] and 3GPP TS 29.500 [4], the access to the Nsmf_PDUSession API may be authorized by means of the OAuth2 protocol (see IETF RFC 6749 [18]), based on local configuration, using the "Client Credentials" authorization grant, where the NRF (see 3GPP TS 29.510 [19]) plays the role of the authorization server.

If OAuth2 authorization is used, an NF Service Consumer, prior to consuming services offered by the Nsmf_PDUSession API, shall obtain a "token" from the authorization server, by invoking the Access Token Request service, as described in 3GPP TS 29.510 [19], subclause 5.4.2.2.

NOTE 1: 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 Nsmf_PDUSession service.

NOTE 2: The security credentials for accessing a child resource URI of an sm-contexts or pdu-sessions collection distributed on different processing instances or hosts are the same as for accessing the collection URI.

The Nsmf_PDUSession API defines a single scope "nsmf-pdusession" for the entire service, and it does not define any additional scopes at resource and operation level.

Annex A (normative): OpenAPI specification

A.1   General

 This Annex specifies the formal definition of the Nsmf_PDUSession service. It consists of OpenAPI 3.0.0 specifications, in YAML format.

A.2   Nsmf_PDUSession API

```
openapi: 3.0.0

info:
  version: '1.0.1'
  title: 'Nsmf_PDUSession'
  description: 'SMF PDU Session Service'

externalDocs:
  description: 3GPP TS 29.502 V15.3.0; 5G System; Session Management Services; Stage 3
  url: http://www.3gpp.org/ftp/Specs/archive/29_series/29.502/

servers:
  - url: '{apiRoot}/nsmf-pdusession/v1'
    variables:
      apiRoot:
        default: https://example.com
        description:  apiRoot as defined in subclause 4.4 of 3GPP TS 29.501. The sm-contexts and
pdu-sessions resources can be distributed on different processing instances or hosts. Thus the
authority and/or deployment-specific string of the apiRoot of the created individual sm context and
pdu-session resources' URIs may differ from the authority and/or deployment-specific string of the
apiRoot of the sm-contexts and pdu-sessions collections' URIs.

security:
  - {}
  - oAuth2ClientCredentials:
    - nsmf-pdusession

paths:
  /sm-contexts:
    post:
      summary:  Create SM Context
      tags:
        - SM contexts collection
      operationId: PostSmContexts
      requestBody:
        description: representation of the SM context to be created in the SMF
        required: true
        content:
          multipart/related:
            schema:
              type: object
              properties: # Request parts
                jsonData:
                  $ref: '#/components/schemas/SmContextCreateData'
                binaryDataN1SmMessage:
                  type: string
                  format: binary
            encoding:
              jsonData:
                contentType:  application/json
              binaryDataN1SmMessage:
                contentType:  application/vnd.3gpp.5gnas
                headers:
                  Content-Id:
                    schema:
                      type: string
      callbacks:
        smContextStatusNotification:
          '{$request.body#/smContextStatusUri}':
            post:
              requestBody:  # contents of the callback message
```

```
                    required: true
                    content:
                      application/json:
                        schema:
                          $ref: '#/components/schemas/SmContextStatusNotification'
                  responses:
                    '204':
                      description: successful notification
                    '307':
                      description: temporary redirect
                    '400':
                      $ref: 'TS29571_CommonData.yaml#/components/responses/400'
                    '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'

      responses:
        '201':
          description: successful creation of an SM context
          content:
            application/json: # message without binary body part
              schema:
                $ref: '#/components/schemas/SmContextCreatedData'
            multipart/related:  # message with binary body part(s)
              schema:
                type: object
                properties: # Request parts
                  jsonData:
                    $ref: '#/components/schemas/SmContextCreatedData'
                  binaryDataN2SmInformation:
                    type: string
                    format: binary
              encoding:
                jsonData:
                  contentType:  application/json
                binaryDataN2SmInformation:
                  contentType:  application/vnd.3gpp.ngap
                  headers:
                    Content-Id:
                      schema:
                        type: string
          headers:
            Location:
              description: 'Contains the URI of the newly created resource, according to the
structure: {apiRoot}/nsmf-pdusession/v1/sm-contexts/{smContextRef}'
              required: true
              schema:
                type: string

        '307':
          description: temporary redirect
        '308':
          description: permanent redirect
        '400':
          description: unsuccessful creation of an SM context - bad request
          content:
            application/json: # message without binary body part
              schema:
                $ref: '#/components/schemas/SmContextCreateError'
            multipart/related:  # message with binary body part(s)
              schema:
                type: object
                properties: # Request parts
                  jsonData:
                    $ref: '#/components/schemas/SmContextCreateError'
```

```
                      binaryDataN1SmMessage:
                        type: string
                        format: binary
                  encoding:
                    jsonData:
                      contentType:  application/json
                    binaryDataN1SmMessage:
                      contentType:  application/vnd.3gpp.5gnas
                      headers:
                        Content-Id:
                          schema:
                            type: string
        '403':
          description: unsuccessful creation of an SM context - forbidden
          content:
            application/json: # message without binary body part
              schema:
                $ref: '#/components/schemas/SmContextCreateError'
            multipart/related:  # message with binary body part(s)
              schema:
                type: object
                properties: # Request parts
                  jsonData:
                    $ref: '#/components/schemas/SmContextCreateError'
                  binaryDataN1SmMessage:
                    type: string
                    format: binary
              encoding:
                jsonData:
                  contentType:  application/json
                binaryDataN1SmMessage:
                  contentType:  application/vnd.3gpp.5gnas
                  headers:
                    Content-Id:
                      schema:
                        type: string
        '404':
          description: unsuccessful creation of an SM context - not found
          content:
            application/json: # message without binary body part
              schema:
                $ref: '#/components/schemas/SmContextCreateError'
            multipart/related:  # message with binary body part(s)
              schema:
                type: object
                properties: # Request parts
                  jsonData:
                    $ref: '#/components/schemas/SmContextCreateError'
                  binaryDataN1SmMessage:
                    type: string
                    format: binary
              encoding:
                jsonData:
                  contentType:  application/json
                binaryDataN1SmMessage:
                  contentType:  application/vnd.3gpp.5gnas
                  headers:
                    Content-Id:
                      schema:
                        type: string
        '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':
          description: unsuccessful creation of an SM context - internal server error
          content:
            application/json: # message without binary body part
              schema:
                $ref: '#/components/schemas/SmContextCreateError'
            multipart/related:  # message with binary body part(s)
              schema:
                type: object
```

```
                  properties: # Request parts
                    jsonData:
                      $ref: '#/components/schemas/SmContextCreateError'
                    binaryDataN1SmMessage:
                      type: string
                      format: binary
                encoding:
                  jsonData:
                    contentType:  application/json
                  binaryDataN1SmMessage:
                    contentType:  application/vnd.3gpp.5gnas
                    headers:
                      Content-Id:
                        schema:
                          type: string
        '503':
          description: unsuccessful creation of an SM context - service unavailable
          content:
            application/json: # message without binary body part
                schema:
                  $ref: '#/components/schemas/SmContextCreateError'
            multipart/related:  # message with binary body part(s)
                schema:
                  type: object
                  properties: # Request parts
                    jsonData:
                      $ref: '#/components/schemas/SmContextCreateError'
                    binaryDataN1SmMessage:
                      type: string
                      format: binary
                encoding:
                  jsonData:
                    contentType:  application/json
                  binaryDataN1SmMessage:
                    contentType:  application/vnd.3gpp.5gnas
                    headers:
                      Content-Id:
                        schema:
                          type: string

        '504':
          description: unsuccessful creation of an SM context - gateway timeout
          content:
            application/json: # message without binary body part
                schema:
                  $ref: '#/components/schemas/SmContextCreateError'
            multipart/related:  # message with binary body part(s)
                schema:
                  type: object
                  properties: # Request parts
                    jsonData:
                      $ref: '#/components/schemas/SmContextCreateError'
                    binaryDataN1SmMessage:
                      type: string
                      format: binary
                encoding:
                  jsonData:
                    contentType:  application/json
                  binaryDataN1SmMessage:
                    contentType:  application/vnd.3gpp.5gnas
                    headers:
                      Content-Id:
                        schema:
                          type: string
        default:
          $ref: 'TS29571_CommonData.yaml#/components/responses/default'


  /sm-contexts/{smContextRef}/retrieve:
    post:
      summary:  Retrieve SM Context
      tags:
        - Individual SM context
      operationId: RetrieveSmContext
      parameters:
        - name: smContextRef
          in: path
          description:  SM context reference
```

```
                  required: true
                  schema:
                    type: string
            requestBody:
              description: parameters used to retrieve the SM context
              required: false
              content:
                application/json:
                  schema:
                    $ref: '#/components/schemas/SmContextRetrieveData'
            responses:
              '200':
                description: successful retrieval of an SM context
                content:
                  application/json:
                    schema:
                      $ref: '#/components/schemas/SmContextRetrievedData'
              '400':
                $ref: 'TS29571_CommonData.yaml#/components/responses/400'
              '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'

  /sm-contexts/{smContextRef}/modify:
    post:
      summary:  Update SM Context
      tags:
        - Individual SM context
      operationId: UpdateSmContext
      parameters:
        - name: smContextRef
          in: path
          description:  SM context reference
          required: true
          schema:
            type: string
      requestBody:
        description: representation of the updates to apply to the SM context
        required: true
        content:
          application/json: # message without binary body part
            schema:
              $ref: '#/components/schemas/SmContextUpdateData'
          multipart/related:  # message with binary body part(s)
            schema:
              type: object
              properties: # Request parts
                jsonData:
                  $ref: '#/components/schemas/SmContextUpdateData'
                binaryDataN1SmMessage:
                  type: string
                  format: binary
                binaryDataN2SmInformation:
                  type: string
                  format: binary
                binaryDataN2SmInformationExt1:
                  type: string
                  format: binary
              encoding:
                jsonData:
                  contentType:  application/json
                binaryDataN1SmMessage:
                  contentType:  application/vnd.3gpp.5gnas
```

```
                      headers:
                        Content-Id:
                          schema:
                            type: string
                  binaryDataN2SmInformation:
                    contentType:  application/vnd.3gpp.ngap
                    headers:
                      Content-Id:
                        schema:
                          type: string
                  binaryDataN2SmInformationExt1:
                    contentType:  application/vnd.3gpp.ngap
                    headers:
                      Content-Id:
                        schema:
                          type: string
          responses:
            '200':
              description: successful update of an SM context with content in the response
              content:
                application/json: # message without binary body part
                  schema:
                    $ref: '#/components/schemas/SmContextUpdatedData'
                multipart/related:  # message with binary body part(s)
                  schema:
                    type: object
                    properties: # Request parts
                      jsonData:
                        $ref: '#/components/schemas/SmContextUpdatedData'
                      binaryDataN1SmMessage:
                        type: string
                        format: binary
                      binaryDataN2SmInformation:
                        type: string
                        format: binary
                  encoding:
                    jsonData:
                      contentType:  application/json
                    binaryDataN1SmMessage:
                      contentType:  application/vnd.3gpp.5gnas
                      headers:
                        Content-Id:
                          schema:
                            type: string
                    binaryDataN2SmInformation:
                      contentType:  application/vnd.3gpp.ngap
                      headers:
                        Content-Id:
                          schema:
                            type: string
            '204':
              description: successful update of an SM context without content in the response
            '400':
              description: unsuccessful update of an SM context - bad request
              content:
                application/json: # message without binary body part
                  schema:
                    $ref: '#/components/schemas/SmContextUpdateError'
                multipart/related:  # message with binary body part(s)
                  schema:
                    type: object
                    properties: # Request parts
                      jsonData:
                        $ref: '#/components/schemas/SmContextUpdateError'
                      binaryDataN1SmMessage:
                        type: string
                        format: binary
                      binaryDataN2SmInformation:
                        type: string
                        format: binary
                  encoding:
                    jsonData:
                      contentType:  application/json
                    binaryDataN1SmMessage:
                      contentType:  application/vnd.3gpp.5gnas
                      headers:
                        Content-Id:
                          schema:
```

```
                              type: string
                  binaryDataN2SmInformation:
                    contentType:  application/vnd.3gpp.ngap
                    headers:
                      Content-Id:
                        schema:
                          type: string
          '403':
            description: unsuccessful update of an SM context - forbidden
            content:
              application/json: # message without binary body part
                schema:
                  $ref: '#/components/schemas/SmContextUpdateError'
              multipart/related:  # message with binary body part(s)
                schema:
                  type: object
                  properties: # Request parts
                    jsonData:
                      $ref: '#/components/schemas/SmContextUpdateError'
                    binaryDataN1SmMessage:
                      type: string
                      format: binary
                    binaryDataN2SmInformation:
                      type: string
                      format: binary
                encoding:
                  jsonData:
                    contentType:  application/json
                  binaryDataN1SmMessage:
                    contentType:  application/vnd.3gpp.5gnas
                    headers:
                      Content-Id:
                        schema:
                          type: string
                  binaryDataN2SmInformation:
                    contentType:  application/vnd.3gpp.ngap
                    headers:
                      Content-Id:
                        schema:
                          type: string
          '404':
            description: unsuccessful update of an SM context - not found
            content:
              application/json: # message without binary body part
                schema:
                  $ref: '#/components/schemas/SmContextUpdateError'
              multipart/related:  # message with binary body part(s)
                schema:
                  type: object
                  properties: # Request parts
                    jsonData:
                      $ref: '#/components/schemas/SmContextUpdateError'
                    binaryDataN1SmMessage:
                      type: string
                      format: binary
                    binaryDataN2SmInformation:
                      type: string
                      format: binary
                encoding:
                  jsonData:
                    contentType:  application/json
                  binaryDataN1SmMessage:
                    contentType:  application/vnd.3gpp.5gnas
                    headers:
                      Content-Id:
                        schema:
                          type: string
                  binaryDataN2SmInformation:
                    contentType:  application/vnd.3gpp.ngap
                    headers:
                      Content-Id:
                        schema:
                          type: string
          '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':
                  description: unsuccessful update of an SM context - Internal server error
                  content:
                    application/json: # message without binary body part
                        schema:
                          $ref: '#/components/schemas/SmContextUpdateError'
                    multipart/related:  # message with binary body part(s)
                        schema:
                          type: object
                          properties: # Request parts
                            jsonData:
                              $ref: '#/components/schemas/SmContextUpdateError'
                            binaryDataN1SmMessage:
                              type: string
                              format: binary
                            binaryDataN2SmInformation:
                              type: string
                              format: binary
                        encoding:
                          jsonData:
                            contentType:  application/json
                          binaryDataN1SmMessage:
                            contentType:  application/vnd.3gpp.5gnas
                            headers:
                              Content-Id:
                                schema:
                                  type: string
                          binaryDataN2SmInformation:
                            contentType:  application/vnd.3gpp.ngap
                            headers:
                              Content-Id:
                                schema:
                                  type: string
            '503':
                  description: unsuccessful update of an SM context - Service Unavailable
                  content:
                    application/json: # message without binary body part
                        schema:
                          $ref: '#/components/schemas/SmContextUpdateError'
                    multipart/related:  # message with binary body part(s)
                        schema:
                          type: object
                          properties: # Request parts
                            jsonData:
                              $ref: '#/components/schemas/SmContextUpdateError'
                            binaryDataN1SmMessage:
                              type: string
                              format: binary
                            binaryDataN2SmInformation:
                              type: string
                              format: binary
                        encoding:
                          jsonData:
                            contentType:  application/json
                          binaryDataN1SmMessage:
                            contentType:  application/vnd.3gpp.5gnas
                            headers:
                              Content-Id:
                                schema:
                                  type: string
                          binaryDataN2SmInformation:
                            contentType:  application/vnd.3gpp.ngap
                            headers:
                              Content-Id:
                                schema:
                                  type: string
            default:
                  $ref: 'TS29571_CommonData.yaml#/components/responses/default'

  /sm-contexts/{smContextRef}/release:
    post:
      summary:  Release SM Context
      tags:
        - Individual SM context
      operationId: ReleaseSmContext
```

```
        parameters:
          - name: smContextRef
            in: path
            description:  SM context reference
            required: true
            schema:
              type: string
        requestBody:
          description: representation of the data to be sent to the SMF when releasing the SM context
          required: false
          content:
            application/json: # message without binary body part
              schema:
                $ref: '#/components/schemas/SmContextReleaseData'
            multipart/related:  # message with binary body part(s)
              schema:
                type: object
                properties: # Request parts
                  jsonData:
                    $ref: '#/components/schemas/SmContextReleaseData'
                  binaryDataN2SmInformation:
                    type: string
                    format: binary
              encoding:
                jsonData:
                  contentType:  application/json
                binaryDataN2SmInformation:
                  contentType:  application/vnd.3gpp.ngap
                  headers:
                    Content-Id:
                      schema:
                         type: string

        responses:
          '204':
            description: successful release of an SM context without content in the response
          '400':
            $ref: 'TS29571_CommonData.yaml#/components/responses/400'
          '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'


  /pdu-sessions:
    post:
      summary:  Create
      tags:
        - PDU sessions collection
      operationId: PostPduSessions
      requestBody:
        description: representation of the PDU session to be created in the H-SMF
        required: true
        content:
          application/json: # message without binary body part
            schema:
              $ref: '#/components/schemas/PduSessionCreateData'
          multipart/related:  # message with binary body part(s)
            schema:
              type: object
              properties: # Request parts
                jsonData:
                  $ref: '#/components/schemas/PduSessionCreateData'
                binaryDataN1SmInfoFromUe:
```

```
                           type: string
                           format: binary
                     binaryDataUnknownN1SmInfo:
                       type: string
                       format: binary
               encoding:
                 jsonData:
                   contentType:  application/json
                 binaryDataN1SmInfoFromUe:
                   contentType:  application/vnd.3gpp.5gnas
                   headers:
                     Content-Id:
                       schema:
                         type: string
                 binaryDataUnknownN1SmInfo:
                   contentType:  application/vnd.3gpp.5gnas
                   headers:
                     Content-Id:
                       schema:
                         type: string
  callbacks:
    statusNotification:
      '{$request.body#/vsmfPduSessionUri}':
        post:
          summary:  Notify Status
          tags:
            - Individual PDU session (V-SMF)
          operationId: NotifyStatus
          requestBody:
            description: representation of the status notification
            required: true
            content:
              application/json:
                schema:
                  $ref: '#/components/schemas/StatusNotification'
          responses:
            '204':
              description: successful notificationof the status change
            '400':
              $ref: 'TS29571_CommonData.yaml#/components/responses/400'
            '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'


    update:
      '{$request.body#/vsmfPduSessionUri}/modify':
        post:
          summary:  Update (initiated by H-SMF)
          tags:
            - Individual PDU session (V-SMF)
          operationId: ModifyPduSession
          requestBody:
            description: representation of updates to apply to the PDU session
            required: true
            content:
              application/+json: # message without binary body part
                  schema:
                    $ref: '#/components/schemas/VsmfUpdateData'
              multipart/related:  # message with binary body part(s)
                  schema:
                    type: object
                    properties: # Request parts
```

```
                            jsonData:
                              $ref: '#/components/schemas/VsmfUpdateData'
                            binaryDataN1SmInfoToUe:
                              type: string
                              format: binary
                        encoding:
                          jsonData:
                            contentType:  application/json
                          binaryDataN1SmInfoToUe:
                            contentType:  application/vnd.3gpp.5gnas
                            headers:
                              Content-Id:
                                schema:
                                  type: string
          responses:
            '200':
              description: successful update of a PDU session with content in the response
              content:
                application/json: # message without binary body part
                  schema:
                    $ref: '#/components/schemas/VsmfUpdatedData'
                multipart/related:  # message with binary body part(s)
                  schema:
                    type: object
                    properties: # Request parts
                      jsonData:
                        $ref: '#/components/schemas/VsmfUpdatedData'
                      binaryDataN1SmInfoFromUe:
                        type: string
                        format: binary
                      binaryDataUnknownN1SmInfo:
                        type: string
                        format: binary
                  encoding:
                    jsonData:
                      contentType:  application/json
                    binaryDataN1SmInfoFromUe:
                      contentType:  application/vnd.3gpp.5gnas
                      headers:
                        Content-Id:
                          schema:
                            type: string
                    binaryDataUnknownN1SmInfo:
                      contentType:  application/vnd.3gpp.5gnas
                      headers:
                        Content-Id:
                          schema:
                            type: string
            '204':
              description: successful update of a PDU session without content in the response
            '400':
              $ref: '#/components/responses/VsmfUpdateError'
            '403':
              $ref: '#/components/responses/VsmfUpdateError'
            '404':
              $ref: '#/components/responses/VsmfUpdateError'
            '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: '#/components/responses/VsmfUpdateError'
            '503':
              $ref: '#/components/responses/VsmfUpdateError'
            '504':
              $ref: '#/components/responses/VsmfUpdateError'
            default:
              $ref: 'TS29571_CommonData.yaml#/components/responses/default'

      responses:
        '201':
          description: successful creation of a PDU session
          content:
            application/json: # message without binary body part
```

```
                schema:
                  $ref: '#/components/schemas/PduSessionCreatedData'
              multipart/related:  # message with binary body part(s)
                schema:
                  type: object
                  properties: # Request parts
                    jsonData:
                      $ref: '#/components/schemas/PduSessionCreatedData'
                    binaryDataN1SmInfoToUe:
                      type: string
                      format: binary
                encoding:
                  jsonData:
                    contentType:  application/json
                  binaryDataN1SmInfoToUe:
                    contentType:  application/vnd.3gpp.5gnas
                    headers:
                      Content-Id:
                        schema:
                          type: string
            headers:
              Location:
                description: 'Contains the URI of the newly created resource, according to the
structure: {apiRoot}/nsmf-pdusession/v1/pdu-sessions/{pduSessionRef}'
                required: true
                schema:
                  type: string
          '307':
            description: temporary redirect
          '308':
            description: permanent redirect
          '400':
            $ref: '#/components/responses/PduSessionCreateError'
          '403':
            $ref: '#/components/responses/PduSessionCreateError'
          '404':
            $ref: '#/components/responses/PduSessionCreateError'
          '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: '#/components/responses/PduSessionCreateError'
          '503':
            $ref: '#/components/responses/PduSessionCreateError'
          default:
            $ref: 'TS29571_CommonData.yaml#/components/responses/default'

  /pdu-sessions/{pduSessionRef}/modify:
    post:
      summary:  Update (initiated by V-SMF)
      tags:
        - Individual PDU session (H-SMF)
      operationId: UpdatePduSession
      parameters:
        - name: pduSessionRef
          in: path
          description:  PDU session reference
          required: true
          schema:
            type: string
      requestBody:
        description: representation of the updates to apply to the PDU session
        required: true
        content:
          application/json: # message without binary body part
            schema:
              $ref: '#/components/schemas/HsmfUpdateData'
          multipart/related:  # message with binary body part(s)
            schema:
              type: object
              properties: # Request parts
                jsonData:
                  $ref: '#/components/schemas/HsmfUpdateData'
```

ETSI

```
                        binaryDataN1SmInfoFromUe:
                          type: string
                          format: binary
                        binaryDataUnknownN1SmInfo:
                          type: string
                          format: binary
                    encoding:
                      jsonData:
                        contentType:  application/json
                      binaryDataN1SmInfoFromUe:
                        contentType:  application/vnd.3gpp.5gnas
                        headers:
                          Content-Id:
                            schema:
                              type: string
                      binaryDataUnknownN1SmInfo:
                        contentType:  application/vnd.3gpp.5gnas
                        headers:
                          Content-Id:
                            schema:
                              type: string
          responses:
            '200':
              description: successful update of a PDU session with content in the response
              content:
                application/json: # message without binary body part
                  schema:
                    $ref: '#/components/schemas/HsmfUpdatedData'
                multipart/related:  # message with binary body part(s)
                  schema:
                    type: object
                    properties: # Request parts
                      jsonData:
                        $ref: '#/components/schemas/HsmfUpdatedData'
                      binaryDataN1SmInfoToUe:
                        type: string
                        format: binary
                  encoding:
                    jsonData:
                      contentType:  application/json
                    binaryDataN1SmInfoToUe:
                      contentType:  application/vnd.3gpp.5gnas
                      headers:
                        Content-Id:
                          schema:
                            type: string
            '204':
              description: successful update of a PDU session without content in the response
            '400':
              $ref: '#/components/responses/HsmfUpdateError'
            '403':
              $ref: '#/components/responses/HsmfUpdateError'
            '404':
              $ref: '#/components/responses/HsmfUpdateError'
            '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: '#/components/responses/HsmfUpdateError'
            '503':
              $ref: '#/components/responses/HsmfUpdateError'
            default:
              $ref: 'TS29571_CommonData.yaml#/components/responses/default'

  /pdu-sessions/{pduSessionRef}/release:
    post:
      summary:  Release
      tags:
        - Individual PDU session (H-SMF)
      operationId: ReleasePduSession
      parameters:
        - name: pduSessionRef
          in: path
```

```
                description:  PDU session reference
                required: true
                schema:
                  type: string
          requestBody:
            description: representation of the data to be sent to H-SMF when releasing the PDU session
            required: false
            content:
              application/json:
                schema:
                  $ref: '#/components/schemas/ReleaseData'
          responses:
            '204':
              description: successful release of a PDU session
            '400':
              $ref: 'TS29571_CommonData.yaml#/components/responses/400'
            '403':
              $ref: 'TS29571_CommonData.yaml#/components/responses/403'
            '404':
              $ref: 'TS29571_CommonData.yaml#/components/responses/404'
            '411':
              $ref: 'TS29571_CommonData.yaml#/components/responses/411'
            '413':
              $ref: 'TS29571_CommonData.yaml#/components/responses/413'
            '415':
              $ref: 'TS29571_CommonData.yaml#/components/responses/415'
            '429':
              $ref: 'TS29571_CommonData.yaml#/components/responses/429'
            '500':
              $ref: 'TS29571_CommonData.yaml#/components/responses/500'
            '503':
              $ref: 'TS29571_CommonData.yaml#/components/responses/503'
            default:
              $ref: 'TS29571_CommonData.yaml#/components/responses/default'

components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{nrfApiRoot}/oauth2/token'
          scopes:
            nsmf-pdusession: Access to the nsmf-pdusession API

  schemas:
#
# STRUCTURED DATA TYPES
#
    SmContextCreateData:
      type: object
      properties:
        supi:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Supi'
        unauthenticatedSupi:
          type: boolean
          default:  false
        pei:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Pei'
        gpsi:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
        pduSessionId:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/PduSessionId'
        dnn:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
        sNssai:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
        hplmnSnssai:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
        servingNfId:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'
        guami:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Guami'
        serviceName:
          $ref: 'TS29510_Nnrf_NFManagement.yaml#/components/schemas/ServiceName'
        servingNetwork:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/PlmnId'
        requestType:
```

```
        $ref: '#/components/schemas/RequestType'
      n1SmMsg:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/RefToBinaryData'
      anType:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/AccessType'
      ratType:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/RatType'
      presenceInLadn:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/PresenceState'
      ueLocation:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/UserLocation'
      ueTimeZone:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/TimeZone'
      addUeLocation:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/UserLocation'
      smContextStatusUri:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
      hSmfUri:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
      additionalHsmfUri:
        type: array
        items:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
        minItems: 1
      oldPduSessionId:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/PduSessionId'
      pduSessionsActivateList:
        type: array
        items:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/PduSessionId'
        minItems: 1
      ueEpsPdnConnection:
        $ref: '#/components/schemas/EpsPdnCnxContainer'
      hoState:
        $ref: '#/components/schemas/HoState'
      pcfId:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'
      nrfUri:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
      supportedFeatures:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      selMode:
        $ref: '#/components/schemas/DnnSelectionMode'
      backupAmfInfo:
        type: array
        items:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/BackupAmfInfo'
        minItems: 1
      traceData:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/TraceData'
      udmGroupId:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/NfGroupId'
      routingIndicator:
        type: string
      epsInterworkingInd:
        $ref: '#/components/schemas/EpsInterworkingIndication'
      indirectForwardingFlag:
        type: boolean
      targetId:
        $ref: 'TS29518_Namf_Communication.yaml#/components/schemas/NgRanTargetId'
    required:
      - servingNfId
      - servingNetwork
      - anType
      - smContextStatusUri

  SmContextCreatedData:
    type: object
    properties:
      hSmfUri:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
      pduSessionId:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/PduSessionId'
      sNssai:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
      upCnxState:
        $ref: '#/components/schemas/UpCnxState'
      n2SmInfo:
```

```
          $ref: 'TS29571_CommonData.yaml#/components/schemas/RefToBinaryData'
        n2SmInfoType:
          $ref: '#/components/schemas/N2SmInfoType'
        allocatedEbiList:
          type: array
          items:
            $ref: '#/components/schemas/EbiArpMapping'
          minItems: 1
        hoState:
          $ref: '#/components/schemas/HoState'
        smfServiceInstanceId:
          type: string
        recoveryTime:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
        supportedFeatures:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'

    SmContextUpdateData:
      type: object
      properties:
        pei:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Pei'
        gpsi:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
        servingNfId:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'
        guami:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Guami'
        servingNetwork:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/PlmnId'
        backupAmfInfo:
          type: array
          items:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/BackupAmfInfo'
          minItems: 1
          nullable: true
        anType:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/AccessType'
        ratType:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/RatType'
        presenceInLadn:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/PresenceState'
        ueLocation:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/UserLocation'
        ueTimeZone:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/TimeZone'
        addUeLocation:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/UserLocation'
        upCnxState:
          $ref: '#/components/schemas/UpCnxState'
        hoState:
          $ref: '#/components/schemas/HoState'
        toBeSwitched:
          type: boolean
          default: false
        failedToBeSwitched:
          type: boolean
        n1SmMsg:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/RefToBinaryData'
        n2SmInfo:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/RefToBinaryData'
        n2SmInfoType:
          $ref: '#/components/schemas/N2SmInfoType'
        targetId:
          $ref: 'TS29518_Namf_Communication.yaml#/components/schemas/NgRanTargetId'
        targetServingNfId:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'
        smContextStatusUri:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
        dataForwarding:
          type: boolean
          default: false
        epsBearerSetup:
          type: array
          items:
            $ref: '#/components/schemas/EpsBearerContainer'
          minItems: 0
        revokeEbiList:
```

```
            type: array
            items:
              $ref: '#/components/schemas/EpsBearerId'
            minItems: 1
          release:
            type: boolean
            default: false
          cause:
            $ref: '#/components/schemas/Cause'
          ngApCause:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/NgApCause'
          5gMmCauseValue:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/5GMmCause'
          sNssai:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
          traceData:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/TraceData'
          epsInterworkingInd:
            $ref: '#/components/schemas/EpsInterworkingIndication'
          anTypeCanBeChanged:
            type: boolean
            default: false
          n2SmInfoExt1:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/RefToBinaryData'
          n2SmInfoTypeExt1:
            $ref: '#/components/schemas/N2SmInfoType'

    SmContextUpdatedData:
      type: object
      properties:
        upCnxState:
          $ref: '#/components/schemas/UpCnxState'
        hoState:
          $ref: '#/components/schemas/HoState'
        releaseEbiList:
          type: array
          items:
            $ref: '#/components/schemas/EpsBearerId'
          minItems: 1
        allocatedEbiList:
          type: array
          items:
            $ref: '#/components/schemas/EbiArpMapping'
          minItems: 1
        modifiedEbiList:
          type: array
          items:
            $ref: '#/components/schemas/EbiArpMapping'
          minItems: 1
        n1SmMsg:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/RefToBinaryData'
        n2SmInfo:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/RefToBinaryData'
        n2SmInfoType:
          $ref: '#/components/schemas/N2SmInfoType'
        epsBearerSetup:
          type: array
          items:
            $ref: '#/components/schemas/EpsBearerContainer'
          minItems: 1
        dataForwarding:
          type: boolean
        cause:
          $ref: '#/components/schemas/Cause'

    SmContextReleaseData:
      type: object
      properties:
        cause:
          $ref: '#/components/schemas/Cause'
        ngApCause:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/NgApCause'
        5gMmCauseValue:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/5GMmCause'
        ueLocation:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/UserLocation'
        ueTimeZone:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/TimeZone'
```

```
        addUeLocation:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/UserLocation'
        vsmfReleaseOnly:
          type: boolean
          default: false
        n2SmInfo:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/RefToBinaryData'
        n2SmInfoType:
          $ref: '#/components/schemas/N2SmInfoType'

    SmContextStatusNotification:
      type: object
      properties:
        statusInfo :
          $ref: '#/components/schemas/StatusInfo'
      required:
        - statusInfo

    PduSessionCreateData:
      type: object
      properties:
        supi:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Supi'
        unauthenticatedSupi:
          type: boolean
          default: false
        pei:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Pei'
        pduSessionId:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/PduSessionId'
        dnn:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
        sNssai:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
        vsmfId:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'
        servingNetwork:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/PlmnId'
        requestType:
          $ref: '#/components/schemas/RequestType'
        epsBearerId:
          type: array
          items:
            $ref: '#/components/schemas/EpsBearerId'
          minItems: 1
        pgwS8cFteid:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Bytes'
        vsmfPduSessionUri:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
        vcnTunnelInfo:
          $ref: '#/components/schemas/TunnelInfo'
        anType:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/AccessType'
        ratType:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/RatType'
        ueLocation:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/UserLocation'
        ueTimeZone:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/TimeZone'
        addUeLocation:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/UserLocation'
        gpsi:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
        n1SmInfoFromUe:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/RefToBinaryData'
        unknownN1SmInfo:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/RefToBinaryData'
        supportedFeatures:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
        hPcfId:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'
        hoPreparationIndication:
          type: boolean
        selMode:
          $ref: '#/components/schemas/DnnSelectionMode'
        alwaysOnRequested:
          type: boolean
          default: false
```

```
        udmGroupId:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/NfGroupId'
        routingIndicator:
          type: string
        epsInterworkingInd:
          $ref: '#/components/schemas/EpsInterworkingIndication'
        vSmfServiceInstanceId:
          type: string
        recoveryTime:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
        roamingChargingProfile:
          $ref: 'TS32291_Nchf_ConvergedCharging.yaml#/components/schemas/RoamingChargingProfile'
        chargingId:
          type: string
        oldPduSessionId:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/PduSessionId'
      required:
        - dnn
        - vsmfId
        - servingNetwork
        - vsmfPduSessionUri
        - vcnTunnelInfo
        - anType

    PduSessionCreatedData:
      type: object
      properties:
        pduSessionType:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/PduSessionType'
        sscMode:
          type: string
          pattern: '^[0-7]$'
        hcnTunnelInfo:
          $ref: '#/components/schemas/TunnelInfo'
        sessionAmbr:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Ambr'
        qosFlowsSetupList:
          type: array
          items:
            $ref: '#/components/schemas/QosFlowSetupItem'
          minItems: 1
        hSmfInstanceId:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'
        pduSessionId:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/PduSessionId'
        sNssai:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
        enablePauseCharging:
          type: boolean
          default: false
        ueIpv4Address:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv4Addr'
        ueIpv6Prefix:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Prefix'
        n1SmInfoToUe:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/RefToBinaryData'
        epsPdnCnxInfo:
          $ref: '#/components/schemas/EpsPdnCnxInfo'
        epsBearerInfo:
          type: array
          items:
            $ref: '#/components/schemas/EpsBearerInfo'
          minItems: 1
        supportedFeatures:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
        maxIntegrityProtectedDataRate:
          $ref: '#/components/schemas/MaxIntegrityProtectedDataRate'
        alwaysOnGranted:
          type: boolean
          default: false
        upSecurity:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/UpSecurity'
        roamingChargingProfile:
          $ref: 'TS32291_Nchf_ConvergedCharging.yaml#/components/schemas/RoamingChargingProfile'
        hSmfServiceInstanceId:
          type: string
        recoveryTime:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
```

```
      required:
        - pduSessionType
        - sscMode
        - hcnTunnelInfo
        - sessionAmbr
        - qosFlowsSetupList
        - hSmfInstanceId

  HsmfUpdateData:
    type: object
    properties:
      requestIndication:
        $ref: '#/components/schemas/RequestIndication'
      pei:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Pei'
      vcnTunnelInfo:
        $ref: '#/components/schemas/TunnelInfo'
      servingNetwork:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/PlmnId'
      anType:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/AccessType'
      ratType:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/RatType'
      ueLocation:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/UserLocation'
      ueTimeZone:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/TimeZone'
      addUeLocation:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/UserLocation'
      pauseCharging:
        type: boolean
      pti:
        $ref: '#/components/schemas/ProcedureTransactionId'
      n1SmInfoFromUe:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/RefToBinaryData'
      unknownN1SmInfo:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/RefToBinaryData'
      qosFlowsRelNotifyList:
        type: array
        items:
          $ref: '#/components/schemas/QosFlowItem'
        minItems: 1
      qosFlowsNotifyList:
        type: array
        items:
          $ref: '#/components/schemas/QosFlowNotifyItem'
        minItems: 1
      NotifyList:
        type: array
        items:
          $ref: '#/components/schemas/PduSessionNotifyItem'
        minItems: 1
      epsBearerId:
        type: array
        items:
          $ref: '#/components/schemas/EpsBearerId'
        minItems: 0
      hoPreparationIndication:
        type: boolean
      revokeEbiList:
        type: array
        items:
          $ref: '#/components/schemas/EpsBearerId'
        minItems: 1
      cause:
        $ref: '#/components/schemas/Cause'
      ngApCause:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/NgApCause'
      5gMmCauseValue:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/5GMmCause'
      alwaysOnRequested:
        type: boolean
        default: false
      epsInterworkingInd:
        $ref: '#/components/schemas/EpsInterworkingIndication'
      secondaryRatUsageReport:
        type: array
        items:
```

```
            $ref: 'TS29571_CommonData.yaml#/components/schemas/SecondaryRatUsageReport'
          minItems: 1
      required:
        - requestIndication

    HsmfUpdatedData:
      type: object
      properties:
        n1SmInfoToUe:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/RefToBinaryData'

    ReleaseData:
      type: object
      properties:
        cause:
          $ref: '#/components/schemas/Cause'
        ngApCause:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/NgApCause'
        5gMmCauseValue:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/5GMmCause'
        ueLocation:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/UserLocation'
        ueTimeZone:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/TimeZone'
        addUeLocation:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/UserLocation'
        secondaryRatUsageReport:
          type: array
          items:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/SecondaryRatUsageReport'
          minItems: 1

    VsmfUpdateData:
      type: object
      properties:
        requestIndication:
          $ref: '#/components/schemas/RequestIndication'
        sessionAmbr:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Ambr'
        qosFlowsAddModRequestList:
          type: array
          items:
            $ref: '#/components/schemas/QosFlowAddModifyRequestItem'
          minItems: 1
        qosFlowsRelRequestList:
          type: array
          items:
            $ref: '#/components/schemas/QosFlowReleaseRequestItem'
          minItems: 1
        epsBearerInfo:
          type: array
          items:
            $ref: '#/components/schemas/EpsBearerInfo'
          minItems: 1
        assignEbiList:
          type: array
          items:
            $ref: '#/components/schemas/EpsBearerId'
          minItems: 1
        revokeEbiList:
          type: array
          items:
            $ref: '#/components/schemas/EpsBearerId'
          minItems: 1
        modifiedEbiList:
          type: array
          items:
            $ref: '#/components/schemas/EbiArpMapping'
          minItems: 1
        pti:
          $ref: '#/components/schemas/ProcedureTransactionId'
        n1SmInfoToUe:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/RefToBinaryData'
        alwaysOnGranted:
          type: boolean
          default: false
        hsmfPduSessionUri:
```

ETSI

```
                $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
              supportedFeatures:
                $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
              cause:
                $ref: '#/components/schemas/Cause'
              n1smCause:
                type: string
              backOffTimer:
                $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
            required:
              - requestIndication

        VsmfUpdatedData:
          type: object
          properties:
            qosFlowsAddModList:
              type: array
              items:
                $ref: '#/components/schemas/QosFlowItem'
              minItems: 1
            qosFlowsRelList:
              type: array
              items:
                $ref: '#/components/schemas/QosFlowItem'
              minItems: 1
            qosFlowsFailedtoAddModList:
              type: array
              items:
                $ref: '#/components/schemas/QosFlowItem'
              minItems: 1
            qosFlowsFailedtoRelList:
              type: array
              items:
                $ref: '#/components/schemas/QosFlowItem'
              minItems: 1
            n1SmInfoFromUe:
              $ref: 'TS29571_CommonData.yaml#/components/schemas/RefToBinaryData'
            unknownN1SmInfo:
              $ref: 'TS29571_CommonData.yaml#/components/schemas/RefToBinaryData'
            ueLocation:
              $ref: 'TS29571_CommonData.yaml#/components/schemas/UserLocation'
            ueTimeZone:
              $ref: 'TS29571_CommonData.yaml#/components/schemas/TimeZone'
            addUeLocation:
              $ref: 'TS29571_CommonData.yaml#/components/schemas/UserLocation'
            assignedEbiList:
              type: array
              items:
                $ref: '#/components/schemas/EbiArpMapping'
              minItems: 1
            failedToAssignEbiList:
              type: array
              items:
                $ref: '#/components/schemas/EpsBearerId'
              minItems: 1
            releasedEbiList:
              type: array
              items:
                $ref: '#/components/schemas/EpsBearerId'
              minItems: 1
            secondaryRatUsageReport:
              type: array
              items:
                $ref: 'TS29571_CommonData.yaml#/components/schemas/SecondaryRatUsageReport'
              minItems: 1

        StatusNotification:
          type: object
          properties:
            statusInfo :
              $ref: '#/components/schemas/StatusInfo'
          required:
            - statusInfo

        QosFlowItem:
          type: object
          properties:
            qfi:
```

```
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Qfi'
        cause:
          $ref: '#/components/schemas/Cause'
      required:
        - qfi

    QosFlowSetupItem:
      type: object
      properties:
        qfi:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Qfi'
        qosRules:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Bytes'
        ebi:
          $ref: '#/components/schemas/EpsBearerId'
        qosFlowDescription:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Bytes'
        qosFlowProfile:
          $ref: '#/components/schemas/QosFlowProfile'
      required:
        - qfi
        - qosRules

    QosFlowAddModifyRequestItem:
      type: object
      properties:
        qfi:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Qfi'
        ebi:
          $ref: '#/components/schemas/EpsBearerId'
        qosRules:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Bytes'
        qosFlowDescription:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Bytes'
        qosFlowProfile:
          $ref: '#/components/schemas/QosFlowProfile'
      required:
        - qfi

    QosFlowReleaseRequestItem:
      type: object
      properties:
        qfi:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Qfi'
        qosRules:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Bytes'
        qosFlowDescription:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Bytes'
      required:
        - qfi

    QosFlowProfile:
      type: object
      properties:
        5qi:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/5Qi'
        nonDynamic5Qi:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/NonDynamic5Qi'
        dynamic5Qi:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Dynamic5Qi'
        arp:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Arp'
        gbrQosFlowInfo:
          $ref: '#/components/schemas/GbrQosFlowInformation'
        rqa:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/ReflectiveQoSAttribute'
        additionalQosFlowInfo:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/AdditionalQosFlowInfo'
      required:
        - 5qi

    GbrQosFlowInformation:
      type: object
      properties:
        maxFbrDl:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRate'
        maxFbrUl:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRate'
```

```
          guaFbrDl:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRate'
          guaFbrUl:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRate'
          notifControl:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/NotificationControl'
          maxPacketLossRateDl:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/PacketLossRate'
          maxPacketLossRateUl:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/PacketLossRate'
        required:
          - maxFbrDl
          - maxFbrUl
          - guaFbrDl
          - guaFbrUl


      QosFlowNotifyItem:
        type: object
        properties:
          qfi:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/Qfi'
          notificationCause:
            $ref: '#/components/schemas/NotificationCause'
        required:
          - qfi
          - notificationCause


      SmContextRetrieveData:
        type: object
        properties:
          targetMmeCap:
            $ref: '#/components/schemas/MmeCapabilities'

      SmContextRetrievedData:
        type: object
        properties:
          ueEpsPdnConnection:
            $ref: '#/components/schemas/EpsPdnCnxContainer'
        required:
          - ueEpsPdnConnection

      MmeCapabilities:
        type: object
        properties:
          nonIpSupported:
            type: boolean
            default: false

      TunnelInfo:
        type: object
        properties:
          ipv4Addr:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv4Addr'
          ipv6Addr:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Addr'
          gtpTeid:
            $ref: '#/components/schemas/Teid'
        required:
          - gtpTeid

      StatusInfo:
        type: object
        properties:
          resourceStatus:
            $ref: '#/components/schemas/ResourceStatus'
          cause:
            $ref: '#/components/schemas/Cause'
        required:
          - resourceStatus


      EpsPdnCnxInfo:
        type: object
        properties:
          pgwS8cFteid:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/Bytes'
          pgwNodeName:
```

```
              $ref: 'TS29571_CommonData.yaml#/components/schemas/Bytes'
          required:
            - pgwS8cFteid

      EpsBearerInfo:
        type: object
        properties:
          ebi:
            $ref: '#/components/schemas/EpsBearerId'
          pgwS8uFteid:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/Bytes'
          bearerLevelQoS:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/Bytes'
        required:
          - ebi
          - pgwS8uFteid
          - bearerLevelQoS

      PduSessionNotifyItem:
        type: object
        properties:
          notificationCause:
            $ref: '#/components/schemas/NotificationCause'
        required:
          - notificationCause

      EbiArpMapping:
        type: object
        properties:
          epsBearerId:
            $ref: '#/components/schemas/EpsBearerId'
          arp:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/Arp'
        required:
          - epsBearerId
          - arp

      SmContextCreateError:
        type: object
        properties:
          error:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
          n1SmMsg:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/RefToBinaryData'
          recoveryTime:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
        required:
          - error

      SmContextUpdateError:
        type: object
        properties:
          error:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
          n1SmMsg:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/RefToBinaryData'
          n2SmInfo:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/RefToBinaryData'
          n2SmInfoType:
            $ref: '#/components/schemas/N2SmInfoType'
          upCnxState:
            $ref: '#/components/schemas/UpCnxState'
          recoveryTime:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
        required:
          - error

      PduSessionCreateError:
        type: object
        properties:
          error:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
          n1smCause:
            type: string
            pattern: '^[A-F0-9]{2}$'
          n1SmInfoToUe:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/RefToBinaryData'
          backOffTimer:
```

```
              $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
            recoveryTime:
              $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
          required:
            - error

    HsmfUpdateError:
      type: object
      properties:
        error:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
        pti:
          $ref: '#/components/schemas/ProcedureTransactionId'
        n1smCause:
          type: string
          pattern: '^[A-F0-9]{2}$'
        n1SmInfoToUe:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/RefToBinaryData'
        backOffTimer:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
        recoveryTime:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
      required:
        - error

    VsmfUpdateError:
      type: object
      properties:
        error:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
        pti:
          $ref: '#/components/schemas/ProcedureTransactionId'
        n1smCause:
          type: string
          pattern: '^[A-F0-9]{2}$'
        n1SmInfoFromUe:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/RefToBinaryData'
        unknownN1SmInfo:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/RefToBinaryData'
        failedToAssignEbiList:
          type: array
          items:
            $ref: '#/components/schemas/EpsBearerId'
          minItems: 1
        ngApCause:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/NgApCause'
        5gMmCauseValue:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/5GMmCause'
        recoveryTime:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
      required:
        - error


#
# SIMPLE DATA TYPES
#
    ProcedureTransactionId:
      type: integer
      minimum: 0
      maximum: 255

    EpsBearerId:
      type: integer
      minimum: 0
      maximum: 15

    EpsPdnCnxContainer:
      type: string

    EpsBearerContainer:
      type: string

    Teid:
      type: string
      pattern: '^[A-F0-9]{8}$'
#
# ENUMERATIONS
```

```
#
    UpCnxState:
      anyOf:
      - type: string
        enum:
          - ACTIVATED
          - DEACTIVATED
          - ACTIVATING
      - type: string
        description: >
          This string provides forward-compatibility with future
          extensions to the enumeration but is not used to encode
          content defined in the present version of this API.
      description: >
        Possible values are
        - ACTIVATED
        - DEACTIVATED
        - ACTIVATING

    HoState:
      anyOf:
      - type: string
        enum:
          - NONE
          - PREPARING
          - PREPARED
          - COMPLETED
          - CANCELLED
      - type: string
        description: >
          This string provides forward-compatibility with future
          extensions to the enumeration but is not used to encode
          content defined in the present version of this API.
      description: >
        Possible values are
        - NONE
        - PREPARING
        - PREPARED
        - COMPLETED
        - CANCELLED

    RequestType:
      anyOf:
      - type: string
        enum:
          - INITIAL_REQUEST
          - EXISTING_PDU_SESSION
          - INITIAL_EMERGENCY_REQUEST
          - EXISTING_EMERGENCY_PDU_SESSION
      - type: string
        description: >
          This string provides forward-compatibility with future
          extensions to the enumeration but is not used to encode
          content defined in the present version of this API.
      description: >
        Possible values are
        - INITIAL_REQUEST
        - EXISTING_PDU_SESSION
        - INITIAL_EMERGENCY_REQUEST
        - EXISTING_EMERGENCY_PDU_SESSION

    RequestIndication:
      anyOf:
      - type: string
        enum:
          - UE_REQ_PDU_SES_MOD
          - UE_REQ_PDU_SES_REL
          - PDU_SES_MOB
          - NW_REQ_PDU_SES_AUTH
          - NW_REQ_PDU_SES_MOD
          - NW_REQ_PDU_SES_REL
          - EBI_ASSIGNMENT_REQ
      - type: string
        description: >
          This string provides forward-compatibility with future
          extensions to the enumeration but is not used to encode
          content defined in the present version of this API.
      description: >
```

```
      Possible values are
      - UE_REQ_PDU_SES_MOD
      - UE_REQ_PDU_SES_REL
      - PDU_SES_MOB
      - NW_REQ_PDU_SES_AUTH
      - NW_REQ_PDU_SES_MOD
      - NW_REQ_PDU_SES_REL
      - EBI_ASSIGNMENT_REQ

  NotificationCause:
    anyOf:
    - type: string
      enum:
        - QOS_FULFILLED
        - QOS_NOT_FULFILLED
        - UP_SEC_FULFILLED
        - UP_SEC_NOT_FULFILLED
    - type: string
      description: >
        This string provides forward-compatibility with future
        extensions to the enumeration but is not used to encode
        content defined in the present version of this API.
    description: >
      Possible values are
      - QOS_FULFILLED
      - QOS_NOT_FULFILLED
      - UP_SEC_FULFILLED
      - UP_SEC_NOT_FULFILLED

  Cause:
    anyOf:
    - type: string
      enum:
        - REL_DUE_TO_HO
        - EPS_FALLBACK
        - REL_DUE_TO_UP_SEC
        - DNN_CONGESTION
        - S-NSSAI_CONGESTION
        - REL_DUE_TO_REACTIVATION
        - 5G_AN_NOT_RESPONDING
        - REL_DUE_TO_SLICE_NOT_AVAILABLE
        - REL_DUE_TO_DUPLICATE_SESSION_ID
        - PDU_SESSION_STATUS_MISMATCH
        - HO_FAILURE
        - INSUFFICIENT_UP_RESOURCES
        - PDU_SESSION_HANDED_OVER
    - type: string
      description: >
        This string provides forward-compatibility with future
        extensions to the enumeration but is not used to encode
        content defined in the present version of this API.
    description: >
      Possible values are
      - REL_DUE_TO_HO
      - EPS_FALLBACK
      - REL_DUE_TO_UP_SEC
      - DNN_CONGESTION
      - S-NSSAI_CONGESTION
      - REL_DUE_TO_REACTIVATION
      - 5G_AN_NOT_RESPONDING
      - REL_DUE_TO_SLICE_NOT_AVAILABLE
      - REL_DUE_TO_DUPLICATE_SESSION_ID
      - PDU_SESSION_STATUS_MISMATCH
      - HO_FAILURE
      - INSUFFICIENT_UP_RESOURCES
      - PDU_SESSION_HANDED_OVER

  ResourceStatus:
    anyOf:
    - type: string
      enum:
        - RELEASED
    - type: string
      description: >
        This string provides forward-compatibility with future
        extensions to the enumeration but is not used to encode
        content defined in the present version of this API.
    description: >
```

```
      Possible values are
      - RELEASED

  DnnSelectionMode:
    anyOf:
    - type: string
      enum:
        - VERIFIED
        - UE_DNN_NOT_VERIFIED
        - NW_DNN_NOT_VERIFIED
    - type: string
      description: >
        This string provides forward-compatibility with future
        extensions to the enumeration but is not used to encode
        content defined in the present version of this API.
    description: >
      Possible values are
      - VERIFIED
      - UE_DNN_NOT_VERIFIED
      - NW_DNN_NOT_VERIFIED

  EpsInterworkingIndication:
    anyOf:
    - type: string
      enum:
        - NONE
        - WITH_N26
        - WITHOUT_N26
    - type: string
      description: >
        This string provides forward-compatibility with future
        extensions to the enumeration but is not used to encode
        content defined in the present version of this API.
    description: >
      Possible values are
      - NONE
      - WITH_N26
      - WITHOUT_N26

  N2SmInfoType:
    anyOf:
    - type: string
      enum:
        - PDU_RES_SETUP_REQ
        - PDU_RES_SETUP_RSP
        - PDU_RES_SETUP_FAIL
        - PDU_RES_REL_CMD
        - PDU_RES_REL_RSP
        - PDU_RES_MOD_REQ
        - PDU_RES_MOD_RSP
        - PDU_RES_MOD_FAIL
        - PDU_RES_NTY
        - PDU_RES_NTY_REL
        - PDU_RES_MOD_IND
        - PDU_RES_MOD_CFM
        - PATH_SWITCH_REQ
        - PATH_SWITCH_SETUP_FAIL
        - PATH_SWITCH_REQ_ACK
        - PATH_SWITCH_REQ_FAIL
        - HANDOVER_REQUIRED
        - HANDOVER_CMD
        - HANDOVER_PREP_FAIL
        - HANDOVER_REQ_ACK
        - HANDOVER_RES_ALLOC_FAIL
        - SECONDARY_RAT_USAGE
    - type: string
      description: >
        This string provides forward-compatibility with future
        extensions to the enumeration but is not used to encode
        content defined in the present version of this API.
    description: >
      Possible values are
      - PDU_RES_SETUP_REQ
      - PDU_RES_SETUP_RSP
      - PDU_RES_SETUP_FAIL
      - PDU_RES_REL_CMD
      - PDU_RES_REL_RSP
      - PDU_RES_MOD_REQ
```

```
                   - PDU_RES_MOD_RSP
                   - PDU_RES_MOD_FAIL
                   - PDU_RES_NTY
                   - PDU_RES_NTY_REL
                   - PDU_RES_MOD_IND
                   - PDU_RES_MOD_CFM
                   - PATH_SWITCH_REQ
                   - PATH_SWITCH_SETUP_FAIL
                   - PATH_SWITCH_REQ_ACK
                   - PATH_SWITCH_REQ_FAIL
                   - HANDOVER_REQUIRED
                   - HANDOVER_CMD
                   - HANDOVER_PREP_FAIL
                   - HANDOVER_REQ_ACK
                   - HANDOVER_RES_ALLOC_FAIL
                   - SECONDARY_RAT_USAGE

        MaxIntegrityProtectedDataRate:
          anyOf:
          - type: string
            enum:
              - 64_KBPS
              - MAX_UE_RATE
          - type: string
            description: >
              This string provides forward-compatibility with future
              extensions to the enumeration but is not used to encode
              content defined in the present version of this API.
          description: >
            Possible values are
              - 64_KBPS
              - MAX_UE_RATE


#
# HTTP responses
#
  responses:
    'PduSessionCreateError':
      description: unsuccessful creation of a PDU session
      content:
        application/json: # message without binary body part
          schema:
            $ref: '#/components/schemas/PduSessionCreateError'
        multipart/related:  # message with binary body part(s)
          schema:
            type: object
            properties: # Request parts
              jsonData:
                $ref: '#/components/schemas/PduSessionCreateError'
              binaryDataN1SmInfoToUe:
                type: string
                format: binary
          encoding:
            jsonData:
              contentType:  application/json
            binaryDataN1SmInfoToUe:
              contentType:  application/vnd.3gpp.5gnas
              headers:
                Content-Id:
                  schema:
                    type: string

    'HsmfUpdateError':
      description: unsuccessful update of a PDU session
      content:
        application/json: # message without binary body part
          schema:
            $ref: '#/components/schemas/HsmfUpdateError'
        multipart/related:  # message with binary body part(s)
          schema:
            type: object
            properties: # Request parts
              jsonData:
                $ref: '#/components/schemas/HsmfUpdateError'
              binaryDataN1SmInfoToUe:
                type: string
                format: binary
```

```
                encoding:
                  jsonData:
                    contentType:  application/json
                  binaryDataN1SmInfoToUe:
                    contentType:  application/vnd.3gpp.5gnas
                    headers:
                      Content-Id:
                        schema:
                          type: string

      'VsmfUpdateError':
        description: unsuccessful update of a PDU session
        content:
          application/json: # message without binary body part
            schema:
              $ref: '#/components/schemas/VsmfUpdateError'
          multipart/related:  # message with binary body part(s)
            schema:
              type: object
              properties: # Request parts
                jsonData:
                  $ref: '#/components/schemas/VsmfUpdateError'
                binaryDataN1SmInfoFromUe:
                  type: string
                  format: binary
                binaryDataUnknownN1SmInfo:
                  type: string
                  format: binary
            encoding:
              jsonData:
                contentType:  application/json
              binaryDataN1SmInfoFromUe:
                contentType:  application/vnd.3gpp.5gnas
                headers:
                  Content-Id:
                    schema:
                      type: string
              binaryDataUnknownN1SmInfo:
                contentType:  application/vnd.3gpp.5gnas
                headers:
                  Content-Id:
                    schema:
                      type: string
```

Annex B (Informative): HTTP Multipart Messages

B.1 Example of HTTP multipart message

B.1.1 General

This subclause provides a (partial) example of HTTP multipart message. The example does not aim to be a complete representation of the HTTP message, e.g. additional information or headers can be included.

This Annex is informative and the normative descriptions in this specification prevail over the description in this Annex if there is any difference.

B.1.2 Example HTTP multipart message with N1 SM Message binary data

```
POST /example.com/nsmf-pdusession/v1/sm-contexts HTTP/2
Content-Type: multipart/related; boundary=----Boundary
Content-Length: xyz

------Boundary
Content-Type: application/json

{
    "supi": "imsi-<IMSI>",
    "pduSessionId": 235,
    "dnn": "<DNN>",
    "sNssai": {
      "sst": 0
    },
    "servingNfId": "<AMF Identifier>",
    "n1SmMsg": {
      "contentId": "n1msg"
    },
    "anType": "3GPP_ACCESS",
    "smContextStatusUri": "<URI>"
}

------Boundary
Content-Type: application/vnd.3gpp.5gnas
Content-Id: n1msg
{ … N1 SM Message binary data …}

------Boundary
```

Annex C (informative):
Change history

Change history							
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
2017-10	CT4#80	C4-175050				Initial Draft.	0.1.0
2017-10	CT4#80	C4-175392				Inclusion of pCRs agreed during CT4#80.	0.2.0
2017-12	CT4#81	C4-176435				Inclusion of pCRs agreed during CT4#81.	0.3.0
2018-01	CT4#82	C4-181389				Inclusion of pCRs agreed during CT4#82.	0.4.0
2018-03	CT4#83	C4-182432				Inclusion of pCRs agreed during CT4#83.	0.5.0
2018-03	CT#79	CP-180030				Presented for information	1.0.0
2018-04	CT4#84	C4-183514				Inclusion of pCRs agreed during CT4#84.	1.1.0
2018-05	CT4#85	C4-184619				Inclusion of pCRs agreed during CT4#85.	1.2.0
2018-06	CT#80	CP-181100				Presented for approval	2.0.0
2018-06	CT#80					Approved in CT#80.	15.0.0
2018-09	CT#81	CP-182055	0002		F	Corrections to missing application errors in API response body description	15.1.0
2018-09	CT#81	CP-182068	0006		B	Add support for 5G Trace	15.1.0
2018-09	CT#81	CP-182055	0007		F	Error Responses	15.1.0
2018-09	CT#81	CP-182055	0015		F	Network Sharing	15.1.0
2018-09	CT#81	CP-182055	0016		F	RAT Type in Create and Update (SM Context) service operations	15.1.0
2018-09	CT#81	CP-182055	0001	1	F	Application specific error cause for Not Acceptable Integrity Protection Max Data Rate	15.1.0
2018-09	CT#81	CP-182055	0008	1	F	EBI Assignment for Home Routed PDU sessions	15.1.0
2018-09	CT#81	CP-182055	0010	1	F	Returning the H-SMF URI to the AMF	15.1.0
2018-09	CT#81	CP-182055	0014	1	F	N2 SM signalling	15.1.0
2018-09	CT#81	CP-182055	0017	1	F	Supporting AMF changes	15.1.0
2018-09	CT#81	CP-182055	0018	1	F	VPLMN S-NSSAI during mobility from EPS to 5GC with N26	15.1.0
2018-09	CT#81	CP-182055	0009	2	F	HTTP message retransmissions and requests colliding with existing contexts	15.1.0
2018-09	CT#81	CP-182055	0029		F	Rejected PDU session during Xn handover	15.1.0
2018-09	CT#81	CP-182055	0033		F	Description of Structured data types	15.1.0
2018-09	CT#81	CP-182055	0034		F	Handling of LADN service area during handovers	15.1.0
2018-09	CT#81	CP-182055	0036		F	Mapping to stage 2 service operation names	15.1.0
2018-09	CT#81	CP-182055	0039		F	Stateless AMF support updates	15.1.0
2018-09	CT#81	CP-182055	0040		F	QoS rule structure improvement	15.1.0
2018-09	CT#81	CP-182055	0020	1	F	NRF URI for PCF Selection	15.1.0
2018-09	CT#81	CP-182055	0022	1	F	BackUp AMF Info	15.1.0
2018-09	CT#81	CP-182055	0031	1	F	NGAP causes	15.1.0
2018-09	CT#81	CP-182055	0024	1	F	EPS Interworking Ind	15.1.0
2018-09	CT#81	CP-182050	0021	2	F	References to common NonDynamic5Qi and Dynamic5Qi data types	15.1.0
2018-09	CT#81	CP-182055	0025	1	F	Not Allowed Slice	15.1.0
2018-09	CT#81	CP-182055	0005	3	F	N2 SM Information Type Definition	15.1.0
2018-09	CT#81	CP-182055	0028	1	F	OpenAPI corrections	15.1.0
2018-09	CT#81	CP-182055	0032	1	F	Age of User Location	15.1.0
2018-09	CT#81	CP-182055	0037	1	F	Detecting SMF Failure and Restart	15.1.0
2018-09	CT#81	CP-182055	0041		F	PresenceState reference	15.1.0
2018-09	CT#81	CP-182055	0030	2	F	URIs of created SM context and PDU session resources	15.1.0
2018-09	CT#81	CP-182055	0023	2	F	5G MM Cause	15.1.0
2018-09	CT#81	CP-182055	0042		F	API version number update	15.1.0
2018-12	CT#82	CP-183013	0044	2	F	IndDirect Forwarding Flag	15.2.0
2018-12	CT#82	CP-183013	0045	1	F	Data Forwarding IE	15.2.0
2018-12	CT#82	CP-183013	0047		F	Alignments with NAS 5GS Session Management	15.2.0
2018-12	CT#82	CP-183013	0048	1	F	Alignments with NGAP	15.2.0
2018-12	CT#82	CP-183013	0049		F	Corrections to N2 Handover and Inter-AMF change or mobility procedures	15.2.0
2018-12	CT#82	CP-183013	0050	2	F	Indication of Access Type can be changed	15.2.0
2018-12	CT#82	CP-183013	0051		F	Roaming Charging Profile negotiation for Home Routed PDU sessions	15.2.0
2018-12	CT#82	CP-183013	0052		F	Service restart detection by direct signalling between NFs	15.2.0
2018-12	CT#82	CP-183013	0053		F	Use of the serviceName attribute by the Notify SM Context Status service operation	15.2.0
2018-12	CT#82	CP-183013	0054		F	Cardinality of arrays	15.2.0
2018-12	CT#82	CP-183013	0055		F	Data type of serviceName attribute	15.2.0
2018-12	CT#82	CP-183013	0056		F	HTTP status code "501 Not Implemented"	15.2.0
2018-12	CT#82	CP-183013	0057		F	Case conventions	15.2.0
2018-12	CT#82	CP-183013	0058		F	Resource URI structure of Nsmf_PDUSession service	15.2.0
2018-12	CT#82	CP-183013	0059		F	EPS bearer identity and data type definitions	15.2.0
2018-12	CT#82	CP-183013	0060	3	F	EPC Interworking in Home Routed Roaming	15.2.0
3018-12	CT#82	CP-183013	0061	1	F	Correction to EPS Interworking Indication	15.2.0
2018-12	CT#82	CP-183013	0063		F	Presence condition of targetServingNfId	15.2.0
2018-12	CT#82	CP-183013	0064	2	F	PDU session removal during interworking with N26	15.2.0
2018-12	CT#82	CP-183013	0067	1	F	Complete the SSC mode 3 in the home routed roaming scenario	15.2.0
2018-12	CT#82	CP-183013	0068	2	F	Clarification on EBI allocation	15.2.0

2018-12	CT#82	CP-183013	0069	1	F	Correct description of Request type	15.2.0
2018-12	CT#82	CP-183190	0071	3	F	PDU Session Id Duplication	15.2.0
2018-12	CT#82	CP-183013	0072	1	F	Service Instance	15.2.0
2018-12	CT#82	CP-183013	0075	2	F	A new cause value 'PDU_Session_Status_Mismatch' for Cause Data Type	15.2.0
2018-12	CT#82	CP-183013	0076	2	F	UDM group Id	15.2.0
2018-12	CT#82	CP-183013	0077	2	F	Always-on PDU sessions	15.2.0
2018-12	CT#82	CP-183013	0078	2	F	Handover Failure scenarios	15.2.0
2018-12	CT#82	CP-183013	0079		F	Release of PDU session during 5GS to EPS mobility	15.2.0
2018-12	CT#82	CP-183013	0080	1	F	Mandatory HTTP status codes	15.2.0
2018-12	CT#82	CP-183013	0081	1	F	Clarification of API URI definition	15.2.0
2018-12	CT#82	CP-183013	0082		F	API version	15.2.0
2018-12	CT#82	CP-183013	0083		F	externalDocs field in OpenAPI document	15.2.0
2018-12	CT#82	CP-183013	0084		F	Location Header	15.2.0
2018-12	CT#82	CP-183169	0085	1	F	Regular Expression Patterns	15.2.0
2018-12	CT#82	CP-183013	0086		F	Correct reference of EPS to 5GS handover	15.2.0
2018-12	CT#82	CP-183013	0087		F	Secondary RAT usage data reporting	15.2.0
2018-12	CT#82	CP-183013	0088	1	F	OAuth2 requirements	15.2.0
2018-12	CT#82	CP-183081	0089		F	SMF Network Function Instance	15.2.0
2018-12						MaxIntegrityProtectedDataRate spare quote fixed in yaml-file	15.2.1
2019-03	CT#83	CP-190018	0090		F	OpenAPI correction	15.3.0
2019-03	CT#83	CP-190018	0091	1	F	Secondary RAT usage reporting	15.3.0
2019-03	CT#83	CP-190018	0092	1	F	Target ID during inter NG-RAN node N2 based handover and EPS to 5GS Handover	15.3.0
2019-03	CT#83	CP-190018	0093		F	Indirect data forwarding timer	15.3.0
2019-03	CT#83	CP-190018	0095		F	API version update	15.3.0
2019-03	CT#83	CP-190018	0096	2	F	Clarification on the use of pduSessionsActivateList during EPS to 5GS Idle Mode Mobility Procedure.	15.3.0
2019-03	CT#83	CP-190018	0097		F	Cause information	15.3.0
2019-03	CT#83	CP-190018	0098	2	F	Update ReleaseSMContext Service Operation Description for PDU Session Release due to Change of Set of Network Slices	15.3.0
2019-03	CT#83	CP-190018	0099	1	F	Trigger Conditions for SMContext Update	15.3.0
2019-03	CT#83	CP-190018	0100	1	F	Trigger Conditions for SMContext Release	15.3.0
2019-03	CT#83	CP-190018	0102	1	F	Status Notify for HO	15.3.0
2019-03	CT#83	CP-190018	0103	1	F	Provide Resource URI before PDU Session Creation Response	15.3.0
2019-03	CT#83	CP-190018	0104	1	F	Allocated EBIs during EPS to 5GS Preparation with N26	15.3.0

History

Document history		
V15.0.0	July 2018	Publication
V15.1.0	October 2018	Publication
V15.2.1	April 2019	Publication
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