

ETSI TS 129 502 V16.4.0 (2020-07)



**5G;
5G System;
Session Management Services;
Stage 3
(3GPP TS 29.502 version 16.4.0 Release 16)**



Reference

RTS/TSGC-0429502vg40

Keywords

5G

ETSI

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Sous-Préfecture de Grasse (06) N° 7803/88

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Foreword

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

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

Version x.y.z

where:

- x the first digit:
 - 1 presented to TSG for information;
 - 2 presented to TSG for approval;
 - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

In the present document, modal verbs have the following meanings:

- shall** indicates a mandatory requirement to do something
- shall not** indicates an interdiction (prohibition) to do something

The constructions "shall" and "shall not" are confined to the context of normative provisions, and do not appear in Technical Reports.

The constructions "must" and "must not" are not used as substitutes for "shall" and "shall not". Their use is avoided insofar as possible, and they are not used in a normative context except in a direct citation from an external, referenced, non-3GPP document, or so as to maintain continuity of style when extending or modifying the provisions of such a referenced document.

- should** indicates a recommendation to do something
- should not** indicates a recommendation not to do something
- may** indicates permission to do something
- need not** indicates permission not to do something

The construction "may not" is ambiguous and is not used in normative elements. The unambiguous constructions "might not" or "shall not" are used instead, depending upon the meaning intended.

- can** indicates that something is possible
- cannot** indicates that something is impossible

The constructions "can" and "cannot" are not substitutes for "may" and "need not".

- will** indicates that something is certain or expected to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document
- will not** indicates that something is certain or expected not to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document
- might** indicates a likelihood that something will happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

might not indicates a likelihood that something will not happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

In addition:

is (or any other verb in the indicative mood) indicates a statement of fact

is not (or any other negative verb in the indicative mood) indicates a statement of fact

The constructions "is" and "is not" do not indicate requirements.

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 and Session Management services for Non-IP Data Delivery (NIDD).

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]. The Session Management services for Non-IP Data Delivery (NIDD) are specified in 3GPP TS 29.542 [37].

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".
- [27] 3GPP TS 24.301: "Non-Access-Stratum (NAS) protocol for Evolved Packet System (EPS); Stage 3".
- [28] 3GPP TR 21.900: "Technical Specification Group working methods".
- [29] 3GPP TS 29.244: "Interface between the Control Plane and the User Plane Nodes; stage 3".
- [30] 3GPP TS 29.512: "5G System; Session Management Policy Control Service; Stage 3".
- [31] IETF RFC 7230: "Hypertext Transfer Protocol (HTTP/1.1): Message Syntax and Routing".
- [32] IETF RFC 7231: "Hypertext Transfer Protocol (HTTP/1.1): Semantics and Content".
- [33] 3GPP TS 23.401: "General Packet Radio Service (GPRS) enhancements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access; Stage 2".
- [34] 3GPP TS 29.524: "5G System; Cause codes mapping between 5GC interfaces; Stage 3".
- [35] 3GPP TS 23.216: "Single Radio Voice Call Continuity (SRVCC); Stage 2".
- [36] 3GPP TS 23.316: "Wireless and wireline convergence access support for the 5G System (5GS)".
- [37] 3GPP TS 29.542: "5G System; Session Management Services for Non-IP Data Delivery (NIDD); 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].

| | |
|----|-----------------|
| BP | Branching Point |
|----|-----------------|

| | |
|-------|------------------------------------|
| DNAI | Data Network Access Identifier |
| DNN | Data Network Name |
| HR | Home Routed |
| H-SMF | Home SMF |
| I-SMF | Intermediate SMF |
| JSON | Javascript Object Notation |
| LADN | Local Area Data Network |
| MA | Multi-Access |
| MO | Mobile Originated |
| MT | Mobile Terminated |
| SM | Session Management |
| SMF | Session Management Function |
| SNPN | Stand-alone Non-Public Network |
| TNGF | Trusted Non-3GPP Gateway Function |
| TWIF | Trusted WLAN Interworking Function |
| UL CL | Uplink Classifier |
| UPF | User Plane Function |
| V-SMF | Visited SMF |
| W-AGF | Wireline Access Gateway Function |

4 Overview

4.1 Introduction

Within the 5GC, the SMF offers services to the AMF, other SMF (V-SMF, H-SMF or I-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.

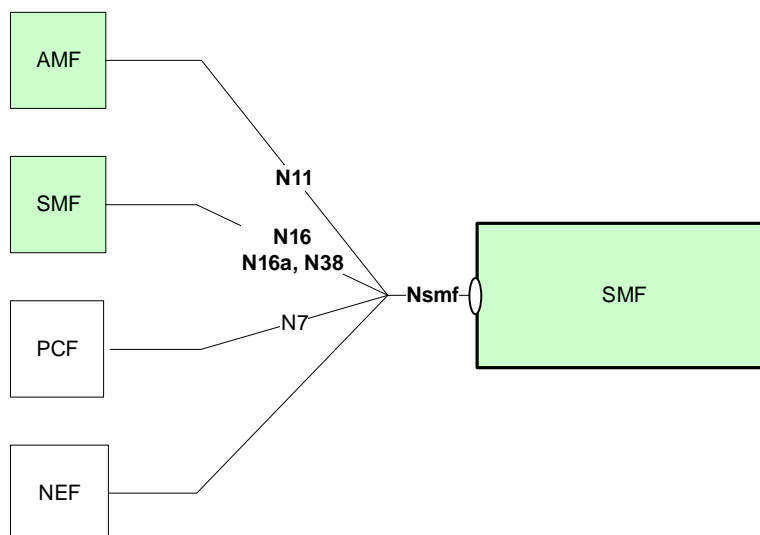


Figure 4.1-1: Reference model – SMF

N16 is the reference point between the V-SMF and H-SMF in Home Routed (HR) roaming cases.

N16a is the reference point between SMF and I-SMF.

N38 is the reference point between I-SMFs or V-SMFs.

The functionalities supported by the SMF are listed in clause 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, and to send mobile originated data. | V-SMF, H-SMF, I-SMF, SMF, AMF |
| Nsmf_EventExposure | This service exposes the events happening on the PDU sessions to the consumer NFs. | PCF, NEF, AMF, SMF |
| Nsmf_NIDD | This service enables the delivery of Non-IP data towards a UE. | NEF |

The Nsmf_EventExposure service is specified in 3GPP TS 29.508 [6]. The Session Management services for Non-IP Data Delivery (NIDD) are specified in 3GPP TS 29.542 [37].

Table 5.1-2 summarizes the corresponding APIs defined in this specification.

Table 5.1-2: API Descriptions

| Service Name | Clause | Description | OpenAPI Specification File | apiName | Annex |
|-----------------|--------|-------------------------|------------------------------|-----------------|-------|
| Nsmf_PDUSession | 6.1 | SMF PDU Session Service | TS29502_Nsmf_PDUSession.yaml | nsmf-pdusession | A.2 |

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; 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 (i.e. UE EPS PDN connection or complete SM context), e.g. to move PDU sessions towards the EPC using the N26 interface or to transfer SM contexts between I-SMFs or V-SMFs over the N38 interface;
- Creation, modification and deletion of PDU sessions between the V-SMF and H-SMF in HR roaming scenarios, or between the I-SMF and SMF for PDU sessions involving an I-SMF;
- Sending of mobile originated data (received over NAS) for a PDU session to the SMF, V-SMF in HR roaming scenarios, or I-SMF for PDU sessions involving an I-SMF;
- Transferring of NEF anchored mobile originated data for a PDU session to the H-SMF in HR roaming scenarios, or SMF for PDU sessions involving an I-SMF;
- Transferring of NEF anchored mobile terminated data for a PDU session to the V-SMF in HR roaming scenarios, or I-SMF for PDU sessions involving an I-SMF;

- 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, or in I-SMF during the I-SMF insertion and change 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, I-SMF |
| 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 (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 (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; - from SMF during I-SMF insertion or from I-SMF during I-SMF change/removal; - from V-SMF during change of V-SMF. | Request/Response | AMF, I-SMF, V-SMF, SMF |
| Create | Create a PDU session in the H-SMF in HR roaming scenarios, or in the SMF for PDU sessions involving an I-SMF. | Request/Response | V-SMF, I-SMF |
| Update | Update a PDU session in the H-SMF or V-SMF in HR roaming scenarios, or in the I-SMF or SMF for PDU sessions involving an I-SMF. | Request/Response | V-SMF, H-SMF, I-SMF, SMF |
| Release | Release a PDU session in the H-SMF in HR roaming scenarios, or in the SMF for PDU sessions involving an I-SMF. | Request/Response | V-SMF, I-SMF |
| Notify Status (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 SMF). | Subscribe/Notify | V-SMF, I-SMF |
| Retrieve (NOTE 2) | Retrieve information from a PDU session context from the H-SMF for a HR PDU session, or from the SMF for a PDU session with an I-SMF. | Request/Response | V-SMF, I-SMF |
| Send MO Data | Send mobile originated data received over NAS for a PDU session | Request/Response | AMF |
| Transfer MO Data (NOTE 4) | Transfer NEF anchored mobile originated data received from AMF for a PDU session | Request/Response | V-SMF, I-SMF |
| Transfer MT Data (NOTE 5) | Transfer NEF anchored mobile terminated data received from NEF for a PDU session | Request/Response | H-SMF, 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]. | | | |
| NOTE 4: This corresponds to the MessageTransfer service operation in clause 4.25.4 of 3GPP TS 23.502 [3]. | | | |
| NOTE 5: This corresponds to the MessageTransfer service operation in clause 4.25.5 of 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, in the V-SMF for HR roaming scenarios, or in the I-SMF for a PDU session with an I-SMF.

It is used in the following procedures:

- UE requested PDU Session Establishment (see clauses 4.3.2 and 4.23.5.1 of 3GPP TS 23.502 [3]);
- EPS to 5GS Idle mode mobility, EPS to 5GS Idle mode mobility with data forwarding or handover using N26 interface (see clauses 4.11.1, 4.23.12.3, 4.23.12.5 and 4.23.12.7 of 3GPP TS 23.502 [3]);
- EPS to 5GS mobility without N26 interface (see clause 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 clause 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 clause 4.9.2.4.2 of 3GPP TS 23.502 [3]);
- Handover from EPS to 5GC-N3IWF (see clause 4.11.3.1 of 3GPP TS 23.502 [3]);
- Handover from EPC/ePDG to 5GS (see clause 4.11.4.1 of 3GPP TS 23.502 [3]);
- Xn based or N2 based handover with I-SMF or V-SMF insertion and change (see clauses 4.23.7.3, 4.23.11 and 4.23.12 of 3GPP TS 23.502 [3]);
- UE Triggered Service Request with I-SMF insertion/change/removal or V-SMF change (see clause 4.23.4.3 of 3GPP TS 23.502 [3]);
- Registration procedure for a UE with a PDU session with I-SMF or V-SMF insertion, change and removal (see clause 4.23.3 of 3GPP TS 23.502 [3]);
- Handover from EPC/ePDG to 5GS with I-SMF insertion (see clause 4.23 of 3GPP TS 23.502 [3]);
- SMF Context Transfer procedure, LBO or no Roaming, no I-SMF (see clause 4.26.5.3 of 3GPP TS 23.502 [3]);
- I-SMF Context Transfer procedure (see clause 4.26.5.2 of 3GPP TS 23.502 [3]);
- 5G-RG requested PDU Session Establishment via W-5GAN (see clause 7.3.1 of 3GPP TS 23.316 [36]);
- FN-RG related PDU Session Establishment via W-5GAN (see clause 7.3.4 of 3GPP TS 23.316 [36]);
- Non-5G capable device behind 5G-CRG and FN-CRG requested PDU Session Establishment via W-5GAN (see clause 4.10a of 3GPP TS 23.316 [36]);
- Handover from 3GPP access/EPS to W-5GAN/5GC (see clause 7.6.4.1 of 3GPP TS 23.316 [36]).

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.

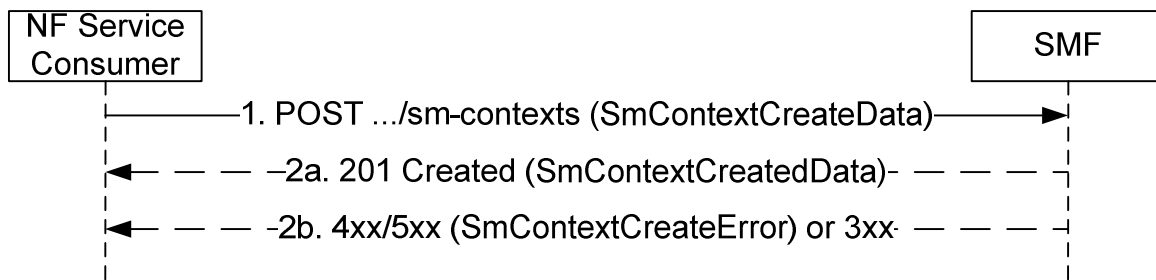


Figure 5.2.2.2.1-1: SM context creation

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 for a single access PDU session and if the request refers to an existing PDU session or an existing Emergency PDU session; the Request Type IE shall not be included for a MA-PDU session establishment request; it 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;
 - the indication that a MA-PDU session is requested if a MA-PDU session is requested to be established by the UE, or the indication that the PDU session is allowed to be upgraded to a MA-PDU session if so indicated by the UE;
 - the anType;
 - the additionalAnType, if the UE is registered over both 3GPP and Non-3GPP accesses;
 - the cpCiotEnabled IE with the value "True", if the NF service consumer (e.g. the AMF) has verified that the CIOT feature is supported by the SMF (and for a home-routed session, that it is also supported by the H-SMF), and Control Plane CIoT 5GS Optimisation is enabled for this PDU session;
 - the cpOnlyInd IE with the value "True", if the PDU session shall only use Control Plane CIoT 5GS Optimisation;
 - the Invoke NEF indication with the value "True" for a home-routed PDU session, if the cpCiotEnabled IE is set to "True" and data delivery via NEF is selected for the PDU session;
 - 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]);
 - identifiers (i.e. FQDN or IP address) of N3 terminations at the W-AGF, TNGF or TWIF, if available;
 - a subscription for DDN failure notification, if the Availability after DDN failure event is subscribed by the UDM.

For the UE requested PDU Session Establishment procedure in home routed roaming scenario (see clause 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.

For a PDU session establishment with an I-SMF (see clause 4.23.5.1 of 3GPP TS 23.502 [3]), the NF Service Consumer shall provide the URI of the Nsmf_PDUSession service of the SMF in the smfUri IE and may provide the URI of the Nsmf_PDUSession service of additional SMFs. The I-SMF shall try to create the PDU session using the smfUri IE. If due to communication failure on the N16a interface the I-SMF does not receive any response from the SMF, then:

- depending on operator policy, the I-SMF may try reaching the smfUri via an alternate path; or
- if additional SMF URI is provided, the I-SMF may try to create the PDU session on one of the additional SMF(s) provided.

For the UE requested PDU Session Establishment procedure, if the AMF determines that the RAT type is NB-IoT and the UE has already 2 PDU Sessions with user plane resources activated, the AMF may continue with the PDU Session establishment and include the cpCiotEnabled IE or cpOnlyInd IE with the value "True" to the SMF as specified in clause 4.3.2.2.1 of 3GPP TS 23.502 [3].

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 clause 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 IE is present in the request and set to INITIAL_REQUEST or INITIAL_EMERGENCY_REQUEST (e.g. single access PDU session establishment request);
 - the RequestType IE and the maRequestInd IE are both absent in the request (e.g. EPS to 5GS mobility); or
 - the maRequestInd IE is present in the request (i.e. MA-PDU session establishment request) and the access type indicated in the request corresponds to the access type of the existing SM context.

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. See also clause 5.2.3.3.1 for the handling of requests which collide with an existing SM context. 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 clause 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 clause 5.2.2.9). For a PDU session with an I-SMF, if the SMF URI in the request is different from the SMF URI of the existing PDU session, the I-SMF should also delete the existing PDU session in the SMF by invoking the Release service operation (see clause 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.

If no GPSI IE is provided in the request, e.g. for a PDU session moved from another access or another system, and the SMF knows that a GPSI is already associated with the PDU session (or a GPSI is received from h-SMF for a HR PDU session), the SMF shall include the GPSI in the response.

- 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 (with or without data forwarding)

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.

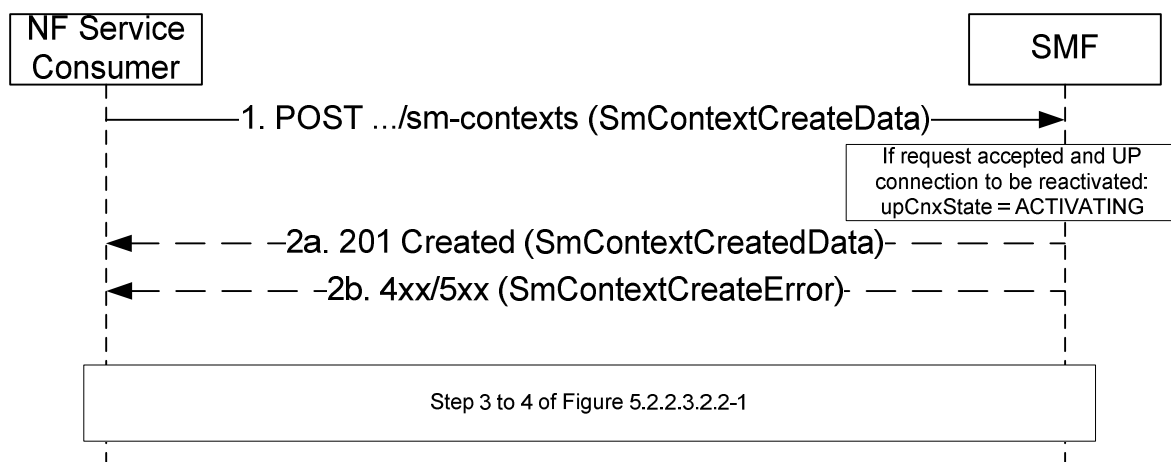


Figure 5.2.2.2.2-1: EPS to 5GS Idle mode mobility using N26 interface

1. The NF Service Consumer shall send a POST request towards the SMF (+PGW-C) of each UE EPS PDN connection, as specified in clause 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;
 - the pduSessionsActivateList attribute, including the PDU Session ID of all the PDU session(s) to be reactivated;
 - the epsBearerCxtStatus attribute, indicating the status of all the EPS bearer contexts in the UE, if corresponding information is received in the Registration Request from the UE;
 - the dlDataWaitingInd attribute, indicating that DL data buffered in EPS needs to be forwarded to the UE, if such indication is present in the Context Response received from the 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, or towards the SMF for a PDU session with an I-SMF);
- the default EPS bearer context of the corresponding PDU session is not reported as inactive by the UE in the epsBearerCtxStatus attribute, if received; and
- it is possible to proceed with moving the PDN connection to 5GS,

then 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;
- S-NSSAI assigned to the PDU session; in home routed roaming case, the S-NSSAI for home PLMN shall be returned;
- the allocatedEbiList attribute, 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, or if DL data buffered in EPS needs to be forwarded to the UE:

- the 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 clause 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.

If the epsBearerCxtStatus attribute is received in the request, the SMF shall check whether some EPS bearer(s) of the corresponding PDU session have been deleted by the UE but not notified to the EPS, and if so, the SMF shall release these EPS bearers, corresponding QoS rules and QoS flow level parameters locally, as specified in clause 4.11.1.3.3 of 3GPP TS 23.502 [3].

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".

If the default EPS bearer context of the PDU session is reported as inactive by the UE in the epsBearerCtxStatus attribute, the SMF shall set the "cause" attribute in the ProblemDetails structure to "DEFAULT_EPS_BEARER_INACTIVE".

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. During an EPS to 5GS Idle mode mobility using N26 interface with data forwarding (see clause 4.11.1.3.3A of 3GPP TS 23.502 [3]), the 200 OK response shall additionally contain the CN tunnel information for data forwarding from EPS, i.e. the forwardingFTEid attribute or the forwarding bearer contexts to be sent to the MME in the Context Acknowledge, based on the association between the EPS bearer ID(s) and QFI(s) for the QoS flow(s).

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.

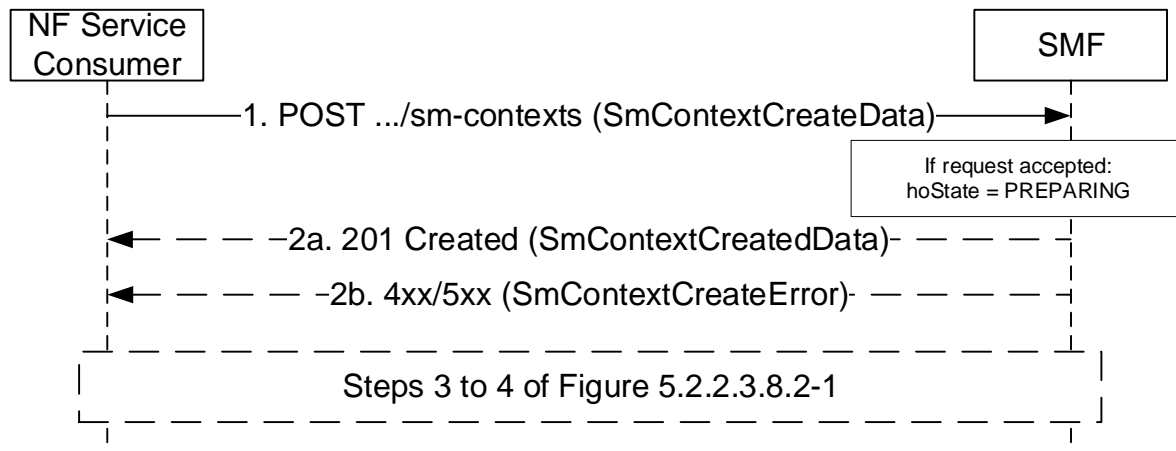


Figure 5.2.2.2.3-1: EPS to 5GS handover using N26 interface

1. The NF Service Consumer shall send a POST request, as specified in clause 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 clause 5.2.2.3.4.1);
- the indication of whether direct or indirect DL data forwarding applies;
- targetId identifying the target RAN Node ID and TAI based on the Target ID IE received in the Forward Relocation Request message from the source MME.

NOTE 1: The Target ID IE can be set to the Target NG-RAN Node ID containing a Global RAN Node ID and selected TAI with 3-octets length, or the Target eNB ID containing a Global eNB ID and selected TAI with 2-octets length; for the latter case, the NF Service Consumer, i.e. the AMF needs determine a value for the Target NG-RAN Node ID and TAI with 3-octets length based on the local configuration to be provided to the SMF.

- 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; if the SMF was indicated in step 1 that direct data forwarding is applicable, the SMF shall include an indication that a direct forwarding path is available in the N2 SM information;
- PDU Session ID corresponding to the default EPS bearer ID of the EPS PDN connection;
- S-NSSAI assigned to the PDU session; in home routed roaming case, the S-NSSAI for home PLMN shall be returned;
- 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 2: 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.

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".

When receiving a 4xx/5xx response from the SMF, the NF service consumer (e.g. the AMF) shall regard the hoState of the SM Context to be NONE.

5.2.2.2.4 I-SMF Insertion, Change or Removal during Xn based Handover

The NF Service Consumer (e.g. AMF) shall request the I-SMF (for I-SMF insertion or change) or the SMF (for I-SMF removal) to create a SM context during Xn based handover, as follows.

1. The NF Service Consumer shall send a POST request, with the following additional information:
 - N2 SM information received from the target 5G-AN (see Path Switch Request Transfer IE in clause 9.3.4.8 of 3GPP TS 38.413 [9]);
 - additional N2 SM information received from the source 5G-AN (see Secondary RAT Data Usage Report Transfer IE in clause 9.3.4.23 of 3GPP TS 38.413 [9]), if any;
 - the smContextRef attribute set to the identifier of the SM Context resource in the SMF during I-SMF insertion, or the SM Context resource in the source I-SMF during I-SMF change or removal.

2a. On success, the SMF shall return a 201 Created response.

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.

2b. Same as step 2b of figure 5.2.2.2.1-1.

If the Path Switch Request Transfer IE is included within the N2 SM Information in the request message but the path switch failed, the message body shall contain an SmContextCreateError structure, including:

- N2 SM information (Path Switch Request Unsuccessful Transfer).

5.2.2.2.5 I-SMF Insertion, Change or Removal during N2 based Handover

The NF Service Consumer (e.g. AMF) shall request the I-SMF (for I-SMF insertion or change) or the SMF (for I-SMF removal) to create a SM context during N2 based handover, as follows.

1. The NF Service Consumer shall send a POST request, with the following additional information:
 - N2 SM information received from the source NG-RAN (see Handover Required Transfer IE in clause 9.3.4.14 of 3GPP TS 38.413 [9]);
 - the hoState attribute set to PREPARING (see clause 5.2.2.3.4.1);
 - the smContextRef attribute set to the identifier of the SM Context resource in the SMF during I-SMF insertion,,or the SM Context resource in the source I-SMF during I-SMF change or removal.
- 2a. On success, 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;

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.

2b. Same as step 2b of figure 5.2.2.2.1-1.

5.2.2.2.6 Service Request with I-SMF insertion/change/removal or with V-SMF change

The NF Service Consumer (e.g. AMF) shall request the new I-SMF or new V-SMF to create a SM context during a Service Request with I-SMF insertion/change or with V-SMF change, or shall request the SMF to create a SM context during a Service Request with I-SMF removal, as follows.

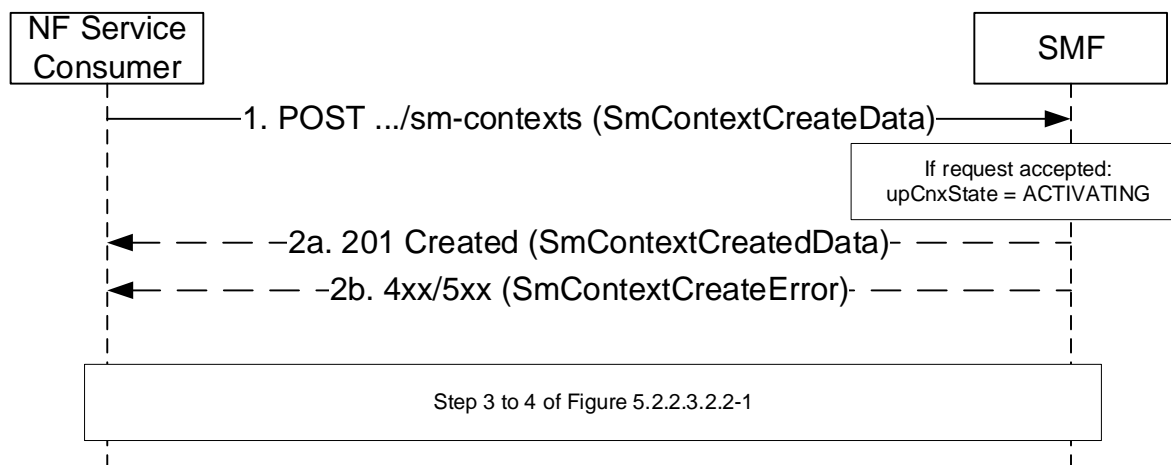


Figure 5.2.2.2.6-1: Service Request with I-SMF insertion/change/removal or with V-SMF change

1. The NF Service Consumer shall send a POST request as specified in clause 5.2.2.2.1, with the following additional information:
 - the smContextRef attribute set to the identifier of the SM Context resource in the SMF (for a Service Request with an I-SMF insertion) or in the old I-SMF (for a Service Request with an I-SMF change or removal) or in the old V-SMF (for a Service Request with a V-SMF change).
 - the upCnxState attribute set to ACTIVATING (see clause 5.2.2.3.2.1) to indicate the establishment of N3 tunnel User Plane resources for the PDU Session;
- 2a. On success, the SMF shall return a 201 Created response as specified in clause 5.2.2.2.1 with the following additional information:
 - the 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 clause 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).
- 2b. Same as step 2b of figure 5.2.2.2.1-1. Steps 3 to 4 are skipped in this case.

5.2.2.2.7 Registration procedure for a UE with a PDU session with I-SMF insertion, change and removal

The NF Service Consumer (e.g. AMF) shall request the SMF to create a SM context during UE Registration procedure for a PDU session with I-SMF insertion, change and removal, as follows.

1. Same as step 1 of 5.2.2.2.1-1, the NF Service Consumer shall send a POST request, with the following additional information:

- the smContextRef attribute set to the identifier of the SM Context resource in the SMF during I-SMF insertion or the SM Context resource in the I-SMF during I-SMF removal or the SM Context resource in the old I-SMF during I-SMF change;
- the upCnxState attribute set to ACTIVATING (see clause 5.2.2.3.2.1) to indicate the establishment of N3 tunnel User Plane resources for the PDU Session, if the UE requested to activate the PDU session.

2a. On success, the SMF shall return a 201 Created response.

If the SMF establishes N3 tunnel User Plane resources for the PDU Session, e.g. due to the NF Service Consumer requesting so or due to buffered DL data in the old I-SMF/I-UPF (see clause 4.23.3 of 3GPP TS 23.502 [3]), the 201 Created response shall contain the following additional information:

- the 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 clause 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).

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.

2b. Same as step 2b of figure 5.2.2.2.1-1.

5.2.2.2.8 SMF Context Transfer procedure, LBO or no Roaming, no I-SMF

The NF Service Consumer (e.g. AMF) shall request the SMF to create a SM context during an SMF Context Transfer procedure, LBO or no Roaming, no I-SMF, as follows.

1. Same as step 1 of 5.2.2.2.1-1, the NF Service Consumer shall send a POST request, with the following additional information:
 - SMF transfer indication, Old SMF ID, the identifier of the SM Context resource in old SMF.

2a. On success, the SMF shall return a 201 Created response.

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.

2b. Same as step 2b of figure 5.2.2.2.1-1.

5.2.2.2.9 I-SMF Context Transfer procedure

The NF Service Consumer (e.g. AMF) shall request the SMF to create a SM context during I-SMF Context Transfer procedure, as follows.

1. Same as step 1 of 5.2.2.2.1-1, the NF Service Consumer shall send a POST request, with the following additional information:
 - SMF transfer indication, Old SMF ID, the identifier of the SM Context resource in old SMF.

2a. On success, the SMF shall return a 201 Created response.

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.

2b. Same as step 2b of figure 5.2.2.2.1-1.

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, or the I-SMF for a PDU session with an I-SMF.

It is used in the following procedures:

- PDU Session modification (see clause 4.3.3 of 3GPP TS 23.502 [3]);
- UE or network requested PDU session release (see clause 4.3.4.2 and clause 4.3.4.3 of 3GPP TS 23.502 [3]);
- UE requested MA PDU session establishment over the other access (see clause 4.22.7 of 3GPP TS 23.502 [3]);
- UE or network-initiated MA PDU session release over a single access (see clause 4.22 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 clause 5.6.8 of 3GPP TS 23.501 [2], clauses 4.2.2.2, 4.2.3, 4.2.6, 4.2.10 and 4.9.1.3.3 of 3GPP TS 23.502 [3] and clauses 7.2.2.1, 7.2.2.2, 7.2.5.2 and 7.2.5.3 of 3GPP TS 23.316 [36]);
- Xn and N2 Handover procedures (see clauses 4.9.1, 4.23.7 and 4.23.11 of 3GPP TS 23.502 [3]);
- Handover between 3GPP and untrusted non-3GPP access procedures (see clause 4.9.2 of 3GPP TS 23.502 [3]);
- Inter-AMF change due to AMF planned maintenance or AMF failure (see clause 5.21.2 of 3GPP TS 23.501 [2]), or inter-AMF mobility in CM-IDLE mode (see clauses 4.2.2.2 and 4.23.3 of 3GPP TS 23.502 [3]);
- RAN Initiated QoS Flow Mobility (see clause 4.14.1 of 3GPP TS 23.502 [3] and clause 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 clause 4.3.2.2 of 3GPP TS 23.502 [3]), session continuity procedure (see clause 4.3.5 of 3GPP TS 23.502 [3]);
- EPS to 5GS Idle mode mobility, EPS to 5GS Idle mode mobility with data forwarding or handover using N26 interface (see clause 4.11 of 3GPP TS 23.502 [3]);
- 5GS to EPS Handover using N26 interface (see clause 4.11.1.2 of 3GPP TS 23.502 [3]);
- 5GS to EPS Idle mode mobility using N26 interface with data forwarding (see clause 4.11.1.3.2A of 3GPP TS 23.502 [3]);
- PDU Session Reactivation during P-CSCF Restoration procedure via AMF (see clause 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 clause 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 clause 5.4.5.2.5 of 3GPP TS 24.501 [7]);
- Secondary RAT Usage Data Reporting (see clause 4.21 of 3GPP TS 23.502 [3]);
- Service Request Procedures with I-SMF change or I-SMF removal when downlink data packets are buffered at the I-UPF (See clause 4.23.4 of 3GPP TS 23.502 [3]);
- Connection Suspend procedure (see clause 4.8.1.2 of 3GPP TS 23.502 [3]);
- Connection Resume in CM-IDLE with Suspend procedure (see clause 4.8.2.3 of 3GPP TS 23.502 [3]);
- 5G-RG or Network requested PDU Session Modification via W-5GAN (see clause 7.3.2 of 3GPP TS 23.316 [36]);

- 5G-RG or Network requested PDU Session Release via W-5GAN (see clause 7.3.3 of 3GPP TS 23.316 [36]);
- FN-RG or Network requested PDU Session Modification via W-5GAN (see clause 7.3.6 of 3GPP TS 23.316 [36]);
- FN-RG or Network requested PDU Session Release via W-5GAN (see clause 7.3.7 of 3GPP TS 23.316 [36]);
- Handover between 3GPP access/5GC and W-5GAN access (see clause 7.6.3 of 3GPP TS 23.316 [36]);
- AMF requested PDU session release due to Network Slice-Specific Authentication and Authorization failure or revocation (see clause 4.2.9.2 of 3GPP TS 23.502 [3] and clause 4.2.9.4 of 3GPP TS 23.502 [3]);
- 5G-RG requested PDU Session Establishment via W-5GAN (see clause 7.3.1 of 3GPP TS 23.316 [36]);
- FN-RG related PDU Session Establishment via W-5GAN (see clause 7.3.4 of 3GPP TS 23.316 [36]);
- Non-5G capable device behind 5G-CRG and FN-CRG requested PDU Session Establishment via W-5GAN (see clause 4.10a of 3GPP TS 23.316 [36]);
- Non-5G capable device behind 5G-CRG and FN-CRG or Network requested PDU Session Modification via W-5GAN (see clause 4.10a of 3GPP TS 23.316 [36]);
- Non-5G capable device behind 5G-CRG and FN-CRG or Network requested PDU Session Release via W-5GAN (see clause 4.10a of 3GPP TS 23.316 [36]);
- CN-initiated selective deactivation of UP connection of an existing PDU Session associated with W-5GAN Access (see clause 7.3.5 of 3GPP TS 23.316 [36]);
- Handover between 3GPP access / EPS and W-5GAN/5GC access (see clause 7.6.4 of 3GPP TS 23.316 [36]);
- AMF requested PDU session release due to Control Plane Only indication associated with PDU Session is not applicable any longer as described in 3GPP TS 23.501 [2] clause 5.31.4.1.

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.

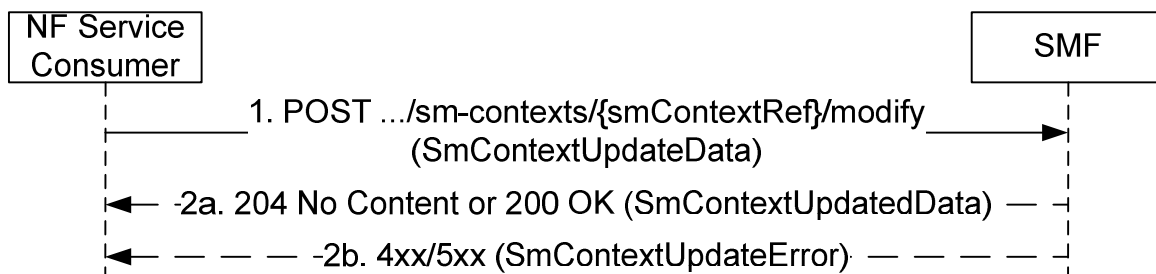


Figure 5.2.2.3.1-1: SM context update

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, or the indication that the PDU session is allowed to be upgraded to a MA PDU session if so indicated by the UE as specified in clause 6.4.2.2 of 3GPP TS 24.501 [7], or subscribe/unsubscribe of the DDN failure notification as specified in clause 4.15.3.2.7 of 3GPP TS 23.502 [3]. 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.

If the ExemptionInd IE is included in the request message, indicating that the NAS SM message included in the request was exempted from NAS congestion control by the AMF, the SMF shall verify that the included 5G SM message can be exempted from a NAS SM congestion control activated in the AMF as specified in clause 5.19.7 of 3GPP TS 23.501 [2].

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 clauses 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).

Clauses 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 clause 5.2.2.3.1 to transfer the response to the SMF.

Clause 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 clause 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.

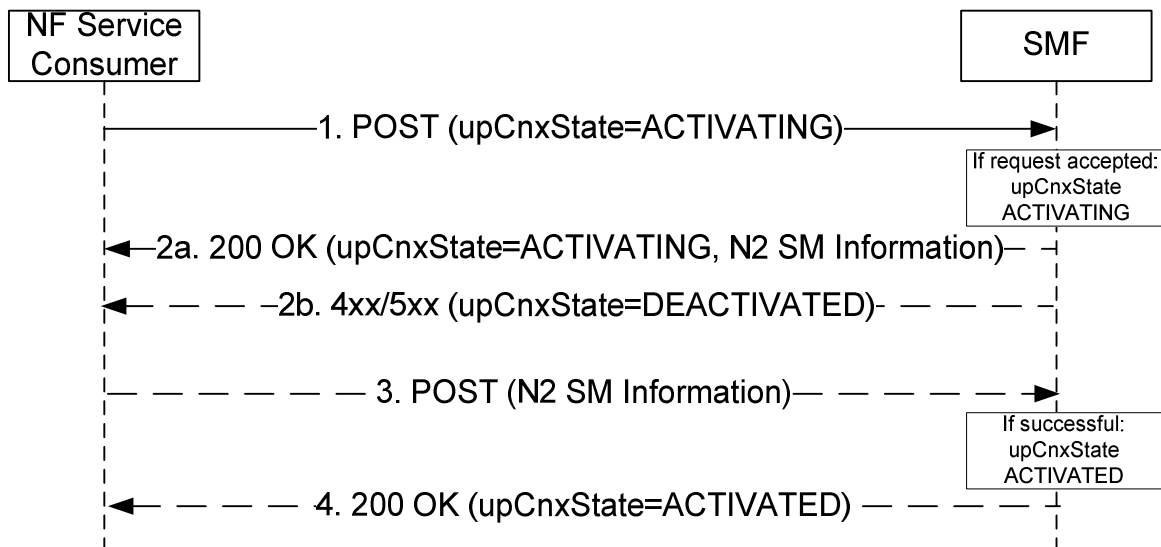


Figure 5.2.3.2.2-1: Activation of the User Plane connection of a PDU session

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 clause 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;
 - the access type for which the user plane connection needs to be re-activated, for a MA PDU session (i.e. the access type over which a Registration or Service Request was received);
 - the "MO Exception Data Counter" if the UE has accessed the network by using "MO exception data" RRC establishment cause;
 - 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 clause 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 clause 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 clause 4.2.3.2 of 3GPP TS 23.502 [3]).

For a MA-PDU session, the SMF shall perform the above requirements for the access type for which the user plane connection is requested to be re-activated (i.e. the access type indicated in the anTypeToReactivate attribute). The SMF shall not modify the user plane connection status for the other access type, e.g. if the user plane connection is already established for the other access type, it shall remain established.

If the "MO Exception Data Counter" is included in the request and Small Data Rate Control is enabled for the PDU session, then the V-SMF/I-SMF shall forward the counter to the H-SMF/SMF.
- 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 clause 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 clause 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 clause 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.

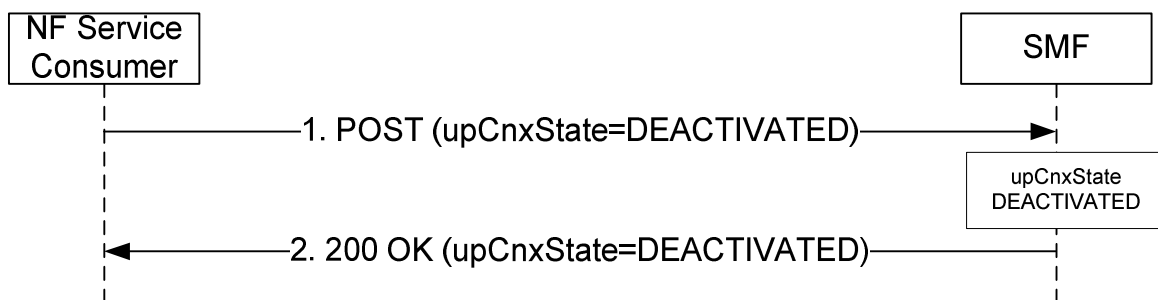


Figure 5.2.2.3.2.2-1: Deactivation of the User Plane connection of a PDU session

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 clause 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:

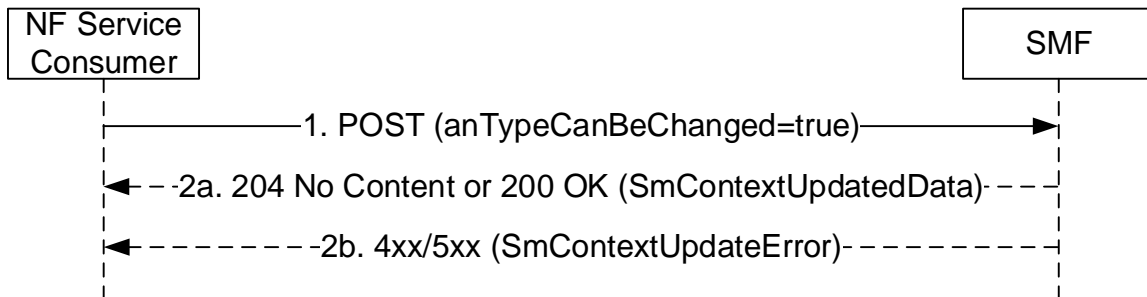


Figure 5.2.2.3.2.4-1: Indicating that the access type of a PDU session can be changed

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 clause 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. In HR roaming scenarios, the V-SMF shall invoke the Update service operation towards the H-SMF to notify that the access type of the PDU session can be changed (see clause 5.2.2.8.2.2).

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

NOTE: This is used during a Service Request procedure (see clause 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 clause 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.

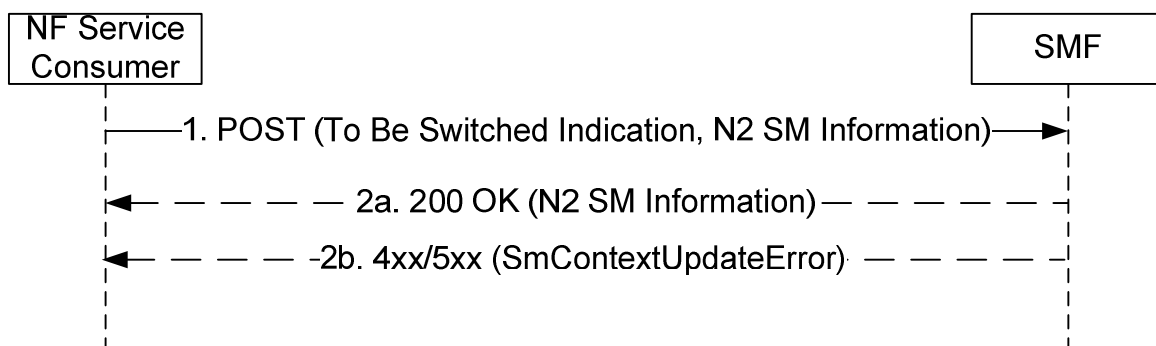


Figure 5.2.2.3.3-1: Xn handover

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 clause 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 clause 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 Data Usage Report Transfer IE in clause 9.3.4.23 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 clause 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 clause 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 Unsuccessful Transfer IE in clause 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.

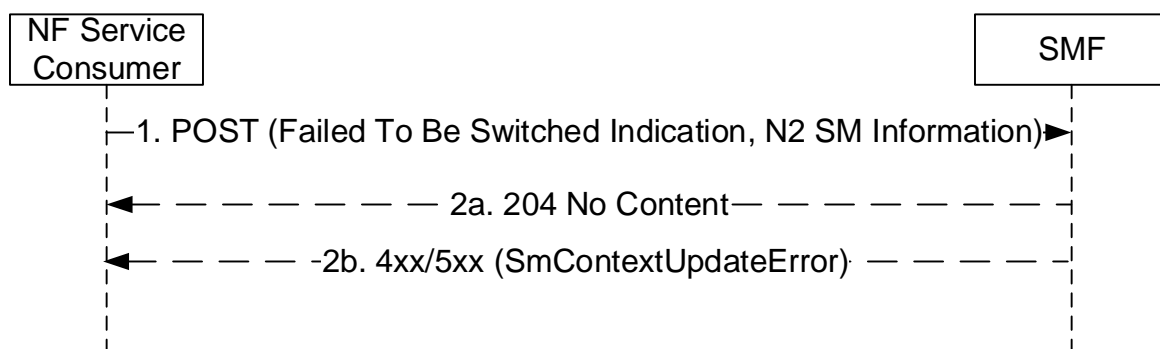


Figure 5.2.2.3.3-2: Xn handover – PDU session rejected by the target RAN

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 clause 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 clause 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 Data Usage Report Transfer IE in clause 9.3.4.23 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 clause 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. T-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.

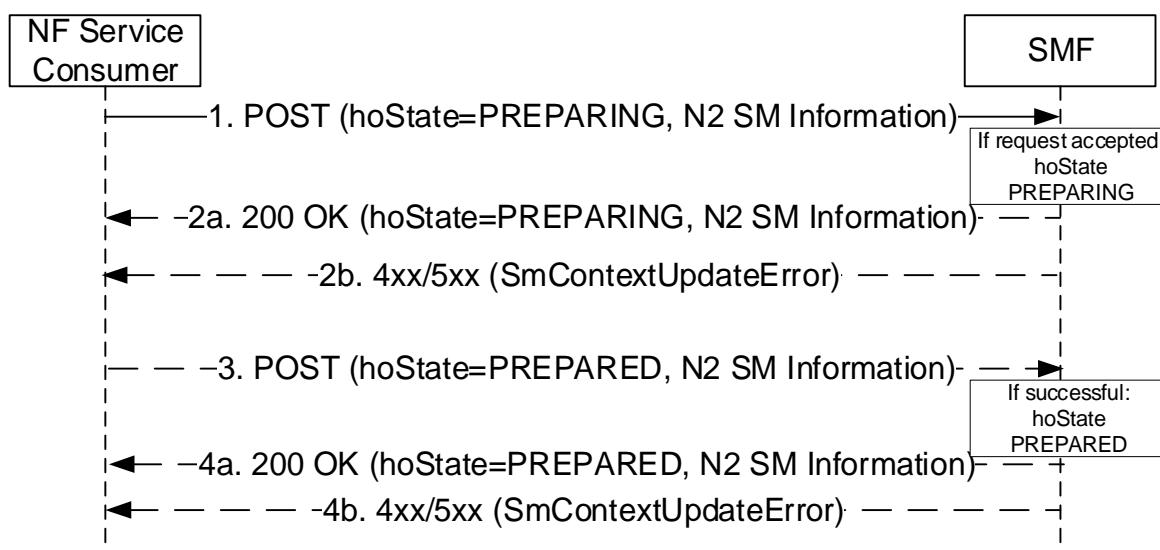


Figure 5.2.2.3.4.2-1: N2 Handover Preparation

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 clause 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 clause 9.3.4.14 of 3GPP TS 38.413 [9]), indicating whether a direct path is available;
 - the supportedFeatures IE indicating the optional features it supports, if at least one optional feature defined in clause 6.1.8 is supported;
 - 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 clause 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 clause 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 supportedFeatures IE in the response, if the supportedFeatures IE was received in the request and at least one optional feature defined in clause 6.1.8 is supported by the updated SM context resource.

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.

When receiving a 4xx/5xx response from the SMF, the NF service consumer (e.g. the AMF) shall regard the hoState of the SM Context to be NONE.

3. If the SMF returned a 200 OK response in step 2a, the NF Service Consumer (e.g. AMF) shall subsequently update the SM context in the SMF by sending POST request, as specified in clause 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 clause 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 clause 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 clause 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 clause 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:

- N2 SM information (see Handover Preparation Unsuccessful Transfer IE in clause 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.

When receiving a 4xx/5xx response from the SMF, the NF service consumer (e.g. the AMF) shall regard the `hoState` of the SM Context to be `NONE`.

If the handover preparation fails completely on the target 5G-AN (i.e. target 5G-AN returns a `NGAP_HANDOVER_FAILURE`), the (T-)AMF shall request the SMF to cancel the handover of the PDU session as described in clause 5.2.2.3.4.4.

5.2.2.3.4.3 N2 Handover Execution

The NF Service Consumer (e.g. T-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.

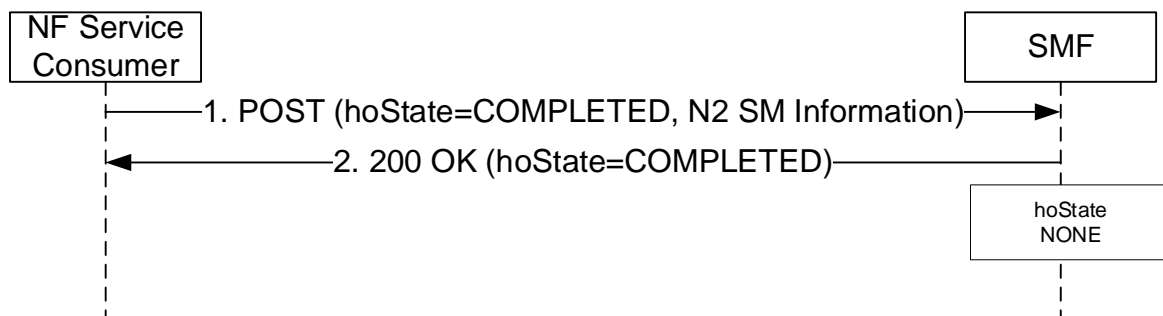


Figure 5.2.2.3.4.3-1: N2 Handover Execution

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 clause 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 Data Usage Report Transfer IE in clause 9.3.4.23 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`. For PDU session with I-SMF insertion, the I-SMF shall complete the execution of the handover by initiating an Update service operation towards the anchor SMF in order to switch the PDU session towards the I-UPF controlled by I-SMF (see clause 5.2.2.8.2.12).

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 clause 5.6.5 of 3GPP TS 23.501 [2].

The (T-)AMF shall request the SMF to complete the execution of the handover of the PDU session only for those PDU sessions that successfully completed the handover procedure. If there are PDU sessions that failed to handover due to timeout of SMF responses in any step of the handover preparation phase (e.g. if the Update SM Context Response arrived too late or not at all during the handover preparation phase, see step 7 of clause 4.9.1.3.3 of 3GPP TS 23.502 [3]), then the (T-)AMF shall inform the SMF about this failure, by sending a POST request with the cause attribute set to "HO_FAILURE" for every such PDU session, upon receipt of the NGAP HANDOVER NOTIFY. The SMF shall then release the resources prepared for the handover and consider that the PDU session is deactivated and that the handover attempt is terminated for the PDU session.

If the handover fails completely on the target 5G-AN due to the execution phase not completed successfully (i.e. missing NGAP HANDOVER NOTIFY), the (T-)AMF shall request the SMF to cancel the handover of the PDU session as described in clause 5.2.2.3.4.4.

5.2.2.3.4.4 N2 Handover Cancellation

The NF Service Consumer (e.g. T-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.

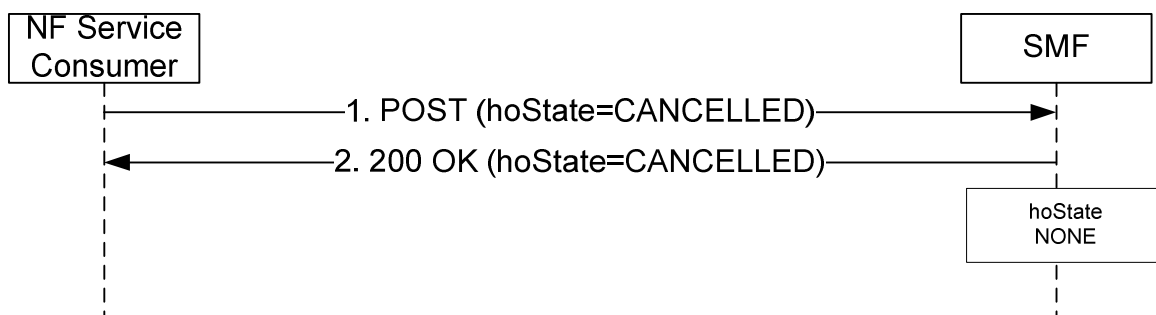


Figure 5.2.2.3.4.3-1: N2 Handover Cancellation

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 clause 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. For PDU Session with I-SMF insertion, the I-SMF shall cancel the handover by initiating an Update service operation towards the anchor SMF in order to release resources at the SMF and PSA UPF reserved during handover preparation (see clause 5.2.2.8.2.13).

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 clause 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 clauses 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]). The Update SM Context service operation is used in these cases; or
- a target AMF in a different PLMN than the source AMF (see clauses 4.9.2.3.2 and 4.9.2.4.2 of 3GPP TS 23.502 [3]). The Create SM Context service operation is used in this case (see clause 5.2.2.2).

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.

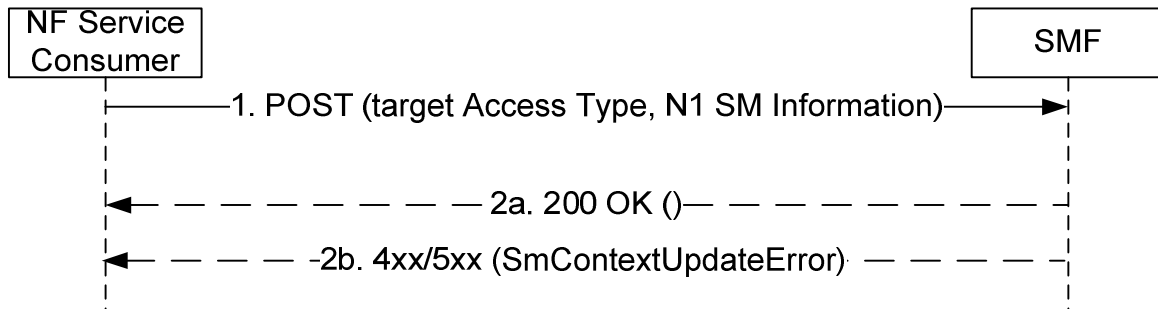


Figure 5.2.2.3.5.2-1: Handover between 3GPP and untrusted non-3GPP access

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 clause 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.

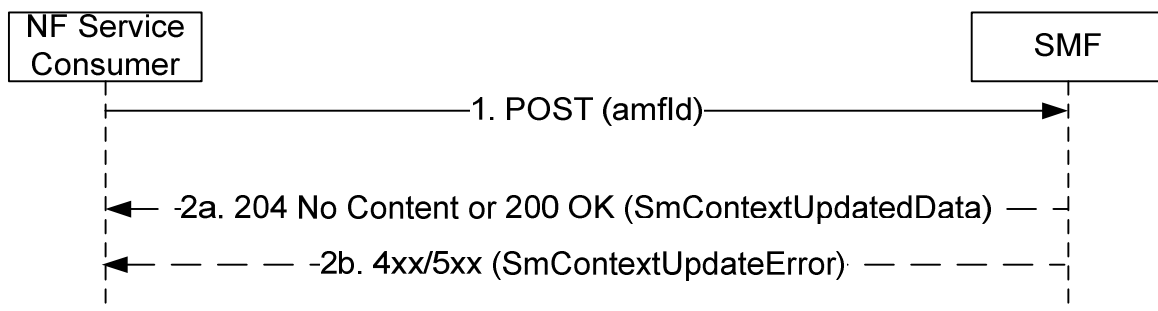


Figure 5.2.2.3.6-1: Inter-AMF change or mobility

1. The NF Service Consumer shall update the SMF with the new serving AMF, by sending a POST request, as specified in clause 5.2.2.3.1, with the following information:
 - servingNfId set to the new serving AMF Id;

- the supportedFeatures IE indicating the optional features it supports, if at least one optional feature defined in clause 6.1.8 is supported;
- other information, if necessary, e.g. to activate the user plane connection of the PDU session (see clause 5.2.2.3.2.2).

2a. Same as step 2a of Figure 5.2.2.3.1-1. In addition, the SMF shall include the supportedFeatures IE in the response, if the supportedFeatures IE was received in the request and at least one optional feature defined in clause 6.1.8 is supported by the updated SM context resource.

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.

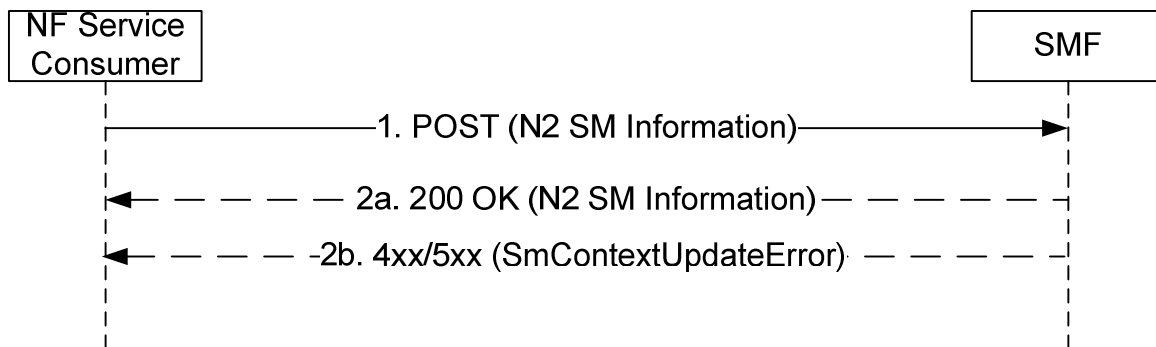


Figure 5.2.2.3.7-1: RAN Initiated QoS Flow Mobility

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 clause 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 clause 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 clause 9.3.4.7 of 3GPP TS 38.413 [9]), including the list of QoS flows which were modified successfully and the list of QoS flows which failed to be modified if available.
- 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 Indication Unsuccessful Transfer IE in clause 9.3.4.22 of 3GPP TS 38.413 [9]).

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 clause 5.2.2.3.4 with the modifications specified in this clause.

5.2.2.3.8.2 EPS to 5GS Handover Preparation

The requirements specified in clause 5.2.2.3.4.2 shall apply with the following modifications.

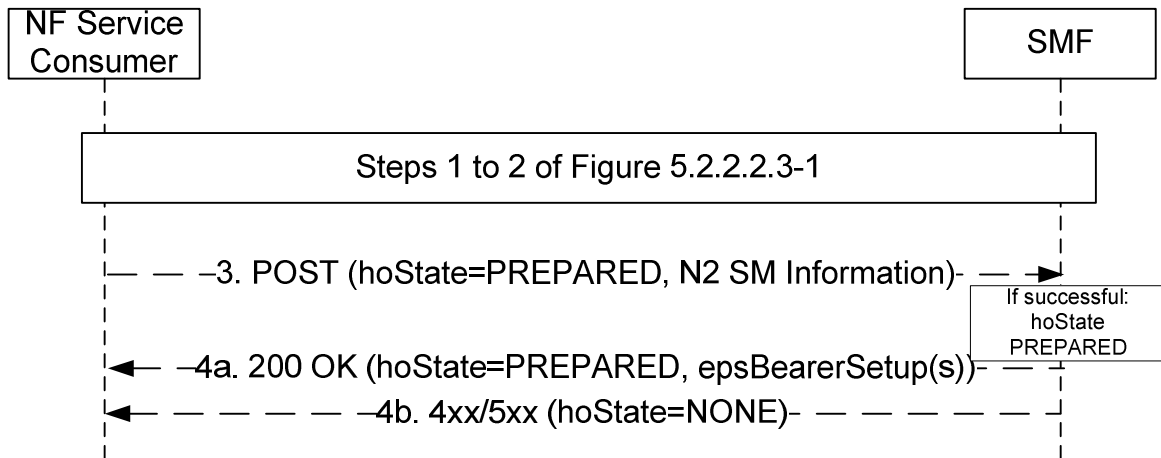


Figure 5.2.2.3.8.2-1: EPS to 5GS Handover Preparation

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 DL data forwarding information, containing either:
 - CN tunnel information generated based on the list of accepted QFI(s) received from the 5G-RAN, if indirect data forwarding applies; or
 - NG-RAN F-TEID per E-RAB accepted for direct data forwarding, as received from the target NG-RAN, if direct data forwarding applies.

- 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 clause 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 clause 5.2.2.8.2.3).

5.2.2.3.8.4 EPS to 5GS Handover Cancellation

The requirements specified in clause 5.2.2.3.4.4 shall apply, with the following modifications.

In step 2 of Figure 5.2.2.3.4.4-1, for a Home Routed PDU session, the V-SMF shall cancel the handover by initiating an Update service operation towards the H-SMF in order to release resources at H-SMF and H-UPF reserved for handover (see clause 5.2.2.8.2.14).

5.2.2.3.9 5GS to EPS Handover using N26 interface

If data forwarding applies to the 5GS to EPS handover, the NF Service Consumer (e.g. AMF) shall provide the SMF with the data forwarding information received from the MME, as specified in clause 4.11.1.2.1 of 3GPP TS 23.502 [3]), as follows.

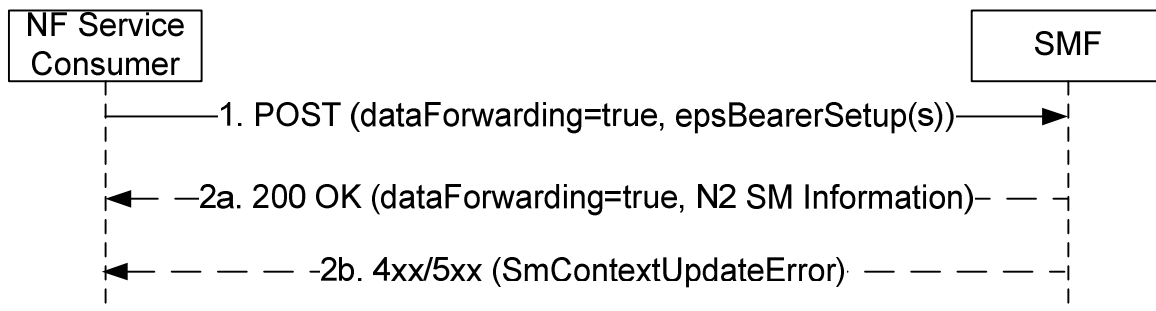


Figure 5.2.2.3.9-1: 5GS to EPS Handover using N26 interface (data forwarding tunnels setup)

1. The NF Service Consumer shall send a POST request, as specified in clause 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, including F-TEID(s) for DL data forwarding tunnel(s) towards the target eNB (for direct data forwarding) or towards the forwarding SGW (for indirect data forwarding).
- 2a. If indirect data forwarding applies, 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).

The SMF shall return a 200 OK response including the following information:

- N2 SM information (see Handover Command Transfer IE in clause 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 clause 4.9.1.3.2 of 3GPP TS 23.502 [3]).

If direct data forwarding applies, the DL forwarding tunnel information shall contain the E-UTRAN tunnel info for data forwarding per EPS bearer received from the MME.

If indirect data forwarding applies, the DL forwarding tunnel information shall contain 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.

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 clause 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 clause 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 clause 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 clause 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.

5.2.2.3.13 Indirect Data Forwarding Tunnel establishment during N2 based Handover with I-SMF

During N2 based handover with I-SMF insertion/change/removal, the NF Service Consumer (e.g. target I-SMF) shall use this procedure to exchange N3/N9 forwarding tunnel information with the NF Service Producer (e.g. source I-SMF).

The NF Service Consumer (e.g. target I-SMF) shall request the SMF to establish one or more downlink and/or uplink indirect data forwarding tunnels, as follows.

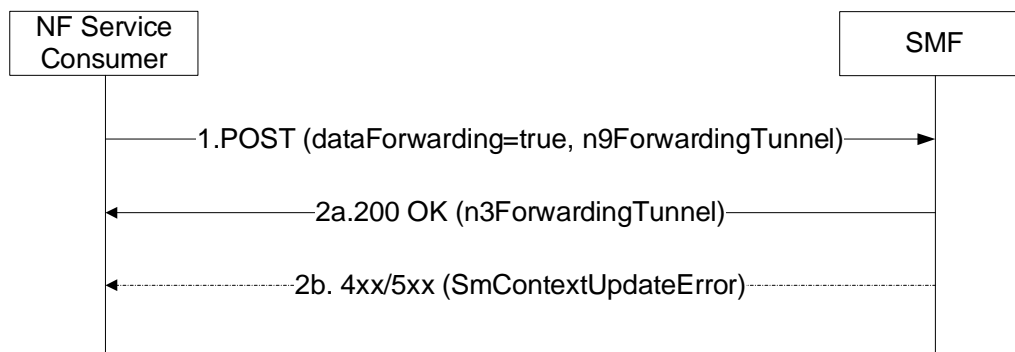


Figure 5.2.2.3.13-1: Indirect Data Forwarding Tunnel establishment during N2 based Handover with I-SMF

1. The NF Service Consumer shall send a POST request, as specified in clause 5.2.2.3.1, with the following information:
 - dataForwarding attribute set to true, for the N2 based handover with I-SMF insertion/change/removal;
 - n9DIForwardingTnlList attribute carrying the N9 downlink indirect data forwarding tunnel(s) info of target I-UPF;
 - n9UIForwardingTnlList attribute carrying the N9 uplink indirect data forwarding tunnel(s) info of target I-UPF;
 - other information, if necessary.
- 2a. Same as step 2a of Figure 5.2.2.3.1-1, with the following information:
 - n3DIForwardingTnlList attribute carrying the N3 downlink indirect data forwarding tunnel(s) info of source I-UPF or source UPF;
 - n3UIForwardingTnlList attribute carrying the N3 uplink indirect data forwarding tunnel(s) info of source I-UPF or source UPF;
 - other information, if necessary.
- 2b. If the source SMF cannot proceed with the request, the source I-SMF shall return an error response, as specified for step 2b of figure 5.2.2.3.1-1.

5.2.2.3.13A Indirect Data Forwarding Tunnel removal during N2 based Handover with I-SMF

During N2 based handover cancellation with I-SMF insertion/change/removal, the NF Service Consumer (e.g. target I-SMF) shall use this procedure to remove previously established Indirect Data Forwarding Tunnel(s) at NF Service Producer (e.g. source I-SMF).

The NF Service Consumer (e.g. target I-SMF) shall request the NF service producer to remove the established Indirect Data Forwarding Tunnel(s), as follows.

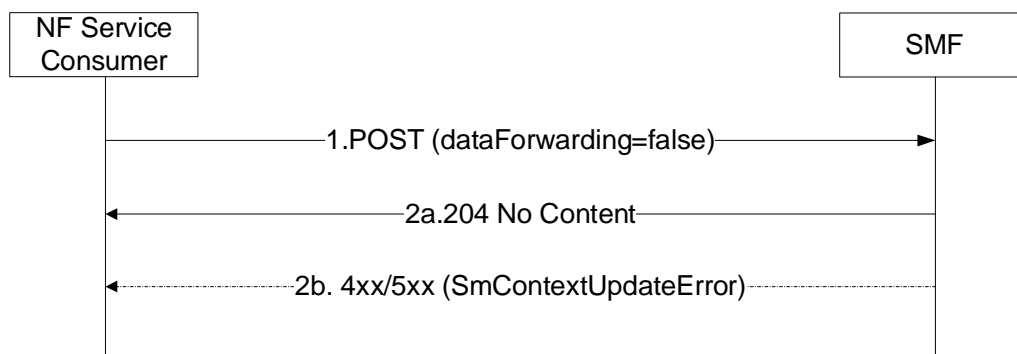


Figure 5.2.2.3.13A-1: Indirect Data Forwarding Tunnel Removal during N2 based Handover with I-SMF

1. The NF Service Consumer shall send a POST request, as specified in clause 5.2.2.3.1, with the following information:
 - dataForwarding attribute set to false;
 - other information, if necessary.
- 2a. If successful, the SMF shall return a 204 No Content response.
- 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.

5.2.2.3.14 Request to forward buffered downlink data packets at I-UPF

For I-SMF change or I-SMF removal when downlink data packets are buffered at the I-UPF, the new I-SMF (for I-SMF change) or SMF (for I-SMF removal) shall request the (old) I-SMF to forward buffered downlink data packets as following:

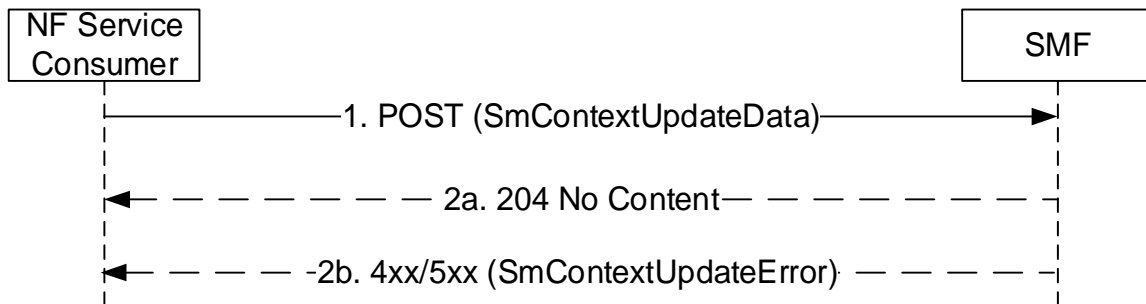


Figure 5.2.2.3.14-1: Request to forward buffered downlink data packets at I-UPF

1. The NF Service Consumer shall send a POST request, as specified in clause 5.2.2.3.1, with the following information:
 - n9ForwardingTunnel IE indicating the allocated tunnel endpoints information to receive the buffered downlink data packets.
- 2a. On success, the SMF shall initiate N4 session modification to the I-UPF trigger the sending of buffered DL data towards received tunnel endpoints and shall return "204 No Content" response.
- 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.

5.2.2.3.15 Connection Suspend procedure

The NF Service Consumer (e.g. AMF) shall request the SMF to suspend the User Plane connection of an existing PDU session, as follows.

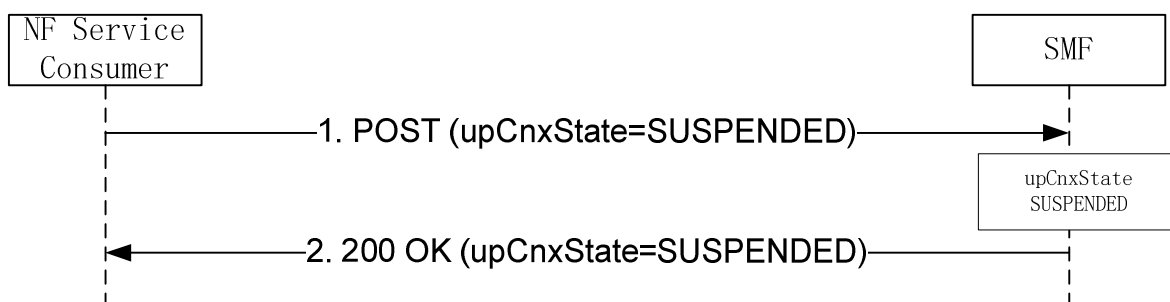


Figure 5.2.2.3.15-1: Connection Suspend

1. The NF Service Consumer shall request the SMF to suspend the user plane connection of the PDU session by sending a POST request, as specified in clause 5.2.2.3.1, with the following information:
 - upCnxState attribute set to SUSPENDED;
 - user location and user location timestamp;
 - other information, if necessary.
2. Upon receipt of such a request, the SMF shall deactivate the N3 tunnel of the PDU session, set the upCnxState attribute to SUSPENDED and return a 200 OK response including the upCnxState attribute set to SUSPENDED.

5.2.2.3.16 Connection Resume in CM-IDLE with Suspend procedure

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

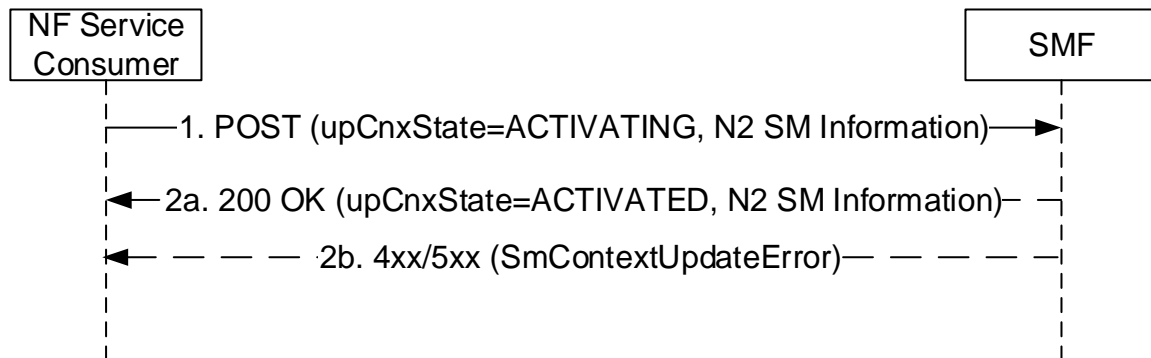


Figure 5.2.2.3.16-1: Connection Resume in CM-IDLE with Suspend

1. The NF Service Consumer shall request the SMF to resume the user plane connection of the PDU session by sending a POST request, as specified in clause 5.2.2.3.1, with the following information:
 - the upCnxState attribute set to ACTIVATING;
 - user location and user location timestamp;
 - cause attribute set to "PDU_SESSION_RESUMED";
 - N2 SM information received from the 5G-AN, 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 5G-AN, if any;
 - the "MO Exception Data Counter" if the UE has accessed the network by using "MO exception data" RRC establishment cause;
 - other information, if necessary.
- 2a. If the SMF can proceed with resuming the user plane connection of the PDU session, the SMF shall return a 200 OK response including the following information:
 - the upCnxState attribute set to ACTIVATED;
 - N2 SM information, 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 "MO Exception Data Counter" is included in the request and Small Data Rate Control is enabled for the PDU session, the V-SMF shall update the H-SMF (see clause 5.2.2.8.2.2) for HR PDU Session (or I-SMF shall update the SMF for PDU session with I-SMF).
- 2b. If the SMF cannot proceed with resuming 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:
 - the upCnxState attribute representing the final state of the user plane connection (e.g. SUSPENDED);
 - N2 SM information, including the cause of the failure.

5.2.2.3.17 AMF requested PDU Session Release due to Network Slice-Specific Authentication and Authorization failure or revocation

The requirements specified in clause 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_AUTHORIZED.

5.2.2.3.18 5GS to EPS Idle mode mobility using N26 interface with data forwarding

The NF Service Consumer (e.g. AMF) shall request the SMF to forward buffered DL data towards the EPS during a 5GS to EPS Idle mode mobility using N26 interface with data forwarding (see 4.11.1.3.2A of 3GPP TS 23.502 [3]), as follows.

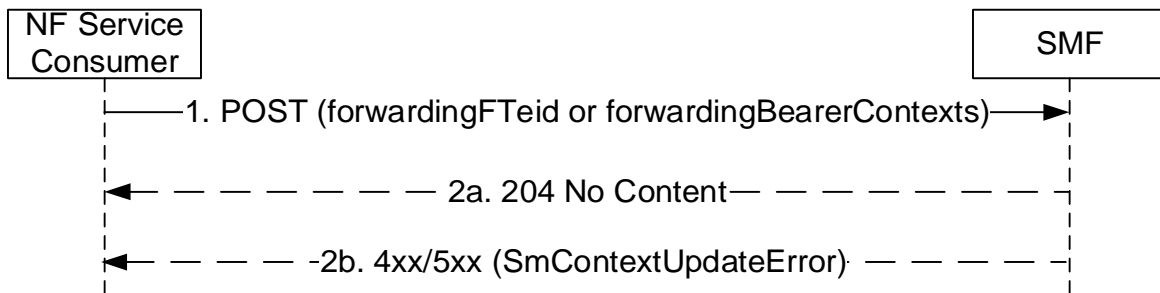


Figure 5.2.2.3.18-1: 5GS to EPS Idle mode mobility using N26 interface with data forwarding

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

- forwardingFTEid received from the MME in the Context Acknowledge, if any; or
- forwarding bearer contexts received from the MME in Context Acknowledge, if any.

2a. Upon receipt of such a request, the SMF shall forward the buffered DL data on the forwarding tunnel(s).

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.

5.2.2.3.19 AMF requested PDU Session Release due to Control Plane Only indication associated with PDU Session is not applicable any longer

The requirements specified in clause 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_CP_ONLY_NOT_APPLICABLE.

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, in the V-SMF for HR roaming scenarios, or in the I-SMF for a PDU session with an I-SMF, in the following procedures:

- UE initiated Deregistration (see clause 4.2.2.3.2 of 3GPP TS 23.502 [3]);
- Network initiated Deregistration, e.g. AMF initiated deregistration (see clause 4.2.2.3.3 of 3GPP TS 23.502 [3]), UDM triggered deregistration by sending Deregistration notification with initial Registration indication (see clause 4.2.2.2.2 of 3GPP TS 23.502 [3]);

- Network requested PDU session release (see clause 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; 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], clauses 5.15.5.2.2 and 4.2.2.2) 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 or in the I-SMF only (see clause 4.23.12.2 of 3GPP TS 23.502 [3]), 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 clauses 4.11.1.2.1 and 4.11.1.3.2 of 3GPP TS 23.502 [3]);
- Inter NG-RAN node Xn based handover and N2 based handover with I-SMF change and removal;
- 5G-SRVCC from NG-RAN to 3GPP UTRAN procedure (see clause 6.5.4 of 3GPP TS 23.216 [35]);
- 5G-RG Deregistration via W-5GAN (see clause 7.2.1.2 of 3GPP TS 23.316 [36]);
- FN-RG Deregistration via W-5GAN (see clause 7.2.1.4 of 3GPP TS 23.316 [36]);
- Non-5G capable device behind 5G-CRG and FN-CRG Deregistration via W-5GAN (see clause 4.10a of 3GPP TS 23.316 [36]);
- 5G-RG or Network requested PDU Session Release via W-5GAN (see clause 7.3.3 of 3GPP TS 23.316 [36]);
- FN-RG or Network Requested PDU Session Release via W-5GAN (see clause 7.3.7 of 3GPP TS 23.316 [36]);
- Non-5G capable device behind 5G-CRG and FN-CRG or Network Requested PDU Session Release via W-5GAN (see clause 4.10a of 3GPP TS 23.316 [36]);
- Mobility procedures with AMF changes (e.g. Registration / N2 based handover with AMF changes), to release the MA-PDU session if target AMF does not support MA-PDU session (see clause 4.22.9 of 3GPP TS 23.502 [3]).

The SMF shall release the SM context without sending any signalling towards the 5G-AN and the UE.

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.

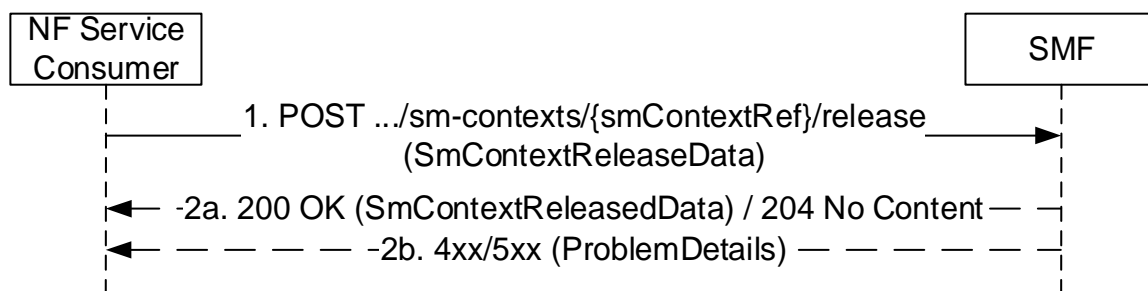


Figure 5.2.2.4.1-1: SM context release

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.

For an inter NG-RAN node Xn based handover and N2 based handover with I-SMF change or removal, the POST request shall contain the ismfReleaseOnly indication.

For 5G-SRVCC from NG-RAN to 3GPP UTRAN, the POST request body shall contain the "cause" attribute with the value "REL_DUE_TO_PS_TO_CS_HO".

- 2a. On success, the SMF shall return a "200 OK" with message body containing the representation of the SmContextReleasedData when information needs to be returned to the NF Service Consumer, or 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.

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

If the POST request body contains the "cause" attribute with the value "REL_DUE_TO_PS_TO_CS_HO", the SMF shall indicate to the PCF within SM Policy Association termination that the PDU session is released due to 5G-SRVCC, or the cause value shall be passed from the V-SMF to the H-SMF (for a HR PDU session) or from the I-SMF to the SMF (for a PDU session with an I-SMF) within the Release service operation.

- 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 and the release is not triggered by a Release SM Context Request, or when the SM context is moved to another system) in the SMF, or in the V-SMF for HR roaming scenarios, or in the I-SMF for a PDU session with an I-SMF.

The Notify SM Context Status service operation may also be used by the SMF to provide the SMF derived CN assisted RAN parameters tuning to the NF Service Consumer (e.g. AMF), if the NF Service Consumer has indicated support of the CARPT (CN Assisted RAN Parameters Tuning) feature.

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 or to provide the SMF derived CN assisted RAN parameters tuning (see clause 4.3.2.2 of 3GPP TS 23.502 [3]);
- UE or Network requested PDU session Modification (see clause 4.3.3.2 of 3GPP TS 23.502 [3]) to provide the SMF derived CN assisted RAN parameters tuning;
- UE or Network requested PDU session release (see clause 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 clauses 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 clause 4.11.2.2 of 3GPP TS 23.502 [3]);
- Handover from 5GC-N3IWF to EPS (see clause 4.11.3.2 of 3GPP TS 23.502 [3]);

- Handover from 5GS to EPC/ePDG (see clause 4.11.4.2 of 3GPP TS 23.502 [3]);
- I-SMF Context Transfer (see clause 4.26.5.2 of 3GPP TS 23.502 [3]);
- SMF Context Transfer procedure, LBO or no Roaming, no I-SMF (see clause 4.26.5.3 of 3GPP TS 23.502 [3]);
- Handover from W-5GAN/5GC to 3GPP access/EPS (see clause 7.6.4.2 of 3GPP TS 23.316 [36]);
- 5G-RG requested PDU Session Establishment via W-5GAN (see clause 7.3.1 of 3GPP TS 23.316 [36]);
- 5G-RG or Network requested PDU Session Modification via W-5GAN (see clause 7.3.2 of 3GPP TS 23.316 [36]);
- 5G-RG or Network requested PDU Session Release via W-5GAN (see clause 7.3.3 of 3GPP TS 23.316 [36]);
- FN-RG related PDU Session Establishment via W-5GAN (see clause 7.3.4 of 3GPP TS 23.316 [36]);
- FN-RG or Network Requested PDU Session Modification via W-5GAN (see clause 7.3.6 of 3GPP TS 23.316 [36]);
- FN-RG or Network Requested PDU Session Release via W-5GAN (see clause 7.3.7 of 3GPP TS 23.316 [36]);
- Non-5G capable device behind 5G-CRG and FN-CRG requested PDU Session Establishment via W-5GAN (see clause 4.10a of 3GPP TS 23.316 [36]);
- Non-5G capable device behind 5G-CRG and FN-CRG or Network requested PDU Session Modification via W-5GAN (see clause 4.10a of 3GPP TS 23.316 [36]);
- Non-5G capable device behind 5G-CRG and FN-CRG or Network requested PDU Session Release via W-5GAN (see clause 4.10a of 3GPP TS 23.316 [36]);
- Handover between 3GPP access/5GC and W-5GAN access (see clause 7.6.3 of 3GPP TS 23.316 [36]);
- Handover from 3GPP access/EPS to W-5GAN/5GC (see clause 7.6.4.1 of 3GPP TS 23.316 [36]).

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

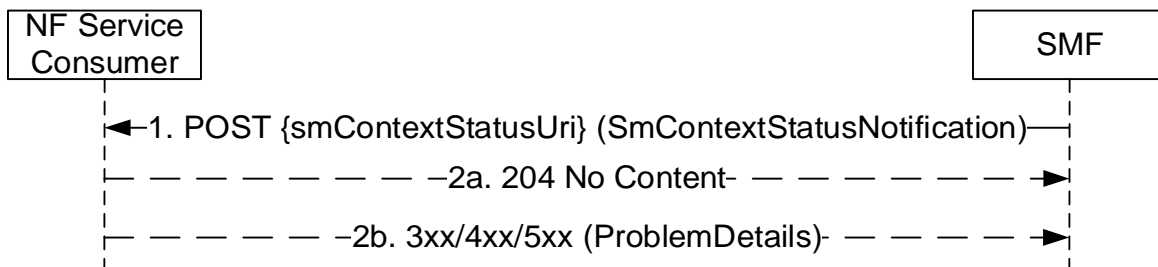


Figure 5.2.2.5.1-1: SM context status notification

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 to release resources of the PDU session in the source access, the notification payload shall contain the resourceStatus IE with the value "RELEASED" and the Cause IE with the value "PDU_SESSION_HANDED_OVER" as specified in clause 4.9.2.3.2 of 3GPP TS 23.501 [2].

If the notification is triggered by PDU session handover to release resources of the PDU session in the target access due to handover failure between 3GPP access and non-3GPP access, the notification payload shall contain the resourceStatus IE with the value "RELEASED" and the Cause IE with the value "PDU_SESSION_HAND_OVER_FAILURE".

If the NF Service Consumer indicated support of the HOFAIL feature (see clause 6.1.8) and if the notification is triggered by PDU session handover to update the access type of the PDU session due to a handover failure between 3GPP access and non-3GPP access, the notification payload shall contain the resourceStatus IE with the value "UPDATED", the anType IE with the value "3GPP" or "NON_3GPP" indicating the access type of the

PDU session after the handover failure scenario and the Cause IE with the value "PDU_SESSION_HAND_OVER_FAILURE".

If the notification is triggered by the SMF derived CN assisted RAN parameters tuning, the notification payload shall contain the resourceStatus IE with the value "UNCHANGED" and the Cause IE with the value "CN_ASSISTED_RAN_PARAMETER_TUNING".

If the notification is triggered by SMF Context Transfer procedure, the notification payload shall contain the Cause IE with the value "ISMF_CONTEXT_TRANSFER" or "SMF_CONTEXT_TRANSFER".

If the notification is triggered by the report of the DDN failure, the notification payload shall contain the resourceStatus IE with the value "UNCHANGED" and the Cause IE with the value "DDN_FAILURE_STATUS".

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.

If the SMF indicated in the request that the SM context resource is updated with the anType IE, the NF Service Consumer shall change the access type of the PDU session with the value of anType IE.

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 clause 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 clause 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 (H-)SMF, from the V-SMF during change or removal of V-SMF, or from the I-SMF during change or removal of I-SMF.

It is used in the following procedures:

- 5GS to EPS handover using N26 interface (see clause 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 clause 4.11.1.3.2 of 3GPP TS 23.502 [3]), for PDU sessions associated with 3GPP access;

- UE Triggered Service Request with I-SMF insertion/change/removal or with V-SMF insertion/change/removal (see clause 4.23.4.3 of 3GPP TS 23.502 [3]);
- Xn based inter NG-RAN handover with insertion of intermediate SMF (see clause 4.23.11 of 3GPP TS 23.502 [3]), for PDU sessions associated with 3GPP access;
- Inter NG-RAN node N2 based handover, preparation phase, with I-SMF or V-SMF insertion/change (see clause 4.23.7.3.2 of 3GPP TS 23.502 [3]), for PDU sessions associated with 3GPP access;
- SMF Context Transfer procedure, LBO or no Roaming, no I-SMF (see clause 4.26.5.3 of 3GPP TS 23.502 [3]), for PDU sessions associated with 3GPP access.

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

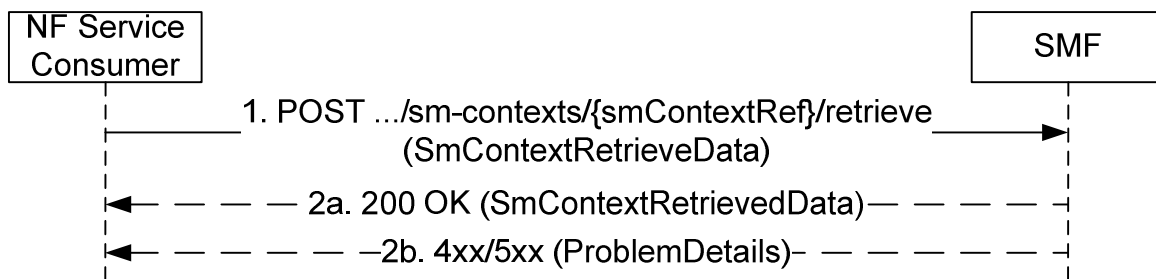


Figure 5.2.2.6.1-1: SM context retrieval

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 Ethernet PDN Type, non-IP PDN type or not;
 - SM context type indicating that this is a request to retrieve the complete SM context (i.e. 5G SM context including EPS context information as defined in clause 6.1.6.2.39), during scenarios with an I-SMF or V-SMF insertion/change/removal or SMF Context Transfer procedure;
 - serving core network operator PLMN ID of the new V-SMF, when the procedure is triggered by a new V-SMF, if the new V-SMF supports inter-PLMN V-SMF change;
 - notToTransferEbiList IE, if the SM context type IE is absent or indicate a request to retrieve the EPS PDN connection, to request the SMF to not transfer EPS bearer context(s) corresponding to EBIs in the list, during an 5GS to EPS mobility when the target MME does not support 15 EPS bearers.
- 2a. On success, "200 OK" shall be returned; the payload body of the POST response shall contain the mapped EPS bearer contexts if this is a request for the UE EPS PDN connection, or the complete SM context if this is a request for retrieving the complete SM context.

If this is a request for the UE EPS PDN connection and the target MME capabilities were provided in the request parameters:

- if the target MME supports the non-IP PDN type, the SMF shall return, for a PDU session with PDU session type "Unstructured", an EPS bearer context with the "non-IP" PDN type;
- if the target MME supports the Ethernet PDN type, the SMF shall return, for a PDU session with PDU session type "Ethernet", an EPS bearer context with the "Ethernet" PDN type;
- if the target MME does not support the Ethernet PDN type but supports the non-IP PDN type, the SMF shall return, for a PDU session with PDU session type "Ethernet", an EPS bearer context with the "non-IP" PDN type.

If the notToTransferEbiList IE was included in the request, the SMF shall not provide EPS bearer context(s) corresponding to EBIs in the list.

If this is a request for retrieving the complete SM context and there are downlink data packets buffered at I-UPF, the SMF shall include the "forwardingInd" attribute with value "true" in the response body to indicate downlink data packets are buffered at the I-UPF. The NF Service Consumer receiving the "forwardingInd" attribute with the value "true" shall setup a forwarding tunnel for receiving the buffered downlink data packets.

If this is a request for retrieving the complete SM context for an inter-PLMN V-SMF change, i.e. if the request contains the serving core network operator PLMN ID indicating a different PLMN than the PLMN of the SMF (acting as the old V-SMF), the latter shall not include the chargingInfo IE and the roamingChargingProfile IE in the SM context returned in the response.

- 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.

If the EBI value of the QoS Flow associated with the default QoS Rule is included in the notToTransferEbiList IE, the SMF shall set the "cause" attribute in the ProblemDetails structure to "DEFAULT_EBI_NOT_TRANSFERRED".

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, or in the SMF for PDU sessions involving an I-SMF.

It is used in the following procedures:

- UE requested PDU Session Establishment with or without an I-SMF insertion (see clauses 4.3.2.2.2 and 4.23.5.1 of 3GPP TS 23.502 [3]);
- when an I-SMF is inserted during the Registration, Service Request, Inter NG-RAN node N2 based handover, Xn based handover and Handover from EPC/ePDG to 5GS procedures (see clauses 4.23.3, 4.23.4, 4.23.7.3 and 4.23.11.2 of 3GPP TS 23.502 [3]);
- EPS to 5GS Idle mode mobility or handover using N26 interface (see clauses 4.11, 4.23.12.3, 4.23.12.5 and 4.23.12.7 of 3GPP TS 23.502 [3]);
- EPS to 5GS mobility without N26 interface (see clause 4.11.2.3 of 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 clause 4.9.2.3.2 of 3GPP TS 23.502 [3]);
- Handover from EPS to 5GC-N3IWF (see clause 4.11.3.1 of 3GPP TS 23.502 [3]);
- Handover from EPC/ePDG to 5GS (see clause 4.11.4.1 of 3GPP TS 23.502 [3]).

The NF Service Consumer (e.g. V-SMF or I-SMF) shall create a PDU session in the SMF (i.e. H-SMF for a HR PDU session, or SMF for a PDU session involving an I-SMF) by using the HTTP POST method as shown in Figure 5.2.2.7.1-1.

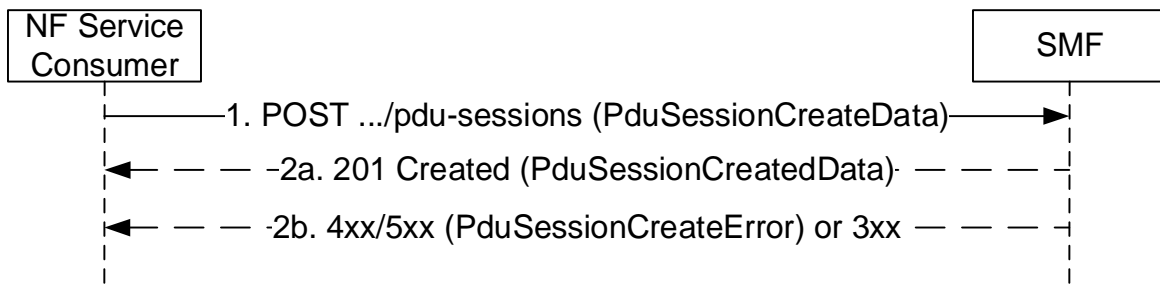


Figure 5.2.2.7.1-1: PDU session creation

1. The NF Service Consumer shall send a POST request to the resource representing the PDU sessions collection resource of the 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 for a single access PDU session and if the request refers to an existing PDU session or an existing Emergency PDU session; the Request Type shall not be included for a MA-PDU session establishment request; it may be included otherwise;
 - the indication that a MA-PDU session is requested if a MA-PDU session is requested to be established by the UE, or the indication that the PDU session is allowed to be upgraded to a MA PDU session if the UE indicated so;
 - the vsmfId IE or ismfId IE identifying the V-SMF or I-SMF respectively;
 - the cpCiotEnabled IE with the value "True", if Control Plane CIoT 5GS Optimisation is enabled for this PDU session;
 - the cpOnlyInd IE with the value "True", if the PDU session shall only use Control Plane CIoT 5GS Optimisation;
 - the Invoke NEF indication with the value "True", if the cpCiotEnabled IE is set to "True" and data delivery via NEF is selected for the PDU session;
 - the vcnTunnelInfo IE or icnTunnelInfo IE with the N9 tunnel information of the UPF controlled by the V-SMF or I-SMF respectively, except when Control Plane CIoT 5GS Optimisation is enabled and data delivery via NEF is selected for this PDU session;
 - the additionalCnTunnelInfo IE with additional N9 tunnel information, if a MA PDU session is requested or if the PDU session is allowed to be upgraded to a MA PDU session, and if the UE is registered over both 3GPP and Non-3GPP accesses;
 - the anType IE, indicating the access network type (3GPP or non-3GPP access) associated to the PDU session;
 - the additionalAnType IE indicating an additional access network type associated to the PDU session, for a MA PDU session, if the UE is registered over both 3GPP and Non-3GPP accesses;
 - the n9ForwardingTunnelInfo IE indicating the allocated N9 tunnel endpoints information for receiving the buffered downlink data packets, when downlink data packets are buffered at I-UPF controlled by the SMF during I-SMF insertion;
 - a URI (`{vsmfPduSessionUri}` or `{ismfPduSessionUri}`) representing the PDU session resource in the V-SMF or I-SMF, for possible use by the SMF to subsequently modify or release the PDU session;
 - the list of DNAs supported by the I-SMF, for a PDU session with an I-SMF.

As specified in clause 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 clause 4.11.1.4.1 of 3GPP TS 23.502 [3]) or Secondary authorization/authentication (see clause 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, except when Control Plane CIoT 5GS Optimisation is enabled for this 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;
- a MA PDU Session Accepted indication, if a MA PDU session is established;
- the smallDataRateControlEnabled indication set to "true" if small data rate control is applicable on the PDU session;
- the "Location" header containing the URI of the created resource.

The SMF may provide alternative QoS profiles for each GBR QoS flow with Notification control enabled, to allow the NG-RAN to accept the setup of the QoS flow if the requested QoS parameters or at least one of the alternative QoS parameters sets can be fulfilled at the time of setup.

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 NF Service Consumer before the Create Response, the URI in the "Location" header and in the hsmfPduSessionUri IE (or smfPduSessionUri IE for a PDU session with an I-SMF) of the 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 IE is present in the request and set to INITIAL_REQUEST or INITIAL_EMERGENCY_REQUEST (e.g. single access PDU session establishment request);
 - the RequestType IE and the maRequestInd IE are both absent in the request (e.g. EPS to 5GS mobility); or
 - the maRequestInd IE is present in the request (i.e. MA-PDU session establishment request) and the access type indicated in the request corresponds to the access type of the existing PDU session context.

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. See also clause 5.2.3.3.1 for the handling of requests which collide with an existing PDU session context. If the vsmfPduSessionUri or ismfPduSessionUri of the existing PDU session context differs from the vsmfPduSessionUri or ismfPduSessionUri received in the POST request, the SMF shall also send a status notification (see clause 5.2.2.10) targeting the vsmfPduSessionUri or ismfPduSessionUri 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 SMF.

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

If no GPSI IE is provided in the request, e.g. for a PDU session moved from another access or another system, and the SMF knows that a GPSI is already associated with the PDU session, the SMF shall include the GPSI in the response.

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 SMF proposes the NF Service Consumer 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 clause 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;
- the `epsBearerCxtStatus` attribute, indicating the status of all the EPS bearer contexts in the UE, if corresponding information has been received in the Create SM Context request (see clause 5.2.2.2.2).

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;
- the default EPS bearer context of the corresponding PDU session is not reported as inactive by the UE in the `epsBearerCxtStatus` attribute, if received; and
- the SMF can proceed with moving the PDN connection to 5GS,

then the 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.

If the `epsBearerCxtStatus` attribute is received in the request, the SMF shall check whether some EPS bearer(s) of the corresponding PDU session have been deleted by the UE but not notified to the EPS, and if so, the SMF shall release these EPS bearers, corresponding QoS rules and QoS flow level parameters locally, as specified in clause 4.11.1.3.3 of 3GPP TS 23.502 [3].

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 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".

If the default EPS bearer context of the PDU session is reported as inactive by the UE in the epsBearerCtxStatus attribute, the SMF shall set the "cause" attribute in the ProblemDetails structure to "DEFAULT_EPS_BEARER_INACTIVE".

5.2.2.7.3 EPS to 5GS Handover Preparation

The requirements specified in clause 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".

5.2.2.7.4 N2 Handover Preparation with I-SMF Insertion

The requirements specified in clause 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 hoPreparationIndication IE set to "true", to indicate that a handover preparation is in progress and the 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:

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

5.2.2.7.5 Xn Handover with I-SMF Insertion

The requirements specified in clause 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 upSecurityInfo IE, if received from the AMF.

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

The SMF shall verify that the upSecurity IE included in the received upSecurityInfo IE is same as the security policy for integrity protection and encryption that the SMF has locally stored. If there is a mismatch, the SMF shall send its locally stored security policy for integrity protection and encryption in upSecurity IE to NG-RAN as specified in clause 6.6.1 of 3GPP TS 33.501 [17].

5.2.2.8 Update service operation

5.2.2.8.1 General

The Update service operation shall be used for HR PDU sessions or for PDU sessions involving an I-SMF to:

- update an individual PDU session in the H-SMF or SMF and/or provide the H-SMF or SMF with information received by the V-SMF or I-SMF in N1 SM signalling from the UE;
- update a MA PDU session to indicate an additional access type, if the UE requests establishment of MA PDU session via the other access after the UE is registered to both 3GPP access and non-3GPP access and the MA PDU session was successfully established on the first access (see clause 4.22.2.2 of 3GPP TS 23.502 [3]);
- release a MA PDU session over a single access in the H-SMF or SMF;
- update an individual PDU session in the V-SMF or I-SMF and/or provide information necessary for the V-SMF or I-SMF to send N1 SM signalling to the UE.

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

- UE or network (e.g. V-SMF, I-SMF) requested PDU session modification (see clauses 4.3.3.3 and 4.23.5.3 of 3GPP TS 23.502 [3]);
- UE requested PDU session release (see clause 4.3.4.3 of 3GPP TS 23.502 [3]);
- UE or network (e.g. AMF, V-SMF, I-SMF) initiated MA PDU session release over a single access (see clause 4.22 of 3GPP TS 23.502 [3]);
- EPS to 5GS handover execution using N26 interface (see clause 4.11 of 3GPP TS 23.502 [3]);
- Handover between 3GPP and untrusted non-3GPP access procedures (see clause 4.9.2 of 3GPP TS 23.502 [3]), without AMF change or with target AMF in same PLMN;
- All procedures requiring to provide the H-SMF or SMF with information received by the V-SMF or I-SMF in N1 SM signalling from the UE to the H-SMF or SMF;
- Secondary RAT Usage Data Reporting (see clause 4.21 of 3GPP TS 23.502 [3]);
- UPF anchored Mobile Originated Data Transport in Control Plane CIoT 5GS Optimisation (see clause 4.24.1 of 3GPP TS 23.502 [3]);
- Connection Resume in CM-IDLE with Suspend procedure (see clause 4.8.2.3 of 3GPP TS 23.502 [3]).

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

- Addition of PDU Session Anchor and Branching Point or UL CL controlled by I-SMF (see clause 4.23.9.1 of 3GPP TS 23.502 [3]);
- Removal of PDU Session Anchor and Branching Point or UL CL controlled by I-SMF (see clause 4.23.9.2 of 3GPP TS 23.502 [3]);
- Change of PDU Session Anchor for IPv6 multi-homing or UL CL controlled by I-SMF (see clause 4.23.9.3 of 3GPP TS 23.502 [3]);

- Sending by I-SMF of N4 notifications related with traffic usage reporting (see clause 5.34.6 of 3GPP TS 23.501 [2]).

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

- Network (e.g. H-SMF, SMF) requested PDU session modification (see clauses 4.3.3.3 and 4.23.5.3 of 3GPP TS 23.502 [3]);
- Network (e.g. H-SMF, SMF) requested PDU session release (see clause 4.3.4.3 of 3GPP TS 23.502 [3]);
- Network (e.g. H-SMF, SMF) initiated MA PDU session release over a single access (see clause 4.22 of 3GPP TS 23.502 [3]);
- All procedures requiring to provide information necessary for the V-SMF or I-SMF to send N1 SM signalling to the UE;
- EPS Bearer ID allocation or revocation (see clauses 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 clause 4.3.2.3 of 3GPP TS 23.502 [3]).

It is invoked by the SMF in the following procedures:

- Addition of PDU Session Anchor and Branching Point or UL CL controlled by I-SMF (see clause 4.23.9.1 of 3GPP TS 23.502 [3]);
- Removal of PDU Session Anchor and Branching Point or UL CL controlled by I-SMF (see clause 4.23.9.2 of 3GPP TS 23.502 [3]);
- Change of PDU Session Anchor for IPv6 multi-homing or UL CL controlled by I-SMF (see clause 4.23.9.3 of 3GPP TS 23.502 [3]);
- Policy update procedures with an I-SMF (see clause 4.23.6.2 of 3GPP TS 23.502 [3]).

5.2.2.8.2 Update service operation towards H-SMF or SMF

5.2.2.8.2.1 General

The NF Service Consumer (i.e. the V-SMF for a HR PDU session, or the I-SMF for a PDU session with an I-SMF) shall update a PDU session in the H-SMF or SMF and/or provide the H-SMF or SMF with information received by the NF Service Consumer 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.

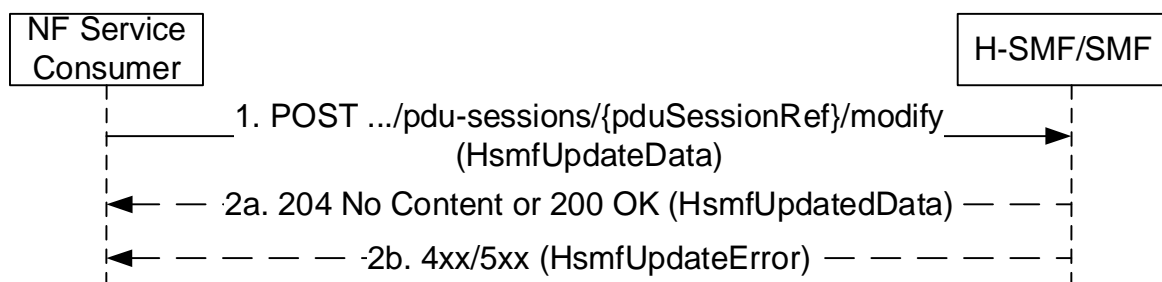


Figure 5.2.2.8.2-1: PDU session update towards H-SMF or SMF

1. The NF Service Consumer shall send a POST request to the resource representing the individual PDU session resource in the H-SMF or SMF. The payload body of the POST request shall contain:
 - the requestIndication IE indicating the request type. Unless specified otherwise in clause 5.2.2.8.2, the value of the requestIndication IE shall be set to NW_REQ_PDU_SES_MOD;
 - the modification instructions and/or the information received by the NF Service Consumer 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 NF Service Consumer 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 an 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 or SMF proposes the NF Service Consumer to return to the UE, if the request included n1SmInfoFromUe;
 - n1SmInfoToUe binary data, if the H-SMF or SMF needs to return NAS SM information which the NF Service Consumer does not need to interpret;
 - the procedure transaction id that was 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 network (e.g. AMF, V-SMF, I-SMF) requested PDU session modification

The requirements specified in clause 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 clause 5.2.3.1, or indication that the PDU session is allowed to be upgraded to a MA PDU session as specified in clause 6.4.2.2 of 3GPP TS 24.501 [7], 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, for a visited network requested PDU session modification, e.g. to:
 - report the release of QoS flow(s) or notify QoS flow(s) whose targets QoS are no longer fulfilled; in the latter case, the V-SMF/I-SMF may also report an alternative QoS profile which the NG-RAN can currently fulfil in the currentQosProfileIndex IE;
 - report that the user plane security enforcement with a value Preferred is not fulfilled or is fulfilled again, in the NotifyList IE and the securityResult IE, if the new security status is received from NG-RAN;
 - report that access type of the PDU session can be changed; in this case, the anTypeCanBeChanged attribute shall be set to "true";
 - report the "MO Exception Data Counter";
 - request for QoS modification initiated by VPLMN, if the H-SMF supports the VPLMN QoS (VQOS) feature.

5.2.2.8.2.3 UE requested PDU session release

The requirements specified in clause 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 clause 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 PDU_SES_MOB;
- 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 H-SMF or SMF shall return a 200 OK response. The H-SMF or SMF shall switch the DL user plane of the PDU session using the N9 tunnel information that has been received in the vcnTunnelInfo or icnTunnelInfo, 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 clause 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 PDU_SES_MOB;- 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 or SMF shall return a 200 OK response. The H-SMF or SMF shall release the resources prepared for the handover.

5.2.2.8.2.5 Handover between 3GPP and untrusted non-3GPP access

For Handover between 3GPP and untrusted non-3GPP access procedures, without AMF change or with the target AMF in the same PLMN, the requirements specified in clause 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

The requirements specified in clause 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.

5.2.2.8.2.7 Addition of PSA and BP or UL CL controlled by I-SMF

This clause applies only in case of non-roaming or LBO roaming as control of an UL CL or BP in VPLMN is not supported in HR roaming case (see clause 5.34.4 of 3GPP TS 23.501 [2]).

An I-SMF and I-UPF have already been inserted for the PDU session.

The requirements specified in clause 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_MOD;
- the indication that an UL CL or BP has been inserted into the data path of the PDU session;
- the list of DNAs supported by the inserted PSA;
- the new UE IPv6 prefix at the PSA, assigned by the I-SMF or by the UPF supporting the PSA, if IPv6 multi-homing applies to the PDU session;
- the icnTunnelInfo with the N9 tunnel information of the UL CL or BP for the downlink traffic, if a UPF different from the earlier I-UPF is selected for the UL CL or BP.

- 2a. Same as step 2a of Figure 5.2.2.8.2-1.

5.2.2.8.2.8 Removal of PSA and BP or UL CL controlled by I-SMF

This clause applies only in case of non-roaming or LBO roaming as control of an UL CL or BP in VPLMN is not supported in HR roaming case (see clause 5.34.4 of 3GPP TS 23.501 [2]).

The requirements specified in clause 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_MOD;
- the indication that an UL CL or BP has been removed from the data path of the PDU session;
- the removed UE IPv6 prefix at the PSA, if IPv6 multi-homing applies to the PDU session;
- the list of DNAs supported by the removed PSA;
- the icnTunnelInfo with the N9 tunnel information of the I-UPF for the downlink traffic.

- 2a. Same as step 2a of Figure 5.2.2.8.2-1.

5.2.2.8.2.9 Change of PSA for IPv6 multi-homing or UL CL controlled by I-SMF

This clause applies only in case of non-roaming or LBO roaming as control of an UL CL or BP in VPLMN is not supported in HR roaming case (see clause 5.34.4 of 3GPP TS 23.501 [2]).

The requirements specified in clause 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_MOD;
- the indication that a PSA is removed and another PSA is inserted;
- the list of DNAs supported by the inserted PSA;
- the new UE IPv6 prefix at the inserted PSA, assigned by the I-SMF or by the UPF supporting the PSA, if IPv6 multi-homing applies to the PDU session;
- the removed UE IPv6 prefix at the removed PSA, if IPv6 multi-homing applies to the PDU session;
- the list of DNAs supported by the removed PSA.

2a. Same as step 2a of Figure 5.2.2.8.2-1.

5.2.2.8.2.10 PDU Session modification with I-SMF or V-SMF change

During PDU Session modification with I-SMF or V-SMF change, the NF Service Consumer (i.e. the new V-SMF for a HR PDU session, or the new I-SMF for a PDU session with an I-SMF) shall update the PDU session in the H-SMF or SMF and provide the information of the new I-SMF or V-SMF.

The requirements specified in clause 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 additions:

The POST request shall contain:

- the requestIndication set to NW_REQ_PDU_SES_MOD or UE_REQ_PDU_SES_MOD for network requested or UE requested PDU session modification respectively;
- the ismfPduSessionUri or vsmfPduSessionUri IE containing the URI representing the PDU session in the new I-SMF or new V-SMF;
- the ismfId or vsmfId IE containing the identifier of the new I-SMF or new V-SMF;
- optionally the iSmfServiceInstanceId or vSmfServiceInstanceId IE containing the serviceInstanceId of the new I-SMF or new V-SMF service instance serving the PDU session;
- the supportedFeatures IE indicating the optional features the NF Service Consumer supports, if at least one optional feature defined in clause 6.1.8 is supported.

2. Same as step 1 of Figure 5.2.2.8.2-1, the SMF shall replace the corresponding information for the old I-SMF or old V-SMF stored locally with the received information. In addition, the SMF shall include the supportedFeatures IE in the response, if the supportedFeatures IE was received in the request and at least one optional feature defined in clause 6.1.8 is supported by the updated PDU session resource.

5.2.2.8.2.11 Sending by I-SMF of N4 notifications related with traffic usage reporting

This clause applies only in case of non-roaming or LBO roaming as control of an UL CL or BP in VPLMN is not supported in HR roaming case (see clause 5.34.4 of 3GPP TS 23.501 [2]).

The requirements specified in clause 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_MOD;
- N4 information related with traffic usage reporting (i.e. PFCP Session Report Request, see Annex D of 3GPP TS 29.244 [29]);
- the DNAI related to the N4 information if the latter relates to a local PSA;

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

The payload body of the POST response shall contain:

- N4 response information (i.e. PFCP Session Report Response);
- the DNAI related to the N4 information if the latter relates to a local PSA.

5.2.2.8.2.12 N2 Handover Execution with I-SMF Insertion

The requirements specified in clause 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 NW_REQ_PDU_SES_MOD;
- the hoPreparationIndication IE set to "false", to indicate that there is no handover preparation in progress anymore and that the 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 icnTunnelInfo, 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 clause 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 NW_REQ_PDU_SES_MOD;- the cause attribute set to "HO_FAILURE";
- 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 SMF shall return a 200 OK response. The SMF shall release the resources prepared for the handover.

5.2.2.8.2.13 N2 Handover Cancellation with I-SMF Insertion

For handover cancellation, the requirements specified in clause 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 NW_REQ_PDU_SES_MOD;
- the cause attribute set to "HO_CANCEL";
- 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 SMF shall return a 200 OK response. The SMF shall release the resources prepared for the handover.

5.2.2.8.2.14 EPS to 5GS Handover Cancellation

If the handover cancellation, the requirements specified in clause 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 PDU_SES_MOB;
- the cause attribute set to "HO_CANCEL";
- 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 or SMF shall return a 200 OK response. The H-SMF or SMF shall release the resources prepared for the handover.

5.2.2.8.2.15 5G-AN requested PDU session resource release

This clause applies only in case of 5G-AN requested PDU session resource release by sending the NGAP PDU SESSION RESOURCE NOTIFY to the AMF case (see step 1d in clause 4.3.4.3 of 3GPP TS 23.502 [3]).

The requirements specified in clause 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 REL_DUE_TO_5G_AN_REQUEST to indicate that the PDU session resource has been released by the 5G-AN.

After receiving the request, the SMF may decide to keep the PDU Session (with user plane connection deactivated) or release the PDU Session.

5.2.2.8.2.16 Xn Handover with or without I-SMF or V-SMF Change

The requirements specified in clause 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 upSecurityInfo IE, if received from the NG-RAN.

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

The SMF shall verify that the upSecurity IE included in the received upSecurityInfo IE is same as the security policy for integrity protection and encryption that the SMF has locally stored. If there is a mismatch, the SMF shall send its locally stored security policy for integrity protection and encryption in upSecurity IE to NG-RAN as specified in clause 6.6.1 of 3GPP TS 33.501 [17].

5.2.2.8.3 Update service operation towards V-SMF or I-SMF

5.2.2.8.3.1 General

The NF Service Consumer (i.e. the H-SMF for a HR PDU session, or the SMF for a PDU session with an I-SMF) shall update a PDU session in the V-SMF or I-SMF and/or provide information necessary for the V-SMF or I-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 or I-SMF

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

- the requestIndication IE indicating the request type, which is set to NW_REQ_PDU_SES_MOD;
 - the modification instructions and/or the information necessary for the V-SMF or I-SMF to send N1 SM signalling to the UE;
 - the hsmfPduSessionUri IE or smfPduSessionUri IE if the Update Request is sent to the V-SMF or I-SMF before the Create Response, and the H-SMF or SMF PDU session resource URI has not been previously provided to the V-SMF or I-SMF; in this case, the supportedFeatures IE shall also be included if at least one optional feature defined in clause 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 or I-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 SMF, or that the V-SMF or I-SMF does not comprehend;
 - the procedure transaction id received from the UE, if available.

5.2.2.8.3.2 Network (e.g. H-SMF, SMF) requested PDU session modification

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

1. Same as step 1 of Figure 5.2.2.8.3.1-1, 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 H-SMF or SMF may provide alternative QoS profiles for each GBR QoS flow with Notification control enabled, to allow the NG-RAN to accept the setup of the QoS flow if the requested QoS parameters or at least one of the alternative QoS parameters sets can be fulfilled at the time of setup. If the H-SMF or SMF provides a new list of alternative QoS profile(s) for a given GBR QoS flow, the V-SMF or I-SMF shall replace any previously stored list for this QoS flow with it.

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 or I-SMF to release some EBI(s) and delete any corresponding EPS bearer context stored in the V-SMF or I-SMF. The V-SMF or I-SMF shall disassociate the EBI(s) with the QFI(s) with which they are associated.

2. Same as step 2 of Figure 5.2.2.8.3.1-1, with the following modifications.

The V-SMF or I-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 qosFlowsAddModList IE and/or the qosFlowsFailedtoAddModList IE respectively.

The V-SMF or I-SMF may report an alternative QoS profile which the NG-RAN currently fulfils in the currentQosProfileIndex IE of the corresponding QoS flow in the qosFlowsAddModList IE.

If the NG-RAN rejects the establishment of a voice QoS flow due to EPS Fallback for IMS voice (see clause 4.13 of 3GPP TS 23.502 [3]), the V-SMF or I-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 or I-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 or I-SMF shall store any EPS bearer information received from the H-SMF or SMF. If the revokeEbiList IE is present in the request, the V-SMF or I-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 or SMF contains the alwaysOnGranted attribute set to true, the V-SMF or I-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 Network (e.g. H-SMF, SMF) requested PDU session release

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

1. Same as step 1 of Figure 5.2.2.8.3.1-1, with the following modifications.

The requestIndication shall be set to NW_REQ_PDU_SES_REL.

2. Same as step 2 of Figure 5.2.2.8.3.1-1, with the following modifications.

If the requestIndication in the request is set to NW_REQ_PDU_SES_REL, the V-SMF or I-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 or I-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 or SMF indicating the PDU session is released in the H-SMF or 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 clause 5.2.2.8.3.1 shall apply with the following modifications.

1. Same as step 1 of Figure 5.2.2.8.3.1-1, with the following modifications.

The NF Service Consumer shall request the source V-SMF or I-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 clause 4.9.2.4.2 of 3GPP TS 23.502 [3]);
- Handover from 5GC-N3IWF to EPS (see clause 4.11.3.2 of 3GPP TS 23.502 [3]);
- Handover from 5GS to EPC/ePDG (see clause 4.11.4.2 of 3GPP TS 23.502 [3]).

2. Same as step 2 of Figure 5.2.2.8.3.1-1, 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 or I-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 or I-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 or SMF indicating the PDU session is released in the H-SMF or SMF.

5.2.2.8.3.5 EPS Bearer ID assignment

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

1. Same as step 1 of Figure 5.2.2.8.3.1-1, 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 or I-SMF to release some EBI(s) and delete any corresponding EPS bearer context stored in the V-SMF or I-SMF. The V-SMF or I-SMF shall disassociate the EBI(s) with the QFI(s) with which they are associated.

NOTE: The SMF does not request EBI allocation when MA PDU Session is established only over non-3GPP access. For MA PDU Session with both 3GPP and non-3GPP accesses, the SMF does not allocate EBI(s) for GBR QoS Flow(s) that are only allowed over non-3GPP access.

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

- 2a. Same as step 2a of Figure 5.2.2.8.3.1-1, with the following modifications.

If the AMF has successfully assigned all or part of the requested EBIs, the V-SMF or I-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 5.2.2.8.3.1-1, 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.

5.2.2.8.3.6 Addition of PSA and BP or UL CL controlled by I-SMF

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

1. Same as step 1 of Figure 5.2.2.8.3.1-1, with the following modifications.

The requestIndication shall be set to NW_REQ_PDU_SES_MOD.

The payload body of the POST response shall contain:

- N4 information for the handling of the local traffic that is offloaded at the PSA (see Annex D of 3GPP TS 29.244 [29]);
- the DNAI related to N4 information targeting the local PSA;
- the indication that the DNAI shall not change, if applicable;
- the indication that the local PSA shall not change, if applicable.

- 2a. Same as step 2a of Figure 5.2.2.8.3.1-1, with the following modifications.

The payload body of the POST response shall contain:

- N4 response information;
- the DNAI related to the N4 information if the latter relates to a local PSA.

- 2b. Same as step 2b of Figure 5.2.2.8.3.1-1, with the following modifications.

For a 4xx/5xx response, the message body shall contain a VsmfUpdateError structure, including N4 response information if available (e.g. PFCP Session Establishment Response with a rejection cause).

5.2.2.8.3.7 Removal of PSA and BP or UL CL controlled by I-SMF

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

1. Same as step 1 of Figure 5.2.2.8.3.1-1, with the following modifications.

The requestIndication shall be set to NW_REQ_PDU_SES_MOD.

The payload body of the POST response shall contain:

- N4 information for the removal of the local offload rules at the UL CL/BP and PSA (see Annex D of 3GPP TS 29.244 [29]);
- the DNAI related to N4 information targeting the local PSA.

- 2a. Same as step 2a of Figure 5.2.2.8.3.1-1, with the following modifications.

The payload body of the POST response shall contain:

- N4 response information;
- the DNAI related to the N4 information if the latter relates to a local PSA.

- 2b. Same as step 2b of Figure 5.2.2.8.3.1-1, with the following modifications.

For a 4xx/5xx response, the message body shall contain a VsmfUpdateError structure, including N4 response information if available (e.g. PFCP Session Deletion Response with a rejection cause).

5.2.2.8.3.8 Change of PSA for IPv6 multi-homing or UL CL controlled by I-SMF

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

1. Same as step 1 of Figure 5.2.2.8.3.1-1, with the following modifications.

The requestIndication shall be set to NW_REQ_PDU_SES_MOD.

The payload body of the POST response shall contain:

- N4 information for the removal of the local offload rules at the removed PSA (see Annex D of 3GPP TS 29.244 [29]);
- N4 information for the handling of the local traffic that is offloaded at the inserted PSA (see Annex D of 3GPP TS 29.244 [29]);
- the DNAIs related to N4 information targeting the removed or inserted PSA.

- 2a. Same as step 2a of Figure 5.2.2.8.3.1-1, with the following modifications.

The payload body of the POST response shall contain:

- N4 response information;
- the DNAI related to the N4 information if the latter relates to a local PSA.

- 2b. Same as step 2b of Figure 5.2.2.8.3.1-1, with the following modifications.

For a 4xx/5xx response, the message body shall contain a VsmfUpdateError structure, including N4 response information if available (e.g. PFCP Session Establishment Response with a rejection cause).

5.2.2.8.3.9 Policy update procedures with an I-SMF

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

1. Same as step 1 of Figure 5.2.2.8.3.1-1, with the following modifications.

The requestIndication shall be set to NW_REQ_PDU_SES_MOD.

The payload body of the POST response may contain:

- N4 information updating local offload rules at the I-SMF (see Annex D of 3GPP TS 29.244 [29]);
- the DNAI related to the N4 information if the latter relates to a local PSA;
- an updated list of DNAI(s) of interest for the PDU Session.

2a. Same as step 2a of Figure 5.2.2.8.3.1-1, with the following modifications.

The payload body of the POST response shall contain:

- N4 response information, if N4 information was received in the request;
- the DNAI related to the N4 information if the latter relates to a local PSA.

2b. Same as step 2b of Figure 5.2.2.8.3.1-1, with the following modifications.

For a 4xx/5xx response, the message body shall contain a VsmfUpdateError structure, including N4 response information if available (e.g. PFCP Session Modification Response with a rejection cause).

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 individual PDU session resource in the SMF (i.e. in the H-SMF for a HR PDU session, or in the SMF for a PDU session with an I-SMF).

It is invoked by the NF Service Consumer (i.e. V-SMF or I-SMF) in the following procedures:

- UE initiated Deregistration (see clause 4.2.2.3.2 of 3GPP TS 23.502 [3]);
- Network initiated Deregistration (see clause 4.2.2.3.2 of 3GPP TS 23.502 [3]), e.g. AMF initiated deregistration;
- visited network requested PDU Session release (see clause 4.3.4.3 of 3GPP TS 23.502 [3]), e.g. AMF initiated release in the following cases:
 - when there is a mismatch of the PDU session status between the UE and the AMF; or
 - when a network slice is no longer available.
- 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 clauses 4.11.1.2.1 and 4.11.1.3.2 of 3GPP TS 23.502 [3]);
- PDU session release procedure, for a PDU session with an I-SMF (see clause 4.23.5.2 of 3GPP TS 23.502 [3]);
- 5G-SRVCC from NG-RAN to 3GPP UTRAN procedure (see clause 6.5.4 of 3GPP TS 23.216 [35]).

The SMF shall release the PDU session context without triggering any signalling towards the 5G-AN and the UE.

The NF Service Consumer shall release a PDU session in the SMF by using the HTTP "release" custom operation as shown in Figure 5.2.2.9.1-1.

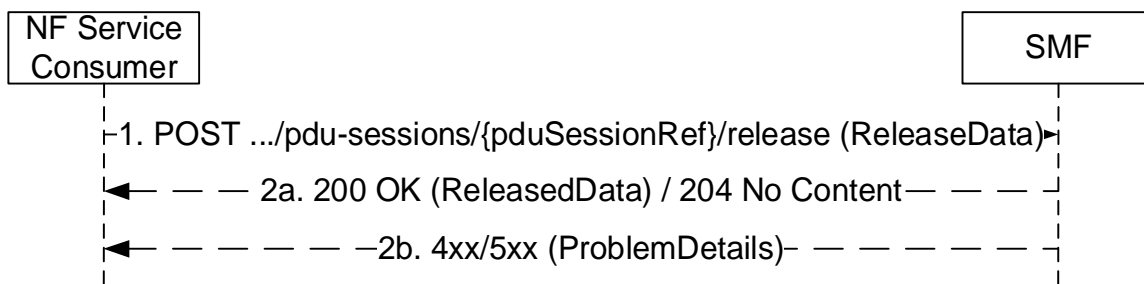


Figure 5.2.2.9.1-1: Pdu session release

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

If an UL CL/BP was inserted in the data path of the PDU session and traffic usage measurements need to be reported to the SMF, the POST request shall contain:

- N4 information related with traffic usage reporting (i.e. PFCP Session Report Request, see Annex D of 3GPP TS 29.244 [29]);
- the DNAI related to the N4 information if the latter relates to a local PSA.

- 2a. On success, the SMF shall return a "200 OK" with message body containing the representation of the ReleasedData when information needs to be returned to the NF Service Consumer, or a "204 No Content" response with an empty payload body in the POST response.

If N4 information was received in the request, the POST response shall contain:

- N4 response information (i.e. PFCP Session Report Response);
- the DNAI related to the N4 information if the latter relates to a local PSA.

If the request body contains the "cause" attribute with the value "REL_DUE_TO_PS_TO_CS_HO", the (H-) SMF shall indicate to the PCF within SM Policy Association termination that the PDU session is released due to 5G-SRVCC.

- 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 errors 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 status changes of a PDU session (e.g. when the PDU session is released and the release is not triggered by a Release Request, or when the PDU session is moved to another system), for a HR PDU session or a PDU session involving an I-SMF.

It is used in the following procedures:

- Home network requested PDU Session release (see clause 4.3.4.3 of 3GPP TS 23.502 [3]), e.g. H-SMF initiated release;
- SMF requested PDU session release, for a PDU session involving an I-SMF (see clause 4.23 of 3GPP TS 23.502 [3]);
- Handover of a PDU Session procedure from 3GPP to untrusted non-3GPP access (see clause 4.9.2.4.2 of 3GPP TS 23.502 [3]);

- Interworking procedures without N26 interface, e.g. 5GS to EPS Mobility (see clause 4.11.2.2 of 3GPP TS 23.502 [3]);
- Handover from 5GC-N3IWF to EPS (see clause 4.11.3.2 of 3GPP TS 23.502 [3]);
- Handover from 5GS to EPC/ePDG (see clause 4.11.4.2 of 3GPP TS 23.502 [3]);

The SMF (i.e. H-SMF for a HR PDU session, or SMF for a PDU session involving an I-SMF) shall notify the NF Service Consumer (i.e. V-SMF for a HR PDU session, or I-SMF for a PDU session involving an I-SMF) by using the HTTP POST method as shown in Figure 5.2.2.10-1.

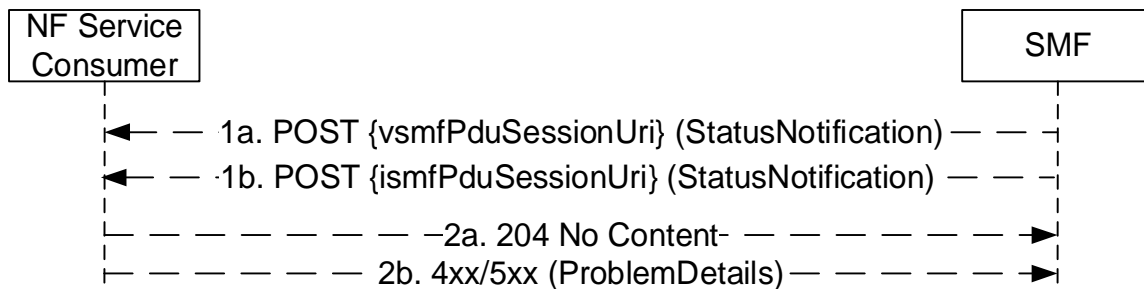


Figure 5.2.2.10-1: PDU session status notification

1. The SMF shall send a POST request to the resource representing the individual PDU session resource in the NF Service Consumer. 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 to release resources of the PDU Session in the source access, the notification payload shall contain the resourceStatus IE with the value "RELEASED" and the Cause IE with value "PDU_SESSION_HANDED_OVER" as specified in clause 4.2.9.4.2 of 3GPP TS 23.501 [2].

If the notification is triggered by PDU session handover to release resources of the PDU Session in the target access due to handover failure between 3GPP access and non-3GPP access, the notification payload shall contain the resourceStatus IE with the value "RELEASED" and the Cause IE with the value "PDU_SESSION_HAND_OVER_FAILURE".

If the NF Service Consumer indicated support of the HOFAIL feature (see clause 6.1.8) and if the notification is triggered by PDU session handover to update access type of the PDU Session due to handover failure between 3GPP access and non-3GPP access, the notification payload shall contain the resourceStatus IE with the value "UPDATED", the anType IE with the value "3GPP" or "NON_3GPP" indicating the access type of the PDU session after the handover failure scenario and the Cause IE with the value "PDU_SESSION_HAND_OVER_FAILURE".

- 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 PDU session in the SMF is released, the NF Service Consumer shall release the SM context for the PDU session.

If the SMF indicated in the request that the SM context resource is updated with the anType IE, the NF Service Consumer shall change the access type of the PDU session with the value of anType IE.

- 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 errors listed in Table 6.1.3.7.3.1-2.

5.2.2.11 Send MO Data service operation

5.2.2.11.1 General

The Send MO Data service operation shall be used to send mobile originated data received over NAS, for a given PDU session, towards the SMF, or the V-SMF for HR roaming scenarios, or the I-SMF for a PDU session with an I-SMF.

It is used in the following procedures:

- UPF anchored Mobile Originated Data Transport in Control Plane CIoT 5GS Optimisation (see clause 4.24.1 of 3GPP TS 23.502 [3]);
- NEF anchored Mobile Originated Data Transport (see clause 4.25.4 of 3GPP TS 23.502 [3]).

The NF Service Consumer (e.g. AMF) shall send mobile originated data to the SMF by using the HTTP POST method (send-mo-data custom operation) as shown in Figure 5.2.2.11.1-1.

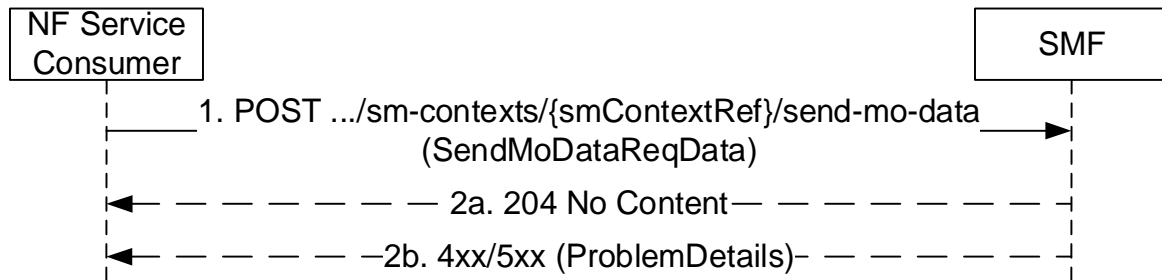


Figure 5.2.2.11.1-1: Send MO Data

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 mobile originated data to send.

The request body may include the "MO Exception Data Counter", which indicates that the UE has accessed the network by using "MO exception data" RRC establishment, if Small Data Rate Control is enabled for the PDU session and the UE is accessing via the NB-IoT RAT.

- 2a. On success, "204 No Content" shall be returned.

For UPF anchored Mobile Originated Data Transport in Control Plane CIoT 5GS Optimisation, if the "MO Exception Data Counter" is included in the request then:

- for HR PDU session, the V-SMF shall update the H-SMF (see clause 5.2.2.8.2.2);
- for PDU session with I-SMF, the I-SMF shall update the SMF (see clause 5.2.2.8.2.2).

- 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 ProblemDetails, with the "cause" attribute indicating the cause of the failure.

5.2.2.12 Transfer MO Data service operation

5.2.2.12.1 General

The Transfer MO Data service operation shall be used to transfer NEF anchored mobile originated data received from AMF, for a given PDU session, towards the H-SMF for HR roaming scenarios, or the SMF for a PDU session with an I-SMF.

It is used in the following procedures:

- NEF anchored Mobile Originated Data Transport (see clause 4.25.4 of 3GPP TS 23.502 [3]).

The NF Service Consumer (e.g. V-SMF or I-SMF) shall transfer NEF anchored mobile originated data to the SMF by using the HTTP POST method (transfer-mo-data custom operation) as shown in Figure 5.2.2.12.1-1.

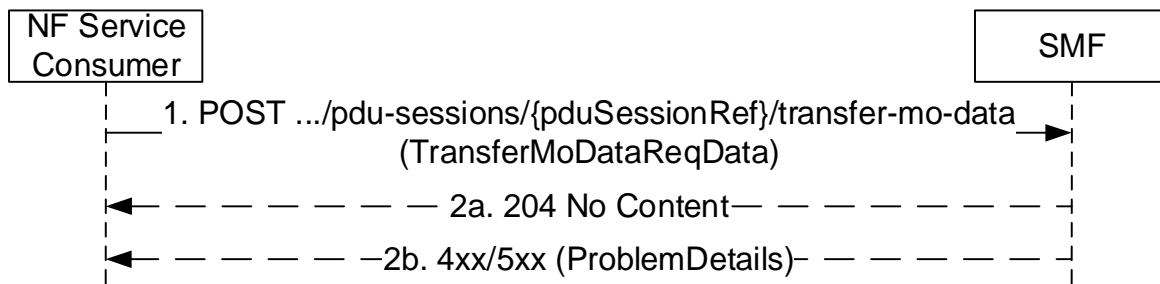


Figure 5.2.2.12.1-1: Transfer MO Data

1. The NF Service Consumer shall send a POST request to the URI of Transfer MO Data custom operation on an individual PDU Session resource in the SMF. The payload body of the POST request shall contain the mobile originated data to be transferred.

The payload body shall also contain the MO Exception Data Counter, if received from AMF.

2a. On success, "204 No Content" shall be returned.

2b. On failure, one of the HTTP status code listed in Table 6.1.3.6.4.4.2-2 shall be returned. For a 4xx/5xx response, the message body may contain a ProblemDetails, with the "cause" attribute indicating the cause of the failure.

5.2.2.13 Transfer MT Data service operation

5.2.2.13.1 General

The Transfer MT Data service operation shall be used to transfer NEF anchored mobile terminated data received from NEF, for a given PDU session, towards the V-SMF for HR roaming scenarios, or the I-SMF for a PDU session with an I-SMF.

It is used in the following procedures:

- NEF anchored Mobile Terminated Data Transport (see clause 4.25.5 of 3GPP TS 23.502 [3]).

The NF Service Consumer (e.g. H-SMF or SMF) shall transfer NEF anchored mobile terminated data to the SMF by using the HTTP POST method (transfer-mt-data custom operation) as shown in Figure 5.2.2.13.1-1.

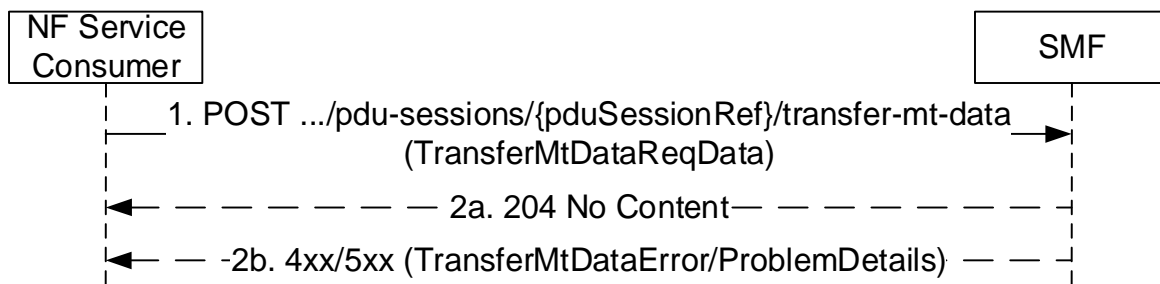


Figure 5.2.2.13.1-1: Transfer MT Data

1. The NF Service Consumer shall send a POST request to the URI of Transfer MT Data custom operation on an individual PDU Session resource in the SMF. The payload body of the POST request shall contain the mobile terminated data to be transferred.

The SMF shall forward the mobile terminated data to AMF. If SMF determines Extended Buffering is allowed by local policy and the NEF supports Extended Buffering, the SMF indicate the Extending Buffering support to AMF.

If AMF responds that it is attempting to reach the UE, the SMF shall wait for potential failure notification from AMF before responding to the NF consumer.

2a. On success, "204 No Content" shall be returned.

- 2b. On failure, one of the HTTP status code listed in Table 6.1.3.7.4.3.2-2 shall be returned. For a 4xx/5xx response, the message body may contain a TransferMtDataError or ProblemDetails object, with the "cause" attribute indicating the cause of the failure. If Estimated Maximum Waiting Time is received from AMF, the SMF shall include it in the message body.

5.2.2.14 Retrieve service operation

5.2.2.14.1 General

The Retrieve service operation shall be used to retrieve information from a PDU session context from the H-SMF for a HR PDU session, or from the SMF for a PDU session with an I-SMF.

It is used in the following procedures:

- 5GS to EPS handover using N26 interface and 5GS to EPS Idle mode mobility using N26 interface (see clauses 4.11.1.2.1 and 4.11.1.2.3 of 3GPP TS 23.502 [3]), for PDU sessions associated with 3GPP access and for which small data rate control is applicable.

The NF Service Consumer (e.g. V-SMF or I-SMF) shall retrieve information from a PDU session context by using the HTTP POST method (retrieve custom operation) as shown in Figure 5.2.2.14.1-1.

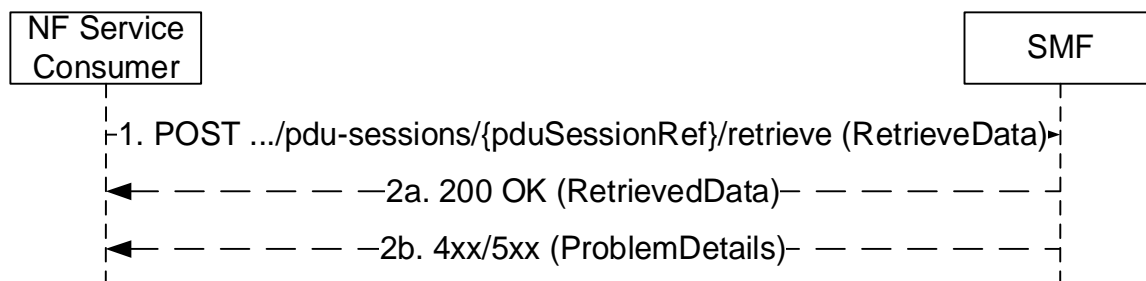


Figure 5.2.2.14.1-1: Retrieval of information from a PDU session context

1. The NF Service Consumer shall send a POST request to the resource representing the individual PDU session context for which information needs to be retrieved. The POST request may contain a payload body with the following parameters:
 - smallDataRateStatusReq set to "true" to indicate a request to retrieve the small data rate control status of the PDU session, if small data rate control is applicable on the PDU session.
- 2a. On success, "200 OK" shall be returned and the payload body of the POST response shall contain the small data rate control status if this is a request for retrieving the small data rate control status.
- 2b. On failure, one of the HTTP status code listed in Table 6.1.3.6.4.5.2-2 shall be returned. For a 4xx/5xx response, the message body may contain a ProblemDetails structure with the "cause" attribute set to one of the application error listed in Table 6.1.3.6.4.5.2-2.

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 clause 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/N16a 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 clause 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/N16a 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.

5.2.3.2 Transfer of NAS SM information between UE and SMF for PDU sessions with an I-SMF

5.2.3.2.1 General

The requirements specified in clause 5.2.3.1 shall also apply for the transfer of NAS SM information between the UE and the SMF for PDU sessions with an I-SMF, whereby the I-SMF and SMF shall take the role of the V-SMF and H-SMF respectively.

5.2.3.3 Detection and handling of late arriving requests

5.2.3.3.1 Handling of requests which collide with an existing SM context or PDU session context

5.2.3.3.1.1 General

This procedure enables an SMF, which receives a request colliding with an existing SM context or PDU session context, to know the time at which the new request and the existing PDU session were originated, and to accept the new request only if it is more recent than the existing PDU session.

The originating entities within the PLMN (i.e. AMFs) shall be NTP synchronized.

5.2.3.3.1.2 Principles

The following principles shall apply if this procedure is supported and enabled by operator policy.

An AMF originating a Create SM Context request shall include in the message the Origination Time Stamp indicating the absolute time at which the request is initiated.

The V-SMF or I-SMF shall forward this header to the H-SMF or SMF, if it is received from the AMF.

Upon receipt of a Create SM Context request or a Create request which collides with an existing SM context or PDU session context, the SMF shall accept the new PDU session establishment request only if it contains a more recent time stamp than the time stamp stored for the existing PDU session. An incoming PDU session establishment request shall be considered as more recent than an existing PDU session and be accepted if no Origination Time Stamp information was provided for at least one of the two PDU sessions. The SMF shall reject an incoming request whose time stamp is less recent than the time stamp of the existing PDU session with the HTTP status code "403 Forbidden" and the application error "LATE_OVERLAPPING_REQUEST".

3GPP TS 29.512 [30] further specify:

- the SMF requirements regarding the forwarding of the Origination Time Stamp towards the PCF, when received from the AMF;
- the handling of the Origination Time Stamp parameter by the PCF for an incoming request colliding with an existing Individual SM Policy Association.

5.2.3.3.2 Detection and handling of requests which have timed out at the HTTP client

5.2.3.3.2.1 General

The procedure specified in clause 6.11.2 of 3GPP TS 29.500 [4] shall apply with the following additions.

An HTTP request may include the 3gpp-Sbi-Origination-Timestamp and the 3gpp-Sbi-Max-Rsp-Time headers, with or without the 3gpp-Sbi-Sender-Timestamp header.

The 3gpp-Sbi-Max-Rsp-Time header shall indicate the duration expressed in milliseconds since the absolute time indicated in the 3gpp-Sbi-Sender-Timestamp header, if this header is present, or indicated in the 3gpp-Sbi-Origination-Timestamp header otherwise.

NOTE: The AMF does not need to include the 3gpp-Sbi-Sender-Timestamp if it includes the 3gpp-Sbi-Origination-Timestamp. A V-SMF or I-SMF forwards the 3gpp-Sbi-Origination-Timestamp over N16 or N16a, if received, and can include a 3gpp-Sbi-Sender-Timestamp header set to the time when it sends the Create request, in which case the 3gpp-Sbi-Max-Rsp-Time header contains the response time with respect to the 3gpp-Sbi-Sender-Timestamp header.

6 API Definitions

6.1 Nsmf_PDUSession Service API

6.1.1 API URI

The Nsmf_PDUSession service shall use the Nsmf_PDUSession API.

The API URI of the Nsmf_PDUSession API shall be:

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

The request URIs used in HTTP requests from the NF service consumer towards the NF service producer shall have the Resource URI structure defined in clause 4.4.1 of 3GPP TS 29.501 [5], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in 3GPP TS 29.501 [5].
- The <apiName> shall be "nsmf-pdusession".
- The <apiVersion> shall be "v1".
- The <apiSpecificResourceUriPart> shall be set as described in clause 6.1.3.

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 clause 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 clause 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 clause 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 clause 4.8 of 3GPP TS 29.501 [5].

Multipart messages shall also be supported (see clause 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 clause 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]. |
| vnd.3gpp.pfcp | Binary encoded payload, encoding a PFCP message, as specified in 3GPP TS 29.244 [29]. (NOTE 2) |
| NOTE 1: 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. | |
| NOTE 2: Binary encoded payload in vnd.3gpp.pfcp content subtype shall include application layer headers for PFCP and shall not include transport layer headers, i.e. IP and UDP. | |

See clause 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 clause 5.2.3 of 3GPP TS 29.500 [4].

6.1.2.3.2 3gpp-Sbi-Origination-Timestamp

The header contains the date and time (with a millisecond granularity) when the originating entity initiated the request.

The encoding of the header follows the ABNF as defined in IETF RFC 7230 [31].

3gpp-Sbi-Origination-Timestamp = "3gpp-Sbi-Origination-Timestamp" ":" day-name "," SP date1 SP time-of-day "." milliseconds SP GMT

milliseconds = 3DIGIT

day-name, date1, time-of-day shall comply with the definition in clause 7.1.1.1 of IETF RFC 7231 [32].

NOTE: This is the same format as the Date header of clause 7.1.1.2 of IETF RFC 7231 [32], but with the time expressed with a millisecond granularity.

EXAMPLE: 3gpp-Sbi-Origination-Timestamp: Sun, 04 Aug 2019 08:49:37.845 GMT

6.1.2.4 HTTP multipart messages

HTTP multipart messages shall be supported, to transfer opaque N1 and/or N2 SMPayloads or N4 information, 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 clause 6.1.6.4);
- one or two N1 SM payloads, over N16 (see clause 6.1.6.4);
- one or two N2 SM payloads over N11 (see clause 5.2.2.3.3);
- one, two or three N4 payloads over N16a (see clause 6.1.6.4.5).

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 clause 5.2.8 of 3GPP TS 29.500 [4] shall be applied with the following modifications.

The NF Service Consumer of Nsmf_PDUSession service, e.g. the AMF, shall retry the same HTTP request in the following scenarios through a new TCP connection towards an (alternative) service endpoint pertaining to the same NF (Service) instance or set if the corresponding procedure triggering the service request allows such retries, e.g. before the timeout of the corresponding N1 or N2 procedure:

- If the stream for the service request has not been processed in the SMF as specified in clause 5.2.8 of 3GPP TS 29.500 [4];
- if the request is rejected by a HTTP status code indicating a temporary failure in the SMF, e.g. the status code 429, 500 and 503, as specified in clause 5.2.7 of 3GPP TS 29.500 [4];
- if the request is timeout (i.e. the NF Service consumer doesn't receive any response after an implementation specific timer expires).

The NF Service Consumer shall determine an alternative service instance as specified in clause 6.5 of 3GPP TS 23.527 [24], i.e. using Binding Indication if supported/available or the NF (service) set or service persistency info from NF profile. The NF Service Consumer should also consider the Load control Information and the Overload Control Information if available as specified in clauses 6.3 and 6.4 in 3GPP TS 29.500 [4] when reselecting an alternative NF service instance.

The SMF shall support handling repeated retries successfully.

NOTE: See clauses 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.

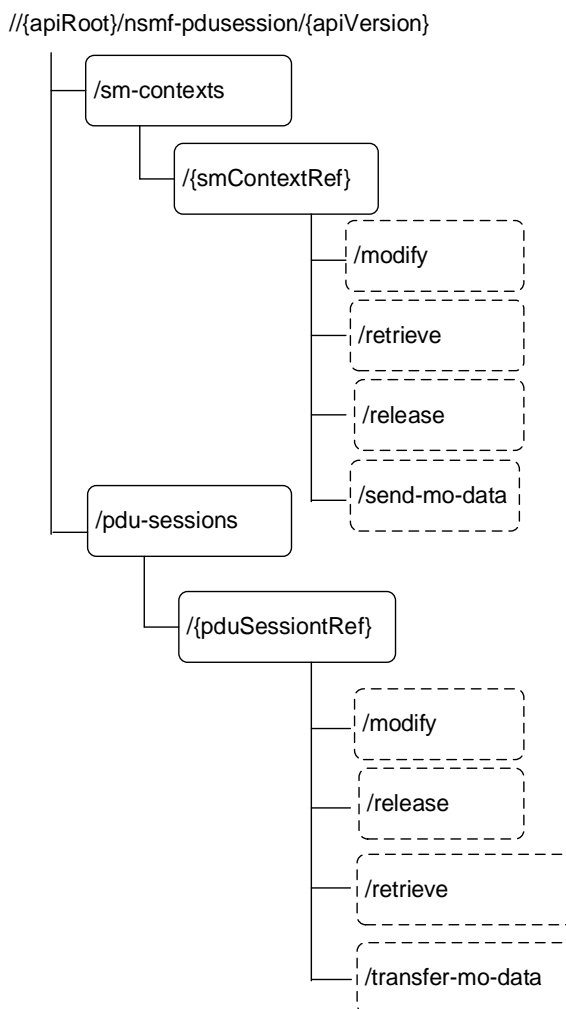


Figure 6.1.3.1-1: Resource URI structure of the Nsmf_PDUSession API

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 | /sm-contexts | POST | Create SM Context |
| Individual SM context | /sm-contexts/{smContextRef}/retrieve | retrieve (POST) | Retrieve SM Context |
| | /sm-contexts/{smContextRef}/modify | modify (POST) | Update SM Context |
| | /sm-contexts/{smContextRef}/release | release (POST) | Release SM Context |
| | /sm-contexts/{smContextRef}/send-mo-data | send-mo-data (POST) | Send MO Data |
| PDU sessions collection (H-SMF or SMF) | /pdu-sessions | POST | Create |
| Individual PDU session (H-SMF or SMF) | /pdu-sessions/{pduSessionRef}/modify | modify (POST) | Update (initiated by V-SMF or I-SMF) |
| | /pdu-sessions/{pduSessionRef}/release | release (POST) | Release |
| | /pdu-sessions/{pduSessionRef}/retrieve | retrieve (POST) | Retrieve |
| | /pdu-sessions/{pduSessionRef}/transfer-mo-data | transfer-mo-data (POST) | Transfer MO Data |
| Individual PDU session (V-SMF or I-SMF) | {vsmfPduSessionUri}/modify or {ismfPduSessionUri}/modify | modify (POST) | Update (initiated by H-SMF or SMF) |
| | {vsmfPduSessionUri} or {ismfPduSessionUri} | POST | Notify Status |
| | {vsmfPduSessionUri}/transfer-mt-data or {ismfPduSessionUri}/transfer-mt-data | transfer-mt-data (POST) | Transfer MT Data |

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 clause C.2 of 3GPP TS 29.501 [5]).

6.1.3.2.2 Resource Definition

Resource URI: {apiRoot}/nsmf-pdusession/{apiVersion}/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 | Data type | Definition |
|------------|-----------|-------------------|
| apiRoot | string | See clause 6.1.1. |
| apiVersion | string | See clause 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 |
|---|---|-------------|------------------------------|---|
| SmContextCreate dData | M | 1 | 201 Created | Successful creation of an SM context. |
| | | | 307 Temporary Redirect | Temporary redirection, during a UE requested PDU Session Establishment. The response shall include a Location header field containing a different URI. The URI shall be an alternative URI of the resource located on an alternative service instance within the SMF that was selected by the AMF. |
| | | | 308 Permanent Redirect | Permanent redirection, during a UE requested PDU Session Establishment. The response shall include a Location header field containing a different URI. The URI shall be an alternative URI of the resource located on an alternative service instance within the SMF that was selected by the AMF. |
| SmContextCreate Error | 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]. |
| SmContextCreate Error | M | 1 | 403 Forbidden | The "cause" attribute shall be set to one of the following application error: <ul style="list-style-type: none"> - N1_SM_ERROR - N2_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 - DEFAULT_EPS_BEARER_INACTIVE See table 6.1.7.3-1 for the description of these errors. |
| SmContextCreate Error | M | 1 | 404 Not Found | The "cause" attribute shall be set to one of the following application error: <ul style="list-style-type: none"> - CONTEXT_NOT_FOUND See table 6.1.7.3-1 for the description of these errors. |
| SmContextCreate Error | 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: <ul style="list-style-type: none"> - INSUFFICIENT_RESOURCES_SLICE - INSUFFICIENT_RESOURCES_SLICE_DNN See table 6.1.7.3-1 for the description of these errors. |
| SmContextCreate Error | 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: <ul style="list-style-type: none"> - DNN_CONGESTION - S_NSSAI_CONGESTION See table 6.1.7.3-1 for the description of these errors. |
| SmContextCreate Error | M | 1 | 504 Gateway Timeout | The "cause" attribute shall be set to one of the following application error: <ul style="list-style-type: none"> - 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 clause 5.2.7 of 3GPP TS 29.500 [4]). | | | | |

Table 6.1.3.2.3.1-4: Headers supported by the 201 Response Code on this resource

| Name | Data type | P | Cardinality | Description |
|----------|-----------|---|-------------|---|
| Location | string | M | 1 | Contains the URI of the newly created resource, according to the structure: {apiRoot}/nsmf-pdusession/{apiVersion}/sm-contexts/{smContextRef} |

Table 6.1.3.2.3.1-5: Headers supported by the 307 Response Code on this resource

| Name | Data type | P | Cardinality | Description |
|----------|-----------|---|-------------|---|
| Location | string | M | 1 | An alternative URI of the resource located on an alternative service instance within the SMF that was selected by the AMF |

Table 6.1.3.2.3.1-6: Headers supported by the 308 Response Code on this resource

| Name | Data type | P | Cardinality | Description |
|----------|-----------|---|-------------|---|
| Location | string | M | 1 | An alternative URI of the resource located on an alternative service instance within the SMF that was selected by the AMF |

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 clause C.1 of 3GPP TS 29.501 [5]).

6.1.3.3.2 Resource Definition

Resource URI: {apiRoot}/nsmf-pdusession/{apiVersion}/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 | Data type | Definition |
|--------------|-----------|--|
| apiRoot | string | See clause 6.1.1. |
| apiVersion | string | See clause 6.1.1. |
| smContextRef | string | 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

| Operation Name | Custom operation URI | Mapped HTTP method | Description |
|----------------|----------------------------|--------------------|---------------------------------------|
| modify | {resourceUri}/modify | POST | Update SM Context service operation |
| release | {resourceUri}/release | POST | Release SM Context service operation |
| retrieve | {resourceUri}/retrieve | POST | Retrieve SM Context service operation |
| send-mo-data | {resourceUri}/send-mo-data | POST | Send MO Data 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: 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 clause 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 |
|---|---|-------------|----------------|---|
| SmContextReleasedData | M | 1 | 200 OK | Successful release of an SM context, when information needs to be returned to the NF Service Consumer (NOTE 2). |
| | | | 204 No Content | Successful release of an SM context. |
| NOTE 1: 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 clause 5.2.7 of 3GPP TS 29.500 [4]). | | | | |
| NOTE 2: The support for 200 OK shall be dependent on the support of the indicated feature. | | | | |

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, from the V-SMF in HR roaming scenario or from the I-SMF.

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, SM context type. |

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 - DEFAULT_EBI_NOT_TRANSFERRER See table 6.1.7.3-1 for the description of these errors. |
| ProblemDetails | O | 0..1 | 504 Gateway Timeout | The "cause" attribute may be set to one of the following application errors: - UPF_NOT_RESPONDING 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 clause 5.2.7 of 3GPP TS 29.500 [4]). | | | | |

6.1.3.3.4.5 Operation: send-mo-data

6.1.3.3.4.5.1 Description

6.1.3.3.4.5.2 Operation Definition

This custom operation enables to send mobile originated data received over NAS, for a given PDU session, towards the SMF, or the V-SMF for HR roaming scenarios, or the I-SMF for a PDU session with an I-SMF.

This operation shall support the request data structures specified in table 6.1.3.3.4.5.2-1 and the response data structure and response codes specified in table 6.1.3.3.4.5.2-2.

Table 6.1.3.3.4.5.2-1: Data structures supported by the POST Request Body on this resource

| Data type | P | Cardinality | Description |
|-----------------------|---|-------------|---|
| SendMoDataReq Data | M | 1 | Representation of the payload of a Send MO Data Request |

Table 6.1.3.3.4.5.2-2: Data structures supported by the POST Response Body on this resource

| Data type | P | Cardinality | Response codes | Description |
|---|---|-------------|-------------------|-----------------------------|
| | | | 204 No Content | Successful MO data transfer |
| 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 clause 5.2.7 of 3GPP TS 29.500 [4]). | | | | |

6.1.3.4 Void

6.1.3.5 Resource: PDU sessions collection (H-SMF or SMF)

6.1.3.5.1 Description

This resource represents the collection of the individual PDU sessions created in the H-SMF for HR PDU sessions or in the SMF for PDU sessions with an I-SMF.

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

6.1.3.5.2 Resource Definition

Resource URI: **{apiRoot}/nsmf-pdusession/{apiVersion}/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 | Data type | Definition |
|------------|-----------|-------------------|
| apiRoot | string | See clause 6.1.1. |
| apiVersion | string | See clause 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 or 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 or 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 |
|---|---|-------------|---------------------------|--|
| PduSessionCreateData | M | 1 | 201 Created | Successful creation of a PDU session. |
| | | | 307 Temporary Redirect | Temporary redirection, during a UE requested PDU Session Establishment. The response shall include a Location header field containing a different URI. The URI shall be an alternative URI of the resource located on an alternative service instance within the SMF that was selected by the AMF. |
| | | | 308 Permanent Redirect | Permanent redirection, during a UE requested PDU Session Establishment. The response shall include a Location header field containing a different URI. The URI shall be an alternative URI of the resource located on an alternative service instance within 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 clause 5.2.7 of 3GPP TS 29.500 [4]). | | | | |

Table 6.1.3.5.3.1-4: Headers supported by the 201 Response Code on this resource

| Name | Data type | P | Cardinality | Description |
|----------|-----------|---|-------------|---|
| Location | string | M | 1 | Contains the URI of the newly created resource, according to the structure: {apiRoot}/nsmf-pdusession/{apiVersion}/pdu-sessions/{pduSessionRef} |

Table 6.1.3.5.3.1-5: Headers supported by the 307 Response Code on this resource

| Name | Data type | P | Cardinality | Description |
|----------|-----------|---|-------------|---|
| Location | string | M | 1 | An alternative URI of the resource located on an alternative service instance within the SMF that was selected by the AMF |

Table 6.1.3.5.3.1-6: Headers supported by the 308 Response Code on this resource

| Name | Data type | P | Cardinality | Description |
|----------|-----------|---|-------------|---|
| Location | string | M | 1 | An alternative URI of the resource located on an alternative service instance within the SMF that was selected by the AMF |

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 operation URI | Mapped HTTP method | Description |
|----------------------|--------------------|-------------|
| n/a | | |

6.1.3.6 Resource: Individual PDU session (H-SMF or SMF)

6.1.3.6.1 Description

This resource represents an individual PDU session created in the H-SMF for a HR PDU session or in the SMF for a PDU session with an I-SMF.

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

6.1.3.6.2 Resource Definition

Resource URI: {apiRoot}/nsmf-pdusession/{apiVersion}/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 | Data type | Definition |
|---------------|-----------|---|
| apiRoot | string | See clause 6.1.1. |
| apiVersion | string | See clause 6.1.1. |
| pduSessionRef | string | PDU session reference assigned by the H-SMF or 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

| Operation Name | Custom operation URI | Mapped HTTP method | Description |
|------------------|---------------------------------|--------------------|------------------------------------|
| modify | {resourceUri}/modify | POST | Update service operation |
| release | {resourceUri}/release | POST | Release service operation |
| transfer-mo-data | {resourceUri}/ transfer-mo-data | POST | Transfer MO Data service operation |
| retrieve | {resourceUri}/retrieve | POST | Retrieve 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 or SMF and/or provide the H-SMF or SMF with information received by the V-SMF or I-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 or 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 or 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 clause 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 for a HR PDU session or in the SMF for a PDU session with an I-SMF.

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 or 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 |
|---|---|-------------|----------------|--|
| ReleasedData | M | 1 | 200 OK | Successful release of a PDU session context, when information needs to be returned to the NF Service Consumer. (NOTE 2) |
| | | | 204 No Content | Successful release of a PDU session. |
| NOTE 1: 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 clause 5.2.7 of 3GPP TS 29.500 [4]). | | | | |
| NOTE 2: The support for 200 OK shall be dependent on the support of the indicated feature. | | | | |

6.1.3.6.4.4 Operation: transfer-mo-data

6.1.3.6.4.4.1 Description

6.1.3.6.4.4.2 Operation Definition

This custom operation enables to transfer mobile originated data received from AMF, for a given PDU session, towards the H-SMF for HR roaming scenarios, or the SMF for a PDU session with an I-SMF.

This operation shall support the request data structures specified in table 6.1.3.6.4.4.2-1 and the response data structure and response codes specified in table 6.1.3.6.4.4.2-2.

Table 6.1.3.6.4.4.2-1: Data structures supported by the POST Request Body on this resource

| Data type | P | Cardinality | Description |
|-----------------------|---|-------------|---|
| TransferMoDataReqData | M | 1 | Representation of the payload of a Transfer MO Data Request |

Table 6.1.3.6.4.4.2-2: Data structures supported by the POST Response Body on this resource

| Data type | P | Cardinality | Response codes | Description |
|---|---|-------------|----------------|-----------------------------|
| | | | 204 No Content | Successful MO data transfer |
| 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 clause 5.2.7 of 3GPP TS 29.500 [4]). | | | | |

6.1.3.6.4.5 Operation: retrieve

6.1.3.6.4.5.1 Description

6.1.3.6.4.5.2 Operation Definition

This custom operation retrieves information from an individual PDU session context in the H-SMF for a HR PDU session or in the SMF for a PDU session with an I-SMF.

This operation shall support the request data structures specified in table 6.1.3.6.4.5.2-1 and the response data structure and response codes specified in table 6.1.3.6.4.5.2-2.

Table 6.1.3.6.4.5.2-1: Data structures supported by the POST Request Body on this resource

| Data type | P | Cardinality | Description |
|--------------|---|-------------|---|
| RetrieveData | M | 1 | Representation of the payload of a Retrieve Request |

Table 6.1.3.6.4.5.2-2: Data structures supported by the POST Response Body on this resource

| Data type | P | Cardinality | Response codes | Description |
|---|---|-------------|---------------------------|--|
| RetrievedData | M | 1 | 200 OK | Successful retrieval of information from a PDU session context. |
| ProblemDetails | O | 0..1 | 504 Gateway Timeout | The "cause" attribute may be set to one of the following application errors: - UPF_NOT_RESPONDING See table 6.1.7.3-1 for the description of these errors. |
| NOTE 1: 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 clause 5.2.7 of 3GPP TS 29.500 [4]). | | | | |

6.1.3.7 Resource: Individual PDU session (V-SMF or I-SMF)

6.1.3.7.1 Description

This resource represents an individual PDU session created in the V-SMF for a HR PDU session or in the I-SMF for a PDU session with an I-SMF.

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

6.1.3.7.2 Resource Definition

Resource URI: {**vsmfPduSessionUri**} or {**ismfPduSessionUri**}

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 | Data type | Definition |
|-------------------|-----------|--|
| vsmfPduSessionUri | Uri | PDU session reference assigned by the V-SMF during the Create service operation. |
| ismfPduSessionUri | Uri | PDU session reference assigned by the I-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 clause 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

| Operation Name | Custom operation URI | Mapped HTTP method | Description |
|------------------|--|--------------------|--|
| modify | {vsmfPduSessionUri}/modify or {ismfPduSessionUri}/modify | POST | Update service operation (initiated by H-SMF or SMF) |
| transfer-mt-data | {vsmfPduSessionUri}/transfer-mt-data or {ismfPduSessionUri}/transfer-mt-data | POST | Transfer MT Data service operation |

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 for a HR PDU session or in the I-SMF for a PDU session with an I-SMF.

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: 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 or I-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 or I-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 clause 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 clause 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 | O | 0..1 | 409 Conflict | The "cause" attribute may be used to indicate one of the following application errors: - HIGHER_PRIORITY_REQUEST_ONGOING; - UE_IN_CM_IDLE_STATE 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 clause 5.2.7 of 3GPP TS 29.500 [4]). | | | | |

6.1.3.7.4.3 Operation: transfer-mt-data

6.1.3.7.4.3.1 Description

This custom operation enables to transfer mobile terminated data received from NEF, for a given PDU session, towards the V-SMF for HR roaming scenarios, or the I-SMF for a PDU session with an I-SMF.

6.1.3.7.4.3.2 Operation Definition

This operation shall support the request data structures specified in Table 6.1.3.7.4.3.2-1 and the response data structure and response codes specified in Table 6.1.3.7.4.3.2-2.

Table 6.1.3.7.4.3.2-1: Data structures supported by the POST Request Body on this resource

| Data type | P | Cardinality | Description |
|-----------------------|---|-------------|---|
| TransferMtDataReqData | M | 1 | Representation of the payload of a Transfer MT Data Request |

Table 6.1.3.7.4.3.2-2: Data structures supported by the POST Response Body on this resource

| Data type | P | Cardinality | Response codes | Description |
|---|---|-------------|---------------------|---|
| | | | 204 No Content | Successful MT data transfer |
| TransferMtDataError | M | 1 | 504 Gateway Timeout | The "cause" attribute may be used to indicate the following application errors: - UE_NOT_REACHABLE, if the UE is not reachable to deliver the mobile terminated data; Estimated Maximum Waiting Time shall be included if available; 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 clause 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 clause specifies the notifications provided by the Nsmf_PDUSession service.

The delivery of notifications shall be supported as specified in clause 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 the endpoint of another NF service consumer to which the notification should be sent. |
| 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 clause 5.2.7 of 3GPP TS 29.500 [4]). | | | | |

Table 6.1.5.2.2-4: Headers supported by the 307 Response Code on this resource

| Name | Data type | P | Cardinality | Description |
|----------|-----------|---|-------------|--|
| Location | string | M | 1 | A URI pointing to the endpoint of another NF service consumer to which the notification should be sent |

6.1.6 Data Model

6.1.6.1 General

This clause 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 | Clause 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, or from I-SMF to SMF |
| HsmfUpdatedData | 6.1.6.2.12 | Information within Update Response from H-SMF, or from SMF to I-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, or from SMF to I-SMF |
| VsmfUpdatedData | 6.1.6.2.16 | Information within Update Response from V-SMF, or from I-SMF to 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 |
| SmContext | 6.1.6.2.39 | Complete SM Context |
| ExemptionInd | 6.1.6.2.40 | Exemption Indication |
| Psainformation | 6.1.6.2.41 | PSA Information |
| Dnainformation | 6.1.6.2.42 | DNAI Information |
| N4Information | 6.1.6.2.43 | N4 Information |
| IndirectDataForwardingTunnelInfo | 6.1.6.2.44 | Indirect Data Forwarding Tunnel Information |
| SmContextReleasedData | 6.1.6.2.45 | Information within Release SM Context Response |
| ReleasedData | 6.1.6.2.46 | Information within Release Response |
| SendMoDataReqData | 6.1.6.2.47 | Information within Send MO Data Request |
| CnAssistedRanPara | 6.1.6.2.48 | SMF derived CN assisted RAN parameters tuning |
| UlclBpInformation | 6.1.6.2.49 | UL CL or BP Information |
| TransferMoDataReqData | 6.1.6.2.50 | Information within Transfer MO Data Request |
| TransferMtDataReqData | 6.1.6.2.51 | Information within Transfer MT Data Request |
| TransferMtDataError | 6.1.6.2.52 | Transfer MT Data Error Response |
| TransferMtDataAddInfo | 6.1.6.2.53 | Transfer MT Data Error Response Additional Information |
| VplmnQos | 6.1.6.2.54 | VPLMN QoS |
| DdnFailureSubs | 6.1.6.2.55 | DDN Failure Subscription |
| RetrieveData | 6.1.6.2.56 | Information within Retrieve Request |
| RetrievedData | 6.1.6.2.57 | Information within Retrieve Response |
| SecurityResult | 6.1.6.2.58 | Security Result |
| UpSecurityInfo | 6.1.6.2.59 | User Plane Security Information |
| DdnFailureSubInfo | 6.1.6.2.60 | DDN Failure Subscription Information |
| AlternativeQosProfile | 6.1.6.2.61 | Alternative QoS Profile |
| Teid | 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 |
| EpsBearerContextStatus | 6.1.6.3.2 | EPS Bearer context status |
| DrblId | 6.1.6.3.2 | Data Radio Bearer Identifier |
| 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 |
| N2SmlInfoType | 6.1.6.3.12 | N2 SM Information Type |
| MaxIntegrityProtectedDataRate | 6.1.6.3.13 | Maximum Integrity Protected Data Rate |
| MaReleaseIndication | 6.1.6.3.14 | Multi-Access PDU session release Indication |
| SmContextType | 6.1.6.3.15 | Type of SM Context information |
| PsalIndication | 6.1.6.3.16 | Indication of whether a PSA is inserted or removed |
| N4MessageType | 6.1.6.3.17 | N4 Message Type |
| QosFlowAccessType | 6.1.6.3.18 | Access type associated with the QoS Flow |
| UnavailableAccessIndication | 6.1.6.3.19 | Indicates the access type of a MA PDU session that is unavailable |
| ProtectionResult | 6.1.6.3.20 | Protection Result of the security policy indicated as "preferred" |
| QosMonitoringReq | 6.1.6.3.21 | Indicates to measure UL, or DL, or both UL/DL delays. |

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 |
| NfInstancelid | 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 |
| SecondaryRatUsageInfo | 3GPP TS 29.571 [13] | Secondary RAT Usage Information |
| Dnai | 3GPP TS 29.571 [13] | Data Network Access Identifier |
| PlmnIdNid | 3GPP TS 29.571 [13] | PLMN Identity and, for SNPN, Network Identity |
| SmallDataRateStatus | 3GPP TS 29.571 [13] | Small Data Rate Control Status |
| ApnRateStatus | 3GPP TS 29.571 [13] | APN Rate Control Status |
| StationaryIndication | 3GPP TS 29.571 [13] | Stationary Indication |
| ScheduledCommunicationTime | 3GPP TS 29.571 [13] | Scheduled Communication Time |
| ScheduledCommunicationType | 3GPP TS 29.571 [13] | Scheduled Communication Type |
| TrafficProfile | 3GPP TS 29.571 [13] | Traffic Profile |
| BatteryIndication | 3GPP TS 29.571 [13] | Battery Indication |
| NfSetId | 3GPP TS 29.571 [13] | NF Set Identifier |
| MoExpDataCounter | 3GPP TS 29.571 [13] | MO Exception Data Counter |
| | | |
| DddTrafficDescriptor | 3GPP TS 29.571 [13] | Traffic Descriptor |
| ServiceName | 3GPP TS 29.510 [19] | Service Name |
| WAgfInfo | 3GPP TS 29.510 [19] | Information about N3 terminations at the W-AGF |
| TngfInfo | 3GPP TS 29.510 [19] | Information about N3 terminations at the TNGF |
| TwifInfo | 3GPP TS 29.510 [19] | Information about N3 terminations at the TWIF |
| ChargingInformation | 3GPP TS 29.512 [30] | CHF addresses |
| 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 clause 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 | Applicability |
|---------------------|--------------|---|-------------|--|---------------|
| supi | Supi | C | 0..1 | This IE shall be present, except if the UE is emergency registered and UICless. 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 UICless 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; the DNN shall be the full DNN (i.e. with both the Network Identifier and Operator Identifier) for a HR PDU session, and it should be the full DNN in LBO and non-roaming scenarios. If the Operator Identifier is absent, the serving core network operator shall be assumed. | |
| selectedDnn | Dnn | C | 0..1 | This IE shall be present, if another DNN other than the UE requested DNN is selected for this PDU session. When present, it shall contain the selected DNN. The DNN shall be the full DNN (i.e. with both the Network Identifier and Operator Identifier) for a HR PDU session, and it should be the full DNN in LBO and non-roaming scenarios. If the Operator Identifier is absent, the serving core network operator shall be assumed. | |
| 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 with I-SMF/V-SMF involved 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 roaming 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 Mapping Of Allowed 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 clause 6.5.2.2 of 3GPP TS 29.500 [4]). This IE may be included if the NF service consumer is an AMF. | |
| servingNetwork | PlmnIdNid | M | 1 | This IE shall contain the serving core network operator PLMN ID and, for an SNPN, the NID that together with the PLMN ID identifies the SNPN. | |
| 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 clause 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. | |
| additionalAnType | AccessType | C | 0..1 | This IE shall indicate the additional Access Network Type to which the PDU session is to be associated. This IE shall be present if a MA-PDU session is requested and the UE is registered over both 3GPP access and Non-3GPP access. | MAPDU |
| 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, including Indirect Communication with Delegated Discovery. When present, it shall contain the API URI of the Nsmf_PDUSession service of the selected H-SMF. The API URI shall be formatted as specified in clause 6.1.1. | |
| smfUri | Uri | C | 0..1 | This IE shall be present for a PDU session with an I-SMF, including Indirect Communication with Delegated Discovery. When present, it shall contain the API URI of the Nsmf_PDUSession service of the selected SMF. The API URI shall be formatted as specified in clause 6.1.1. | DTSSA |

| | | | | | |
|-------------------------|---------------------|---|------|--|-------|
| 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 clauses 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 clause 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 API 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 API URI shall be formatted as specified in clause 6.1.1. | |
| additionalSmfUri | array(Uri) | O | 1..N | This IE may be present for a PDU session with an I-SMF. When present, it shall contain an array of API URI of the Nsmf_PDUSession service of the additional SMFs discovered by the AMF for the given DNN, Snssai and for this PDU session. If provided, the I-SMF shall use these additional SMF(s) if the I-SMF is not able to receive any response from the SMF identified by smfUri. The API URI shall be formatted as specified in clause 6.1.1. | DTSSA |
| 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 and/or UE Policy); it shall be the V-PCF in LBO roaming and the H-PCF in HR roaming. | |
| pcfGroupId | NfGroupId | O | 0..1 | This IE may be present in non-roaming and HR roaming scenarios. When present, this IE shall contain the identity of the (home) PCF group serving the UE for Access and Mobility Policy and/or UE Policy. | |
| pcfSetId | NfSetId | O | 0..1 | When present, this IE shall contain the NF Set ID of the PCF serving the UE for Access and Mobility Policy and/or UE Policy. It shall be the V-PCF Set ID in LBO roaming and the H-PCF Set ID 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 clause 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], clause 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 | |
| directForwardingFlag | 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], clause 4.11.1.2.2), to inform the SMF of the applicability or non-applicability of direct data forwarding. When present, it shall be set as follows: - True: direct data forwarding is applicable - False: direct data forwarding is not applicable | |
| targetId | NgRanTargetId | C | 0..1 | This IE shall be present in the following cases: - during an EPS to 5GS handover preparation using the N26 interface, when the hoState IE is set to the value "PREPARING"; - during N2 based handover procedure with I-SMF or V-SMF insertion/change/removal, when hoState IE is set to the value "PREPARING". When present, it shall contain the Target ID identifying the target RAN Node ID and TAI. In case of EPS to 5GS handover, the TAI is received in the Forward Relocation Request from the Source MME. | |
| epsBearerCtxStatus | EpsBearerContextStatus | C | 0..1 | This IE shall be present during an EPS to 5GS idle mode mobility using the N26 interface, if received in the Registration Request from the UE. When present, it shall be set to the value received from the UE. | |

| | | | | | |
|----------------|-----------------|---|------|---|-------|
| cpCiotEnabled | boolean | C | 0..1 | <p>This IE shall be present with the value "True", if</p> <ul style="list-style-type: none"> - the NF service consumer (e.g. the AMF) has verified that the CIOT feature is supported by the SMF (and for a home-routed session, that it is also supported by the H-SMF); and - Control Plane Clot 5GS Optimisation is enabled for the PDU session <p>(see 3GPP TS 23.502 [3], clauses 4.3.2.2.1 and 4.3.2.2.2).</p> <p>When present, it shall be set as follows:</p> <ul style="list-style-type: none"> - True: Control Plane Clot 5GS Optimisation is enabled. - False (default): Control Plane Clot 5GS Optimisation is not enabled. | CIOT |
| cpOnlyInd | boolean | C | 0..1 | <p>This IE shall be present with the value "True", if the PDU session shall only use Control Plane Clot 5GS Optimisation (see clause 5.31.4.1 of 3GPP TS 23.501 [2]).</p> <p>When present, it shall be set as follows:</p> <ul style="list-style-type: none"> - True: the PDU session shall only use Control Plane Clot 5GS Optimisation - False (default): the PDU session is not constrained to only use Control Plane Clot 5GS Optimisation. | CIOT |
| invokeNef | boolean | C | 0..1 | <p>This IE shall be present with the value "True", if Control Plane Clot 5GS Optimisation is enabled and data delivery via NEF is selected for the PDU session (see 3GPP TS 23.502 [3], clause 4.3.2.2.2).</p> <p>When present, it shall be set as follows:</p> <ul style="list-style-type: none"> - True: Data delivery via NEF is selected. - False (default): Data delivery via NEF is not selected. | CIOT |
| maRequestInd | boolean | C | 0..1 | <p>This IE shall be present if a MA-PDU session is requested to be established.</p> <p>When present, it shall be set as follows:</p> <ul style="list-style-type: none"> - True: a MA-PDU session is requested - False (default): a MA-PDU session is not requested | MAPDU |
| maNwUpgradeInd | boolean | C | 0..1 | <p>This IE shall only be present if the PDU session is allowed to be upgraded to MA PDU session (see clause 4.22.3 of 3GPP TS 23.502 [3]).</p> <p>When present, it shall be set as follows:</p> <ul style="list-style-type: none"> - True: the PDU session is allowed to be upgraded to MA PDU session - False (default): the PDU session is not allowed to be upgraded to MA PDU session <p>When maRequestInd is present and set to "true", this IE shall not be present.</p> | MAPDU |
| n2SmlInfo | RefToBinaryData | C | 0..1 | <p>This IE shall be present if N2 SM Information needs to be sent to the I-SMF.</p> | DTSSA |
| n2SmlInfoType | N2SmlInfoType | C | 0..1 | <p>This IE shall be present if "n2SmlInfo" attribute is present.</p> <p>When present, this IE shall indicate the NG AP IE type for the NG AP SMF related IE container carried in "n2SmlInfo" attribute.</p> | DTSSA |
| n2SmlInfoExt1 | RefToBinaryData | C | 0..1 | <p>This IE shall be present if more than one N2 SM Information has been received from the AN.</p> <p>When present, this IE shall reference the N2 SM Information binary data (see clause 6.1.6.4.3).</p> | DTSSA |

| | | | | | |
|-----------------------|---------------------|---|------|--|-------|
| 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. | DTSSA |
| smContextRef | Uri | C | 0..1 | This IE shall be present during an I-SMF or V-SMF insertion if available and during an I-SMF or V-SMF change or removal. When present, this IE shall contain the URI of the SM Context resource in the SMF or of the SM context resource in the source I-SMF or V-SMF during an I-SMF or V-SMF insertion or during an I-SMF or V-SMF change/removal respectively. The URI shall be an absolute URI, including apiRoot (see clause 6.1.3.3.2). | DTSSA |
| upCnxState | UpCnxState | C | 0..1 | This IE shall be present to request the activation of the user plane connection of the PDU session, during a Service Request with an I-SMF insertion / change / removal, or with a V-SMF change (see clause 5.2.2.2.6). | DTSSA |
| smallDataRateStatus | SmallDataRateStatus | C | 0..1 | This IE shall be present if the small data rate control status is available in AMF, see clause 5.31.14.3 of 3GPP TS 23.501 [2] and clause 4.3.2.2.1 of 3GPP TS 23.502 [3]. | CIOT |
| apnRateStatus | ApnRateStatus | C | 0..1 | This IE shall be present if the APN rate control status is available in AMF, see clause 4.7.7.3 in 3GPP TS 23.401 [33] and clause 5.2.8.2.5 in 3GPP TS 23.502 [3]. | CIOT |
| extendedNasSmTimerInd | boolean | C | 0..1 | This IE shall be present with the value "True" if the UE supports CE mode B and use of CE mode B is not restricted according to the Enhanced Coverage Restriction information in the UE context in the AMF. When present, it shall indicate whether extended NAS SM timers shall be used for the UE as specified in 3GPP TS 24.501 [7], as follows: - True: extended NAS SM timers shall be used - False (default): normal NAS SM timers shall be used. | CIOT |
| dlDataWaitingInd | boolean | C | 0..1 | This IE shall be present during an EPS to 5GS Idle mode mobility using N26 interface with data forwarding (see clause 4.11.1.3.3A of 3GPP TS 23.502 [3]), if the same indication is received from the MME in the Context Response message. When present, it shall be set as follows: - true: DL data needs to be sent to the UE; - false (default): no DL data needs to be sent to the UE. | CIOT |
| ddnFailureSubs | DdnFailureSubs | C | 0..1 | This IE shall be present to subscribe the notification of the DDN Failure if the Availability after DDN failure event is subscribed by the UDM, see clause 4.15.3.2.7 of 3GPP TS 23.502 [3]. | CIOT |
| smfTransferInd | boolean | C | 0..1 | This IE shall be present during an SMF Context Transfer procedure, LBO or no Roaming, no I-SMF. When present, it shall be set as follows: - True: SMF Context Transfer - False (default): Not an SMF Context Transfer | CTXTR |
| oldSmfId | NfInstanceId | C | 0..1 | This IE shall be present if smfTransferInd is set to true. When present, it shall indicate old SMF instance identifier. | CTXTR |

| | | | | | |
|---|----------|---|------|--|-------|
| oldSmContextRef | Uri | C | 0..1 | This IE shall be present if smfTransferInd is set to true. When present, this IE shall contain the identifier of the SM Context resource in the old SMF. | CTXTR |
| wAgfInfo | WAgfInfo | C | 0..1 | This IE shall be present, if received from the W-AGF. When present, it shall contain information about the N3 terminations of the W-AGF. The SMF may use this information when selecting the UPF. | |
| tngfInfo | tngfInfo | C | 0..1 | This IE shall be present, if received from the TNGF. When present, it shall contain information about the N3 terminations of the TNGF. The SMF may use this information when selecting the UPF. | |
| twifInfo | twifInfo | C | 0..1 | This IE shall be present, if received from the TWIF. When present, it shall contain information about the N3 terminations of the TWIF. The SMF may use this information when selecting the UPF. | |
| <p>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.</p> <p>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.</p> | | | | | |

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 | Applicability |
|------------------|----------------------|---|-------------|--|---------------|
| 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 API URI of the H-SMF towards which the PDU session was established. The API URI shall be formatted as specified in clause 6.1.1. | |
| smfUri | Uri | C | 0..1 | This IE shall be present for a PDU session with an I-SMF, if the additionalSmfUri IE was received in the request and the I-SMF established the PDU session towards an alternative SMF listed in the additionalSmfUri IE. When present, it shall contain the API URI of the SMF towards which the PDU session was established. The API URI shall be formatted as specified in clause 6.1.1. | DTSSA |
| 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. In Home-Routed roaming case, this IE shall contain the S-NSSAI for home PLMN. | |
| 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 clauses 5.2.2.2.2 or 5.2.2.2.6. | |
| n2SmlInfo | RefToBinaryData | C | 0..1 | This IE shall be present if N2 SM Information needs to be sent to the AN. | |
| n2SmlInfoType | N2SmlInfoType | C | 0..1 | This IE shall be present if "n2SmlInfo" attribute is present. When present, this IE shall indicate the NG AP IE type for the NG AP SMF related IE container carried in "n2SmlInfo" 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 clause 5.2.2.2.3. | |
| gpsi | Gpsi | C | 0..1 | This IE shall be present if no GPSI IE is provided in the request, e.g. for a PDU session moved from another access or another system, and the SMF knows that a GPSI is already associated with the PDU session (or a GPSI is received from h-SMF for a HR PDU session). When present, it shall contain the user's GPSI associated with the PDU session. | |

| | | | | | |
|----------------------|-------------------|---|------|--|--|
| smfServiceInstanceid | string | O | 0..1 | <p>When present, this IE shall contain the serviceInstanceid of the SMF PDUSession service instance serving the SM Context, i.e. of:</p> <ul style="list-style-type: none"> - the I-SMF, for a PDU session with I-SMF; - the V-SMF, for a HR PDU session; or - the SMF, for a non-roaming or an LBO roaming PDU session without I-SMF. <p>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 clause 6.2 of 3GPP TS 23.527 [24]).</p> | |
| recoveryTime | DateTime | O | 0..1 | Timestamp when the SMF service instance serving the PDU session was (re)started (see clause 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 clause 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 | Applicability |
|--------------------|----------------------|---|-------------|---|---------------|
| 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. | |
| 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 | PlmnIdNid | 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 and, for an SNPN, the NID that together with the PLMN ID identifies the SNPN. | |
| 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 clause 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. | |
| additionalAnType | AccessType | C | 0..1 | This IE shall indicate the additional Access Network Type to which the PDU session is to be associated. This IE shall be present when the UE requests to establish resources for MA PDU session over the other access. | MAPDU |
| anTypeToReactivate | AccessType | C | 0..1 | This IE shall indicate the Access Network Type for which the UP connection is requested to be re-activated, for a MA PDU session. | MAPDU |
| 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 clause 5.2.2.3.2.2), an Xn handover (see clause 5.2.2.3.3) or a N2 handover execution (see clause 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 | <p>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).</p> <p>When present, this IE shall contain:</p> <ul style="list-style-type: none"> - the UE location information; and - the timestamp, if available, indicating the UTC time when the UeLocation information was acquired. <p>(NOTE 1)</p> | |
| ueTimeZone | TimeZone | C | 0..1 | <p>This IE shall be present if it is available, the UE Time Zone has changed and needs to be reported to the SMF.</p> <p>When present, this IE shall contain the UE Time Zone.</p> | |
| addUeLocation | UserLocation | O | 0..1 | <p>Additional UE location.</p> <p>This IE may be present, if anType indicates a non-3GPP access and a valid 3GPP access user location information is available.</p> <p>When present, it shall contain:</p> <ul style="list-style-type: none"> - the last known 3GPP access user location; and - the timestamp, if available, indicating the UTC time when the addUeLocation information was acquired. <p>(NOTE 1)</p> | |
| upCnxState | UpCnxState | C | 0..1 | <p>This IE shall be present to request the activation or the deactivation of the user plane connection of the PDU session.</p> <p>When present, it shall be set as specified in clauses 5.2.2.3.2, 5.2.2.3.15 and 5.2.2.3.16.</p> | |
| hoState | HoState | C | 0..1 | <p>This IE shall be present to request the preparation, execution or cancellation of a handover of the PDU session.</p> <p>When present, it shall be set as specified in clause 5.2.2.3.4.</p> | |
| toBeSwitched | boolean | C | 0..1 | <p>This IE shall be present during an Xn Handover (see clause 5.2.2.3.3) to request to switch the PDU session to a new downlink N3 tunnel endpoint.</p> <p>When present, it shall be set as follows:</p> <ul style="list-style-type: none"> - true: request to switch to the PDU session. - false (default): no request to switch the PDU session. | |
| failedToBeSwitched | boolean | C | 0..1 | <p>This IE shall be present during an Xn Handover (see clause 5.2.2.3.3) if the PDU session failed to be setup in the target RAN.</p> <p>When present, it shall be to true to indicate that the PDU session failed to be setup in the target RAN.</p> | |
| n1SmMsg | RefToBinaryData | C | 0..1 | <p>This IE shall be present if N1 SM Information has been received from the UE.</p> <p>When present, this IE shall reference the N1 SM Message binary data (see clause 6.1.6.4.2).</p> | |
| n2SmlInfo | RefToBinaryData | C | 0..1 | <p>This IE shall be present if N2 SM Information has been received from the AN.</p> <p>When present, this IE shall reference the N2 SM Information binary data (see clause 6.1.6.4.3).</p> | |
| n2SmlInfoType | N2SmlInfoType | C | 0..1 | <p>This IE shall be present if "n2SmlInfo" attribute is present.</p> <p>When present, this IE shall indicate the NG AP IE type for the NG AP SMF related IE container carried in "n2SmlInfo" attribute.</p> | |

| | | | | | |
|-----------------------|---|---|------|---|-------|
| 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 clause 5.2.2.3.9 during a 5GS to EPS handover, or as specified in 5.2.2.3.13 during a N2 based handover with I-SMF insertion/change/removal. 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 (see clause 5.2.2.3.9). | |
| n9ForwardingTunnel | TunnelInfo | C | 0..1 | This IE shall be present in the following case: - UE triggered Service Request with I-SMF change/removal, if requesting to forward buffered downlink data packets at I-UPF (See clause 4.23.4 of 3GPP TS 23.502 [3]). When present, it shall carry the N9 forwarding tunnel info of I-UPF. | DTSSA |
| n9DIForwardingTnlList | array (IndirectDataForwardingTunnelInfo) | C | 1..N | This IE shall be present in the following case: - N2 based handover with I-SMF insertion/change/removal, if downlink indirect data forwarding tunnels are requested to be established between target I-UPF and source I-UPF / source UPF (see clause 4.23.7 and 4.23.11 of 3GPP TS 23.502 [3]). When present, it shall carry the list of N9 downlink indirect data forwarding tunnel(s) info of I-UPF. | DTSSA |
| n9UIForwardingTnlList | array (IndirectDataForwardingTunnelInfo) | C | 1..N | This IE shall be present in the following case: - N2 based handover with I-SMF insertion/change/removal, if uplink indirect data forwarding tunnels are requested to be established between target I-UPF and source I-UPF / source UPF (see clause 4.23.7 and 4.23.11 of 3GPP TS 23.502 [3]). When present, it shall carry the list of N9 uplink indirect data forwarding tunnel(s) info of I-UPF. | DTSSA |
| epsBearerSetup | array(EpsBearerContainer) | 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(EpsBearerId) | C | 1..N | This IE shall be present to request the SMF to revoke some EBIs (see clause 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 | <p>This IE shall be used to indicate a network initiated PDU session release is requested.</p> <p>This IE shall be present and set as specified in clause 5.2.2.3.10 during P-CSCF restoration procedure, in clause 5.2.2.3.11 during AMF requested PDU Session Release due to duplicated PDU Session Id, in clause 5.2.2.3.12 during AMF requested PDU Session Release due to slice not available, and in clause 5.2.2.3.17 during AMF requested PDU Session Release due to Network Slice-Specific Authentication and Authorization failure or revocation.</p> <p>When present, it shall be set as follows:</p> <ul style="list-style-type: none"> - 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 | Snsai | C | 0..1 | <p>This IE shall be present and sent to the V-SMF, during an EPS to 5GS mobility registration 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.</p> <p>When present, it shall contain the S-NSSAI for the serving PLMN.</p> | |
| traceData | TraceData | C | 0..1 | <p>This IE shall be included if trace is required to be activated, modified or deactivated (see 3GPP TS 32.422 [22]).</p> <p>For trace modification, it shall contain a complete replacement of trace data.</p> <p>For trace deactivation, it shall contain the Null value.</p> | |
| epsInterworkingInd | EpsInterworkingIndication | O | 0..1 | <p>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.</p> <p>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.</p> | |

| | | | | | |
|--------------------|---------------------|---|------|---|-------|
| anTypeCanBeChanged | boolean | C | 0..1 | <p>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 clause 5.2.2.3.2.4), during a Service Request procedure (see clause 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 clause 4.2.3.3 of 3GPP TS 23.502 [3].</p> <p>When present, it shall be set as follows:</p> <ul style="list-style-type: none"> - true: the access type of the PDU session can be changed. - false (default): the access type of the PDU session cannot be changed. | |
| n2SmlInfoExt1 | RefToBinaryData | C | 0..1 | <p>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 clause 6.1.6.4.3).</p> | |
| n2SmlInfoTypeExt1 | N2SmlInfoType | C | 0..1 | <p>This IE shall be present if "n2SmlInfoExt1" attribute is present. When present, this IE shall indicate the NG AP IE type for the NG AP SMF related IE container carried in "n2SmlInfoExt1" attribute.</p> | |
| maReleaseInd | MaReleaseIndication | C | 0..1 | <p>This IE shall be present if one access of a MA PDU session is requested to be released, in the following cases:</p> <ul style="list-style-type: none"> - when UE/AMF initiates MA PDU session release over one access; or - when UE deregisters from one access. <p>When present, it indicates the access to be released.</p> | MAPDU |
| maNwUpgradeInd | boolean | C | 0..1 | <p>This IE shall be present if the PDU session is allowed to be upgraded to MA PDU session (see clause 6.4.2.2 of 3GPP TS 24.501 [7]).</p> <p>When present, it shall be set as follows:</p> <ul style="list-style-type: none"> - true: the PDU session is allowed to be upgraded to MA PDU session - false (default): the PDU session is not allowed to be upgraded to MA PDU session | MAPDU |
| maRequestInd | boolean | C | 0..1 | <p>This IE shall be present if a MA-PDU session is requested to be established (see clause 4.22.6.3 of 3GPP TS 23.502 [3]).</p> <p>When present, it shall be set as follows:</p> <ul style="list-style-type: none"> - true: a MA-PDU session is requested - false (default): a MA-PDU session is not requested | MAPDU |
| exemptionInd | ExemptionInd | C | 0..1 | <p>This IE shall be present if the AMF has exempted the NAS message from a NAS SM congestion control activated in the AMF.</p> | |
| supportedFeatures | SupportedFeatures | C | 0..1 | <p>This IE shall be present if the servingNfId or the targetServingNfId is present (i.e. during a change of AMF) and at least one optional feature defined in clause 6.1.8 is supported by the new AMF. If this IE is absent when the servingNfId or the targetServingNfId is present, the new serving AMF or the target AMF respectively shall be considered as not supporting any optional feature.</p> | |

| | | | | | |
|--|----------------------------------|---|------|--|------|
| moExpDataCounter | MoExpDataCounter | C | 0..1 | <p>This IE shall be included if the UE has accessed the network by using "MO exception data" RRC establishment cause and when the AMF decides to send a non-zero value to the SMF. (NOTE 2)</p> <p>When present, this IE shall contain the MO Exception Data Counter.</p> | CIOT |
| extendedNasSmTimerInd | boolean | C | 0..1 | <p>This IE shall be present if the UE supports CE mode B and use of CE mode B changes from restricted to unrestricted or vice versa in the Enhanced Coverage Restriction information in the UE context in the AMF.</p> <p>When present, it shall indicate whether extended NAS SM timers shall be used for the UE as specified in 3GPP TS 24.501 [7], as follows:</p> <ul style="list-style-type: none"> - True: extended NAS SM timers shall be used - False: normal NAS SM timers shall be used. | CIOT |
| forwardingFteid | Bytes | C | 0..1 | <p>This IE shall be present during a 5GS to EPS Idle mode mobility using N26 interface with data forwarding (see clause 4.11.1.3.2A of 3GPP TS 23.502 [3]), if the Forwarding F-TEID IE is present in the Context Acknowledge message received from the MME.</p> <p>When present, it shall contain Base64-encoded characters, encoding the Forwarding F-TEID in the Context Acknowledge message, as specified in Figure 8.22-1 of 3GPP TS 29.274 [16] (starting from octet 1).</p> | CIOT |
| forwardingBearerContexts | array(ForwardingBearerContainer) | C | 1..N | <p>This IE shall be present during a 5GS to EPS Idle mode mobility using N26 interface with data forwarding (see clause 4.11.1.3.2A of 3GPP TS 23.502 [3]), if the Bearer Contexts IE is present in the Context Acknowledge message received from the MME.</p> <p>When present, it shall contain the Bearer Contexts in the Context Acknowledge message.</p> | CIOT |
| ddnFailureSubs | DdnFailureSubs | C | 0..1 | <p>This IE shall be present to subscribe or unsubscribe to the notification of the DDN Failure if the Availability after DDN failure event is subscribed/unsubscribed by the UDM, see clause 4.15.3.2.7 of 3GPP TS 23.502 [3].</p> <p>This IE shall also be present if it is required to add, modify or remove DDN failure subscriptions. If it is present and the FailureSubsInd indicates notification of DDN failure is subscribed, the content of the received ddnFailureSubs shall overwrite any ddnFailureSubs received earlier.</p> | CIOT |
| <p>NOTE 1: 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.</p> <p>NOTE 2: The AMF increments the MO Exception Data Counter when the UE establishes/resumes RRC with "MO Exception Data" RRC cause. The AMF may defer sending the moExpDataCounter attribute to the SMF based on local configuration. The AMF resets the MO Exception Data Counter when receiving successful response from the SMF. The SMF however keeps incrementing the counter locally.</p> | | | | | |

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 | Applicability |
|-----------------------|--|---|-------------|---|---------------|
| 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 clauses 5.2.2.3.2, 5.2.2.3.15 and 5.2.2.3.16. | |
| 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 clause 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 clause 6.1.6.4.2). | |
| n2SmlInfo | 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 clause 6.1.6.4.3). | |
| n2SmlInfoType | N2SmlInfoType | C | 0..1 | This IE shall be present if "n2SmlInfo" attribute is present. When present, this IE shall indicate the NG AP IE type for the NG AP SMF related IE container carried in "n2SmlInfo" 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 clause 5.2.2.3.9. | |
| n3DIForwardingTnlList | array (IndirectDataForwardingTunnelInfo) | C | 1..N | This IE shall be present if indirect data forwarding is requested and N9 downlink indirect data forwarding tunnels info is included in the corresponding request. When present, it shall carry the list of N3 downlink indirect data forwarding tunnels info of source I-UPF or source UPF. | DTSSA |
| n3UIForwardingTnlList | array (IndirectDataForwardingTunnelInfo) | C | 1..N | This IE shall be present if indirect data forwarding is requested and N9 uplink indirect data forwarding tunnels info is included in the corresponding request. When present, it shall carry the list of N3 uplink indirect data forwarding tunnels info of source I-UPF or source UPF. | DTSSA |
| cause | Cause | C | 0..1 | This IE shall be present if the activation of the User Plane connection failed due to insufficient resources (see clause 5.2.2.3.2.2). | |

| | | | | | |
|--------------------------|----------------------------------|---|------|---|-------|
| maAcceptedInd | boolean | C | 0..1 | This IE shall be present if a request to modify a single access PDU session into a MA PDU session was accepted (see clause 4.22.6.3 of 3GPP TS 23.502 [3]). When present, it shall be set as follows: - true: MA PDU session - false (default): single access PDU session | MAPDU |
| supportedFeatures | SupportedFeatures | C | 0..1 | This IE shall be present if the supportedFeatures IE was received in the request and at least one optional feature defined in clause 6.1.8 is supported by the updated SM context resource. | |
| forwardingFteid | Bytes | C | 0..1 | This IE shall be present during an EPS to 5GS Idle mode mobility using N26 interface with data forwarding (see clause 4.11.1.3.3A of 3GPP TS 23.502 [3]), if the Forwarding F-TEID IE shall be sent to the MME in the Context Acknowledge message. When present, it shall contain Base64-encoded characters, encoding the Forwarding F-TEID to be sent in the Context Acknowledge message, as specified in Figure 8.22-1 of 3GPP TS 29.274 [16] (starting from octet 1). | CIOT |
| forwardingBearerContexts | array(ForwardingBearerContainer) | C | 1..N | This IE shall be present during an EOS to 5GS Idle mode mobility using N26 interface with data forwarding (see clause 4.11.1.3.3A of 3GPP TS 23.502 [3]), if the Bearer Contexts IE shall be sent to the MME in the Context Acknowledge message. When present, it shall contain the Bearer Contexts to be sent in the Context Acknowledge message. | CIOT |

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 | Applicability |
|-----------------|-----------------|---|-------------|--|---------------|
| 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 Time Zone 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: <ul style="list-style-type: none"> - 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: <ul style="list-style-type: none"> - 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. | |
| n2SmlInfo | 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 clause 6.1.6.4.3). | |
| n2SmlInfoType | N2SmlInfoType | C | 0..1 | This IE shall be present if "n2SmlInfo" attribute is present. When present, this IE shall indicate the NG AP IE type for the NG AP SMF related IE container carried in "n2SmlInfo" attribute. | |
| ismfReleaseOnly | boolean | C | 0..1 | This IE shall be present and set to "true" during a 5GS to EPS Idle mode mobility with I-SMF removal, an inter NG-RAN node Xn based handover and N2 based handover with I-SMF change or removal. When present, it shall be set as follows: <ul style="list-style-type: none"> - true: only release the SM context of the PDU session in the I-SMF; - false (default): release the SM context and PDU session in I-SMF and SMF. | DTSSA |

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 | Applicability |
|----------------------|--------------------|---|-------------|--|---------------|
| targetMmeCap | MmeCapabilities | C | 0..1 | This IE shall be present if it is available. When present, it shall contain the target MME capabilities. | |
| smContextType | SmContextType | C | 0..1 | This IE shall be present if this is a request to retrieve the complete SM context, during scenarios with an I-SMF or V-SMF insertion/change/removal, or during SMF Context Transfer procedure for LBO or non-roaming PDU session without I-SMF (see clause 4.26.5.3 of 3GPP TS 23.502 [3]). | DTSSA, CTXTR |
| servingNetwork | PlmnId | C | 0..1 | This IE shall be present when the procedure is triggered by a new V-SMF, if the new V-SMF supports inter-PLMN V-SMF change. When present, this IE shall contain the serving core network operator PLMN ID of the NF Service Consumer (i.e. new V-SMF). | DTSSA |
| notToTransferEbiList | array(EpsBearerId) | C | 1..N | This IE shall be present, if the SM context type IE is absent or indicate a request to retrieve the EPS PDN connection, and the AMF determines that certain EPS bearers shall not to be transferred to EPS during a 5GS to EPS mobility procedure, as specified in clause 4.11.1 of 3GPP TS 23.502 [3]. When present, it shall contain the EBI list not to be transferred. | |

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 | Applicability |
|-----------------------------------|---------------------|---|-------------|--|---------------|
| statusInfo | StatusInfo | M | 1 | This IE shall contain status information about the SM context. | |
| smallDataRateStatus | SmallDataRateStatus | C | 0..1 | This IE shall be present, if the NF Service Consumer has indicated support of Clot and if the status is available. When present, it shall indicate the current small data rate control status for the PDU session. | CIOT |
| apnRateStatus | ApnRateStatus | C | 0..1 | This IE shall be present, if the NF Service Consumer has indicated support of Clot and if the status is available. When present, it shall indicate the current APN rate control status for the PDN connection (APN rates are shared by all PDN connections of the UE to this APN). | CIOT |
| ddnFailureStatus | boolean | C | 0..1 | This IE shall be present if the DDN Failure shall be reported (see clause 5.2.8.2.8 of 3GPP TS 23.502 [3]). When present, it shall be set as follows: - true: DDN failure detected - false (default): DDN failure is not detected | CIOT |
| notifyCorrelationIdsForDdnFailure | array(string) | C | 1..N | This IE shall be present if the DDN Failure shall be reported. When present, it shall contain the notification correlation Id(s) of the DDN failure subscriptions for which a DDN failure has been detected. This parameter can be useful if the NF service consumer has multiple subscriptions for the same PDU session. | CIOT |
| newSmfId | NfInstanceId | C | 0..1 | This IE may be present if resourceStatus in statusInfo is: - TRANSFERRED When present, it shall include: - the new I-SMF instance identifier if the cause in statusInfo is "ISMF_CONTEXT_TRANSFER"; - the new SMF instance identifier if the cause in statusInfo is "SMF_CONTEXT_TRANSFER". | CTXTR |
| newSmfSetId | NfSetId | C | 0..1 | This IE may be present if resourceStatus in statusInfo is: - TRANSFERRED When present, it shall include: - The new I-SMF set identifier if cause in statusInfo is "ISMF_SERVICE_CONTEXT_TRANSFER"; - The new SMF set identifier if cause in statusInfo is "SMF_SERVICE_CONTEXT_TRANSFER". | CTXTR |
| oldSmfId | NfInstanceId | C | 0..1 | This IE shall be present if resourceStatus in statusInfo is: - TRANSFERRED When present, it shall include: - The old I-SMF instance identifier if cause in statusInfo is "ISMF_CONTEXT_TRANSFER"; - The old SMF instance identifier if cause in statusInfo is "SMF_CONTEXT_TRANSFER". | CTXTR |
| oldSmContextRef | Uri | C | 0..1 | This IE may be present if resourceStatus in statusInfo is: - TRANSFERRED When present, this IE shall include the identifier of the SM Context resource in the old I-SMF or SMF. | CTXTR |

NOTE: If resourceStatus in statusInfo is "TRANSFERRED", at least one of newSmfId and newSmfSetId shall be included.

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 | Applicability |
|---------------------|--------------|---|-------------|--|---------------|
| supi | Supi | C | 0..1 | This IE shall be present, except if the UE is emergency registered and UICClassless. When present, it shall contain the subscriber permanent identifier. | |
| 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 UICClassless 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. The DNN shall be the full DNN (i.e. with both the Network Identifier and Operator Identifier) for a HR PDU session, and it should be the full DNN in LBO and non-roaming scenarios. If the Operator Identifier is absent, the serving core network operator shall be assumed. | |
| selectedDnn | Dnn | C | 0..1 | This IE shall be present, if another DNN other than the UE requested DNN is selected for this PDU session. When present, it shall contain the selected DNN. The DNN shall be the full DNN (i.e. with both the Network Identifier and Operator Identifier) for a HR PDU session, and it should be the full DNN in LBO and non-roaming scenarios. If the Operator Identifier is absent, the serving core network operator shall be assumed. | |
| sNssai | Snsai | 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 for a HR PDU session; or - the requested S-NSSAI in the serving PLMN for a PDU session with an I-SMF. | |
| vsmfld | NfInstanceId | C | 0..1 | This IE shall be present for a HR PDU session. When present, it shall contain the identifier of the V-SMF. | |
| ismfld | NfInstanceId | C | 0..1 | This IE shall be present for a PDU session with an I-SMF. When present, it shall contain the identifier of the I-SMF. | DTSSA |
| servingNetwork | PlmnIdNid | M | 1 | This IE shall contain the serving core network operator PLMN ID and, for an SNPN, the NID that together with the PLMN ID identifies the SNPN. | |
| 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] (starting from octet 1), received from the MME. | |
| vsmfPduSessionUri | Uri | C | 0..1 | This IE shall be present for a HR PDU session. When present, it shall include the URI representing the PDU session in the V-SMF. | |
| ismfPduSessionUri | Uri | C | 0..1 | This IE shall be present for a PDU session with an I-SMF. When present, it shall include the URI representing the PDU session in the I-SMF. | DTSSA |
| vcnTunnelInfo | TunnelInfo | C | 0..1 | This IE shall be present for a HR PDU session, except when Control Plane Clot 5GS Optimisation is enabled and data delivery via NEF is selected for this PDU session. When present, this IE shall contain the N9 tunnel information of the visited CN side, i.e. V-UPF. | |
| icnTunnelInfo | TunnelInfo | C | 0..1 | This IE shall be present for a PDU session involving an I-SMF, except when Control Plane Clot 5GS Optimisation is enabled and data delivery via NEF is selected for this PDU session. When present, this IE shall contain the N9 tunnel information of the I-UPF controlled by the I-SMF. | DTSSA |
| n9ForwardingTunnelInfo | TunnelInfo | C | 0..1 | This IE shall be present during Service Request procedures with I-SMF insertion, if buffered DL data is available at the I-UPF that is controlled by the SMF (see clause 4.23.4 in 3GPP TS 23.502 [3]). When present, this IE shall contain the N9 tunnel information of the I-UPF controlled by the I-SMF. | DTSSA |
| additionalCnTunnelInfo | TunnelInfo | C | 0..1 | This IE shall be present if a MA PDU session is requested or if the PDU session is allowed to be upgraded to a MA PDU session, and the UE is registered over both 3GPP access and Non-3GPP access. When present, it shall contain additional N9 tunnel information of the UPF controlled by the V-SMF or I-SMF. | MAPDU |
| anType | AccessType | M | 1 | This IE shall indicate the Access Network Type to which the PDU session is to be associated. | |
| additionalAnType | AccessType | C | 0..1 | This IE shall indicate the additional Access Network Type to which the PDU session is to be associated. This IE shall be present if a MA-PDU session is requested and the UE is registered over both 3GPP access and Non-3GPP access. | MAPDU |
| 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 | <p>Additional UE location.</p> <p>This IE may be present, if anType indicates a non-3GPP access and a valid 3GPP access user location information is available.</p> <p>When present, it shall contain:</p> <ul style="list-style-type: none"> - the last known 3GPP access user location; and - the timestamp, if available, indicating the UTC time when the addUeLocation information was acquired. <p>See NOTE.</p> | |
| gpsi | Gpsi | C | 0..1 | This IE shall be present if it is available. When present, it shall contain the user's GPSI. | |
| n1SmlInfoFromUe | RefToBinaryData | C | 0..1 | This IE shall be present if the V-SMF or I-SMF has received known N1 SM information from the UE that does not need to be interpreted by the V-SMF or I-SMF. When present, this IE shall reference the n1SmlInfoFromUe binary data (see clause 6.1.6.4.4). | |
| unknownN1SmlInfo | RefToBinaryData | C | 0..1 | This IE shall be present if the V-SMF or I-SMF has received unknown N1 SM information from the UE. When present, this IE shall reference the unknownN1SmlInfo binary data (see clause 6.1.6.4.4). | |
| supportedFeatures | SupportedFeatures | C | 0..1 | This IE shall be present if at least one optional feature defined in clause 6.1.8 is supported. | |
| hPcflD | NfInstanceld | O | 0..1 | When present, this IE shall contain the identifier of the H-PCF (for a HR PDU session) selected by the AMF for the UE (for Access and Mobility Policy Control). | |
| pcflD | NfInstanceld | O | 0..1 | When present, this IE shall contain the identifier of the PCF (for a PDU session with an I-SMF) selected by the AMF for the UE (for Access and Mobility Policy Control). | DTSSA |
| pcfGroupld | NfGroupld | O | 0..1 | When present, this IE shall contain the identity of the (home) PCF group serving the UE for Access and Mobility Policy and/or UE Policy. | |
| pcfSetld | NfSetld | O | 0..1 | <p>When present, it shall contain the NF Set ID of:</p> <ul style="list-style-type: none"> - the H-PCF, for a HR PDU session, or - the PCF or V-PCF, for a PDU session with an I-SMF, in non-roaming and LBO roaming scenarios respectively <p>serving the UE for Access and Mobility Policy and/or UE Policy.</p> | |
| hoPreparationIndication | boolean | C | 0..1 | <p>This IE shall be present during an EPS to 5GS handover preparation using the N26 interface or during N2 handover preparation with I-SMF insertion.</p> <p>When present, it shall be set as follows:</p> <ul style="list-style-type: none"> - true: an EPS to 5GS handover preparation or N2 handover preparation with I-SMF 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 or N2 handover preparation with I-SMF 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 or icnTunnelInfo. <p>It shall be set to "true" during an EPS to 5GS handover preparation using the N26 interface or during N2 handover preparation with I-SMF insertion.</p> | |
| 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 or I-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 clauses 6.2 and 6.3 of 3GPP TS 23.527 [24]). | |
| iSmfServiceInstanceId | string | O | 0..1 | When present, this IE shall contain the serviceInstanceId of I-SMF service instance serving the PDU session. This IE may be used by the SMF to identify PDU sessions affected by a failure or restart of the I-SMF service (see clauses 6.2 and 6.3 of 3GPP TS 23.527 [24]). | DTSSA |
| recoveryTime | DateTime | O | 0..1 | Timestamp when the V-SMF or I-SMF service instance serving the PDU session was (re)started (see clause 6.3 of 3GPP TS 23.527 [24]). | |
| roamingChargingProfile | RoamingChargingProfile | O | 0..1 | Roaming Charging Profile applicable in the VPLMN (see clauses 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 clauses 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 clauses 4.3.2.2.1 and 4.3.5.2 of 3GPP TS 23.502 [3]. | |
| epsBearerCtxStatus | EpsBearerContextStatus | C | 0..1 | This IE shall be present during an EPS to 5GS idle mode mobility using the N26 interface, if received in the Create SM Context request. When present, it shall be set to the value received in the Create SM Context request. | |
| amfNfId | NfInstanceId | C | 0..1 | This IE shall be present unless the PDU session is related to regulatory prioritized service. When present, it shall contain the identifier of the serving AMF during UE-requested PDU Session Establishment Procedure. See clauses 4.3.2.2.2 of 3GPP TS 23.502 [3]. | |
| guami | Guami | C | 0..1 | This IE shall be present if the amfNfId is present. When present, it shall contain the serving AMF's GUAMI. | |
| maxIntegrityProtectedDataRateUl | MaxIntegrityProtectedDataRate | C | 0..1 | This IE shall be present if it is available. When present, it shall indicate the maximum integrity protected data rate supported by the UE for uplink. | |
| maxIntegrityProtectedDataRateDl | MaxIntegrityProtectedDataRate | C | 0..1 | This IE shall be present if it is available. When present, it shall indicate the maximum integrity protected data rate supported by the UE for downlink. | |

| | | | | | |
|-----------------------|------------------------------|---|------|---|-------|
| cpCiotEnabled | boolean | C | 0..1 | This IE shall be present with the value "True" if the "5gCiotCpEnabled" attribute is received with "True" value in SM Context Create request, indicating the Control Plane Clot 5GS Optimisation is enabled for the PDU session (see 3GPP TS 23.502 [3], clause 4.3.2.2.2). When present, it shall be set as follows: - True: Control Plane Clot 5GS Optimisation is enabled. - False (default): Control Plane Clot 5GS Optimisation is not enabled. | CIOT |
| cpOnlyInd | boolean | C | 0..1 | This IE shall be present with the value "True", if the PDU session shall only use Control Plane Clot 5GS Optimisation (see clause 5.31.4.1 of 3GPP TS 23.501 [2]). When present, it shall be set as follows: - True: the PDU session shall only use Control Plane Clot 5GS Optimisation - False (default): the PDU session is not constrained to only use Control Plane Clot 5GS Optimisation. | CIOT |
| invokeNef | boolean | C | 0..1 | This IE shall be present with value "True", if Control Plane Clot 5GS Optimisation is enabled and data delivery via NEF is selected for the PDU session. When present, it shall be set as follows: - True: Data delivery via NEF is selected. - False (default): Data delivery via NEF is not selected. | CIOT |
| maRequestInd | boolean | C | 0..1 | This IE shall be present if a MA-PDU session is requested to be established by the UE. When present, it shall be set as follows: - True: a MA-PDU session is requested - False (default): a MA-PDU session is not requested | MAPDU |
| maNwUpgradeInd | boolean | C | 0..1 | This IE shall only be present if the PDU session is allowed to be upgraded to MA PDU session (see clause 4.22.3 of 3GPP TS 23.502 [3]). When present, it shall be set as follows: - True: the PDU session is allowed to be upgraded to MA PDU session - False (default): the PDU session is not allowed to be upgraded to MA PDU session When maRequestInd is present and set to "true", this IE shall not be present. | MAPDU |
| dnaiList | array(Dnai) | C | 1..N | This IE shall be present over N16a if an I-SMF is inserted into a PDU session during the following procedures: PDU session establishment, Registration, Service Request, Xn based handover, Inter NG-RAN node N2 based handover (see clause 4.23 of 3GPP TS 23.502 [3]). When present, it shall include the list of DNAs supported by the I-SMF. | DTSSA |
| presenceInLadn | PresenceState | C | 0..1 | This IE shall be present during Xn based handover with I-SMF insertion, 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. | DTSSA |
| secondaryRatUsageInfo | array(SecondaryRatUsageInfo) | O | 1..N | This IE may be present to report usage data for a secondary RAT for QoS flows and/or the whole PDU session. | DTSSA |

| | | | | | |
|--|---------------------|---|------|--|-------|
| smallDataRateStatus | SmallDataRateStatus | C | 0..1 | This IE shall be present if the small data rate control status is received from AMF, see clause 5.31.14.3 of 3GPP TS 23.501 [2] and clause 4.3.2.2.2 of 3GPP TS 23.502 [3]. | CIOT |
| apnRateStatus | ApnRateStatus | C | 0..1 | This IE shall be present, if the APN rate control status (APN rates are shared by all PDN connections of the UE to this APN) is received from the AMF, see clause 4.7.7.3 in 3GPP TS 23.401 [33] and clause 4.11.5.3 in 3GPP TS 23.502 [3]. | CIOT |
| dlServingPlmnRateCtl | integer | C | 0..1 | This IE shall be present if Serving PLMN Rate Control for downlink data packets is enabled in the PLMN and Control Plane Clot 5GS Optimisation is enabled for the PDU session. When present, this IE shall contain the maximum allowed number of Downlink NAS Data PDUs per deci hour of the serving PLMN, as specified in clause 5.31.14.2 of 3GPP TS 23.501 [2]. Minimum: 10 | CIOT |
| upSecurityInfo | UpSecurityInfo | C | 0..1 | This IE shall be present if received from NG-RAN during Xn handover procedure with I-SMF Insertion (see clause 5.2.2.7.5). When present, this IE shall contain the User Plane Security Information associated to the PDU session. See clause 9.3.1.60 of 3GPP TS 38.413 [9]. | DTSSA |
| 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 | Applicability |
|------------------------|-------------------------|---|-------------|---|---------------|
| 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 clause 9.11.4.16 of 3GPP TS 24.501 [7]. Pattern: "[0-7]" Example: SSC mode 3 shall be encoded as "3". (NOTE 1). | |
| hcnTunnelInfo | TunnelInfo | C | 0..1 | This IE shall be present for a HR PDU session, except when Control Plane Clot 5GS Optimisation is enabled and data delivery via NEF is selected for this PDU session. When present, this IE shall contain the N9 tunnel information of the home CN side, i.e. H-UPF. | |
| cnTunnelInfo | TunnelInfo | C | 0..1 | This IE shall be present for a PDU session involving an I-SMF, except when Control Plane Clot 5GS Optimisation is enabled and data delivery via NEF is selected for this PDU session. When present, this IE shall contain the N9 tunnel information of the SMF. | DTSSA |
| additionalCnTunnelInfo | TunnelInfo | C | 0..1 | This IE shall be present if a MA-PDU session is established for a UE registered over both 3GPP access and Non-3GPP access. When present, it shall contain additional N9 tunnel information of the UPF controlled by the H-SMF or SMF. | MAPDU |
| sessionAmbr | Ambr | C | 0..1 | This IE shall be present, except when Control Plane Clot 5GS Optimisation is enabled for the PDU session. When present, this IE shall contain the Session AMBR granted to the PDU session. | |
| qosFlowsSetupList | array(QosFlowSetupItem) | C | 1..N | This IE shall be present, except when Control Plane Clot 5GS Optimisation is enabled for the PDU session. When present, this IE shall contain the full 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 | C | 0..1 | This IE shall be present for a HR PDU session. When present, it shall contain the identifier of the home SMF. | |
| smfInstanceid | NfInstanceid | C | 0..1 | This IE shall be present for a PDU session with an I-SMF. When present, it shall contain the identifier of the SMF. | DTSSA |
| 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: <ul style="list-style-type: none"> - the S-NSSAI assigned to the PDU session in the Home PLMN, for a HR PDU session; - the S-NSSAI assigned to the PDU session in the serving PLMN, for a PDU session with an I-SMF. The Snssai shall overwrite the S-NSSAI earlier stored in I-SMF, if they are different. | |
| 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 clause 4.4.4 of 3GPP TS 23.502 [3]). When present, it shall be set as follows: <ul style="list-style-type: none"> - true: enable Pause of Charging; - false (default): disable Pause of Charging. | |
| uelpv4Address | Ipv4Addr | C | 0..1 | This IE shall be present if the SMF assigns a UE IPv4 address to the PDU session. | |
| uelpv6Prefix | Ipv6Prefix | C | 0..1 | This IE shall be present if the SMF assigns a UE IPv6 prefix to the PDU session. | |
| n1SmInfoToUe | RefToBinaryData | C | 0..1 | This IE shall be present if the SMF needs to send N1 SM information to the UE that does not need to be interpreted by the V-SMF or I-SMF. When present, this IE shall reference the n1SmInfoToUe binary data (see clause 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 clause 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. When present, it shall indicate the maximum integrity protected data rate for uplink. If the maxIntegrityProtectedDataRateDI IE is absent, this IE applies to both uplink and downlink. | |
| maxIntegrityProtectedDataRateDI | MaxIntegrityProtectedDataRate | C | 0..1 | This IE may be present if the upSecurity IE is present and indicates that integrity protection is preferred or required. When present, it shall indicate the maximum integrity protected data rate for downlink. | |
| alwaysOnGranted | boolean | C | 0..1 | This IE shall be present if the alwaysOnRequested IE was received in the request or if the 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: <ul style="list-style-type: none"> - true: always-on PDU session granted. - false (default): always-on PDU session not granted. | |
| gpsi | Gpsi | C | 0..1 | This IE shall be present if no GPSI IE is provided in the request, e.g. for a PDU session moved from another access or another system, and the SMF knows that a GPSI is already associated with the PDU session. When present, it shall contain the user's GPSI associated with the PDU session. | |

| | | | | | |
|------------------------|------------------------|---|------|---|-------|
| 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 clauses 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, for a HR 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 clause 6.2 of 3GPP TS 23.527 [24]). | |
| smfServiceInstanceId | string | O | 0..1 | When present, this IE shall contain the serviceInstanceId of the SMF service instance serving the PDU session, for a PDU session with an I-SMF. This IE may be used by the I-SMF to identify PDU sessions affected by a failure or restart of the SMF service (see clause 6.2 of 3GPP TS 23.527 [24]). | DTSSA |
| recoveryTime | DateTime | O | 0..1 | Timestamp when the SMF service instance serving the PDU session was (re)started (see clause 6.3 of 3GPP TS 23.527 [24]). | |
| dnaiList | array(Dnai) | C | 1..N | This IE shall be present over N16a, if available and an I-SMF has been inserted into a PDU session, during the following procedures: PDU session establishment, Registration, Service Request, Xn based handover, Inter NG-RAN node N2 based handover (see clause 4.23 of 3GPP TS 23.502 [3]). When present, it shall include the list of DNAs of interest for the PDU session for local traffic steering at the I-SMF. | DTSSA |
| ipv6MultiHomingInd | boolean | C | 0..1 | This IE shall be present over N16a, if available and an I-SMF has been inserted into the PDU session during the following procedures: PDU session establishment, Registration, Service Request, Xn based handover, Inter NG-RAN node N2 based handover (see clause 4.23 of 3GPP TS 23.502 [3]). When present, it shall be set as follows: - true: IPv6 multi-homing is permitted. - false (default): IPv6 multi-homing is not allowed. | DTSSA |
| maAcceptedInd | boolean | C | 0..1 | This IE shall be present if a request to establish a MA PDU session was accepted or if a single access PDU session was upgraded into a MA PDU session (see clauses 4.22.2 and 4.22.3 of 3GPP TS 23.502 [3]). When present, it shall be set as follows: - true: MA PDU session - false (default): single access PDU session | MAPDU |
| homeProvidedChargingId | string | O | 0..1 | When present, this IE shall contain the Home provided Charging ID (see 3GPP TS 32.255 [25]). | |
| nefExtBufSupportInd | boolean | C | 0..1 | This IE shall be present with value "true", if NEF has indicated Extended Buffering Support for mobile terminated data in SMF-NEF connection establishment response. When present, this IE shall be set as following: - true: Extended Buffering supported by NEF - false (default): Extended Buffering not supported by NEF | CIOT |

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|--|---------|---|------|--|------|
| smallDataRateControl Enabled | boolean | C | 0..1 | <p>This IE shall be present and set to "true" if small data rate control is applicable on the PDU session. When present, it shall be set as follows:</p> <ul style="list-style-type: none"> - true: small data rate control is applicable. - false (default): small data rate control is not applicable. | CIOT |
| <p>NOTE 1: This IE contains information that the V-SMF or I-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.</p> <p>NOTE 2: In scenarios with a V-SMF/I-SMF insertion, the V-SMF/I-SMF may receive in the Create Response some IEs it has already received during the earlier SM context retrieval from the SMF (e.g. due to the condition of presence of IEs in the Create Response). In such a case, the V-SMF/I-SMF shall overwrite the IEs earlier received with the new IEs received in the Create Response.</p> | | | | | |

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 | Applicability |
|------------------------|-------------------|---|-------------|--|---------------|
| 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 or 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. | |
| icnTunnelInfo | TunnelInfo | C | 0..1 | This IE shall be present if the N9 tunnel information of the I-UPF for DL traffic provided earlier by the I-SMF to the SMF has changed. When present, this IE shall contain the new N9 tunnel information of the I-UPF. | DTSSA |
| additionalCnTunnelInfo | TunnelInfo | C | 0..1 | This IE shall be present if additional N9 tunnel information provided earlier has changed, or if the UE requests to establish resources for a MA PDU session over the other access. When present, it shall contain additional N9 tunnel information of the UPF controlled by the V-SMF or I-SMF. | MAPDU |
| servingNetwork | PlmnIdNid | C | 0..1 | This IE shall contain the serving core network operator PLMN ID, and, for an SNPN, the NID that together with the PLMN ID identifies the SNPN, if the serving network has changed. | |
| anType | AccessType | C | 0..1 | This IE shall be present if the Access Network Type provided earlier to the H-SMF or SMF has changed, e.g. during a handover of the PDU session between 3GPP access and untrusted non-3GPP access (see clause 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. | |
| additionalAnType | AccessType | C | 0..1 | This IE shall indicate the additional Access Network Type to which the PDU session is to be associated. This IE shall be present when the UE requests to establish resources for MA PDU session over the other access. | MAPDU |
| 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 or SMF. When present, this IE shall contain: <ul style="list-style-type: none"> - the new UE location information; and - the timestamp, if available, indicating the UTC time when the UeLocation information was acquired. (NOTE 1) | |
| 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 or SMF. When present, this IE shall contain the new UE Time Zone. | |

| | | | | | |
|-----------------------|-----------------------------|---|------|--|--|
| addUeLocation | UserLocation | O | 0..1 | <p>Additional UE location.</p> <p>This IE may be present, if anType indicates a non-3GPP access and a valid 3GPP access user location information is available.</p> <p>When present, it shall contain:</p> <ul style="list-style-type: none"> - the last known 3GPP access user location; and - the timestamp, if available, indicating the UTC time when the addUeLocation information was acquired. <p>(NOTE 1)</p> | |
| pauseCharging | boolean | C | 0..1 | <p>This IE shall be present if the H-SMF or SMF enabled the use of Pause of Charging for the PDU session during the PDU session establishment and Pause of Charging needs to be started or stopped (see clause 4.4.4 of 3GPP TS 23.502 [3]).</p> <p>When present, it shall be set as follows:</p> <ul style="list-style-type: none"> - true: to Start Pause of Charging; - false: to Stop Pause of Charging. | |
| pti | ProcedureTransactionId | C | 0..1 | <p>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.</p> | |
| n1SmlInfoFromUe | RefToBinaryData | C | 0..1 | <p>This IE shall be present if the V-SMF or I-SMF has received known N1 SM information from the UE that does not need to be interpreted by the V-SMF or I-SMF. When present, this IE shall reference the n1SmlInfoFromUe binary data (see clause 6.1.6.4.4).</p> | |
| unknownN1SmlInfo | RefToBinaryData | C | 0..1 | <p>This IE shall be present if the V-SMF or I-SMF has received unknown N1 SM information from the UE. When present, this IE shall reference the unknownN1SmlInfo binary data (see clause 6.1.6.4.4).</p> | |
| qosFlowsRelNotifyList | array(QosFlowItem) | C | 1..N | <p>This IE shall be present if QoS flows have been released.</p> | |
| qosFlowsNotifyList | array(QosFlowNotifyItem) | C | 1..N | <p>This IE shall be present if the QoS targets for GBR QoS flow(s) are not fulfilled anymore or when they are fulfilled again. For each GBR QoS flow indicated as not fulfilled anymore, the V-SMF/I-SMF may also indicate an alternative QoS profile which the NG-RAN currently fulfils in the currentQosProfileIndex IE.</p> | |
| NotifyList | array(PduSessionNotifyItem) | C | 1..N | <p>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.</p> <p>When present, this IE shall include the notification cause "UP_SEC_NOT_FULFILLED" if at least one of the UP integrity protection or UP ciphering security enforcement is not fulfilled.</p> <p>If the securityResult IE is present in the message, it provides additional details on the security enforcement results.</p> | |
| epsBearerId | array(EpsBearerId) | C | 0..N | <p>This IE shall be present during an EPS to 5GS handover execution using the N26 interface.</p> <p>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.</p> | |

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|-------------------------|--------------------------------|---|------|---|--|
| hoPreparationIndication | boolean | C | 0..1 | <p>This IE shall be present during an EPS to 5GS handover preparation and handover execution using the N26 interface or during N2 handover execution with I-SMF insertion.</p> <p>When present, it shall be set as follows:</p> <ul style="list-style-type: none"> - true: an EPS to 5GS handover preparation or N2 handover preparation with I-SMF 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 or N2 handover preparation with I-SMF 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 or icnTunnelInfo. <p>It shall be set to "true" during an EPS to 5GS handover preparation using the N26 interface.</p> <p>It shall be set to "false" during an EPS to 5GS handover execution using the N26 interface or during N2 handover execution with I-SMF insertion.</p> | |
| revokeEbiList | array(EpsBearerId) | C | 1..N | <p>This IE shall be present to request the H-SMF or SMF to revoke some EBIs (see clause 4.11.1.4.1 of 3GPP TS 23.502 [3]). When present, it shall contain the EBIs to revoke.</p> | |
| cause | Cause | C | 0..1 | <p>This IE shall be present and set as specified in clause 5.2.2.8.2.6 during P-CSCF restoration procedure and clause 5.2.2.8.2.3 during 5G-AN requested PDU session resource release procedure. When present, this IE shall indicate the NF Service Consumer cause of the requested modification.</p> | |
| ngApCause | NgApCause | C | 0..1 | <p>The V-SMF or I-SMF shall include this IE if it received it from the 5G-AN and, for a HR PDU session, 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.</p> | |
| 5gMmCauseValue | 5GMmCause | C | 0..1 | <p>The V-SMF or I-SMF shall include this IE if it received it from the AMF and, for a HR PDU session, if this information is permitted to be sent to the H-SMF operator according to the V-SMF operator's policy.</p> | |
| alwaysOnRequested | boolean | C | 0..1 | <p>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 or I-SMF.</p> <p>When present, it shall be set as follows:</p> <ul style="list-style-type: none"> - true: request for an always-on PDU session - false (default): not a request for an always-on PDU session | |
| epsInterworkingInd | EpsInterworkingIndication | O | 0..1 | <p>This IE may be present if the indication has been received from AMF and, for a HR PDU session, it is allowed to be forwarded to H-SMF by operator configuration.</p> <p>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.</p> | |
| secondaryRatUsageReport | array(SecondaryRatUsageReport) | O | 1..N | <p>This IE may be present to report usage data for a secondary RAT for QoS flows. (NOTE 2)</p> | |
| secondaryRatUsageInfo | array(SecondaryRatUsageInfo) | O | 1..N | <p>This IE may be present to report usage data for a secondary RAT for QoS flows and/or the whole PDU session.</p> | |

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|----------------------|-----------------------------|---|------|--|-------|
| 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 clause 5.2.2.8.2.2), during a Service Request procedure (see clauses 4.2.3.2 and 4.3.3.3 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 clause 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 (default): the access type of the PDU session cannot be changed. | |
| maReleaseInd | MaReleaseIndication | C | 0..1 | This IE shall be present if a MA PDU session is requested to be released over a single access, in the following cases: - when UE/AMF/V-SMF initiates MA PDU session release over one access; or - when UE deregisters from one access. When present, it shall indicate the access to be released. | MAPDU |
| maNwUpgradeInd | boolean | C | 0..1 | This IE shall be present if the PDU session is allowed to be upgraded to MA PDU session (see clause 6.4.2.2 of 3GPP TS 24.501 [7]). When present, it shall be set as follows: - true: the PDU session is allowed to be upgraded to MA PDU session - false (default): the PDU session is not allowed to be upgraded to MA PDU session | MAPDU |
| maRequestInd | boolean | C | 0..1 | This IE shall be present if a MA-PDU session is requested to be established (see clause 4.22.6.3 of 3GPP TS 23.502 [3]). When present, it shall be set as follows: - true: a MA-PDU session is requested - false (default): a MA-PDU session is not requested | MAPDU |
| unavailableAccessInd | UnavailableAccessIndication | C | 0..1 | This IE shall be present if an access of a MA-PDU session is unavailable (see clause 4.22.7 of 3GPP TS 23.502 [3]). When present, it shall indicate the access that is unavailable. | MAPDU |
| psaInfo | array(PsaInformation) | C | 1..N | This IE shall be present, for a PDU session with an I-SMF, if one or more PSAs UPF are inserted and/or removed by the I-SMF. | DTSSA |
| ulclBpInfo | UlclBpInformation | C | 0..1 | This IE shall be present, for a PDU session with an I-SMF, if an UL CL or BP UPF separate from the local PSA is inserted. | DTSSA |
| n4Info | N4Information | O | 0..1 | This IE may be present if the I-SMF needs to send N4 information (e.g. traffic usage reporting) to the SMF for traffic offloaded at a PSA controlled by an I-SMF. | DTSSA |
| n4InfoExt1 | N4Information | O | 0..1 | This IE may be present if the I-SMF needs to send additional N4 information (e.g. traffic usage reporting) to the SMF for traffic offloaded at a PSA controlled by an I-SMF. | DTSSA |
| n4InfoExt2 | N4Information | O | 0..1 | This IE may be present if the I-SMF needs to send additional N4 information to the SMF (e.g. during a change of PSA). | DTSSA |

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|------------------------|---------------|---|------|--|-------|
| presenceInLadn | PresenceState | C | 0..1 | This IE shall be present during Xn based handover with I-SMF change, 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. | DTSSA |
| vsmfPduSessionUri | Uri | C | 0..1 | This IE shall be present during PDU session modification procedures when V-SMF has changed, as specified in clause 4.23.4.3 of 3GPP TS 23.502 [3]. When present, it shall include the URI representing the PDU session in the new V-SMF. | DTSSA |
| ismfPduSessionUri | Uri | C | 0..1 | This IE shall be present during PDU session modification procedures when I-SMF has changed, as specified in clause 4.23.4.3 of 3GPP TS 23.502 [3]. When present, it shall include the URI representing the PDU session in the new I-SMF. | DTSSA |
| vsmfld | NfInstancelId | C | 0..1 | This IE shall be present during PDU session modification procedures when V-SMF has changed, as specified in clause 4.23.4.3 of 3GPP TS 23.502 [3]. When present, it shall contain the identifier of the new V-SMF. | DTSSA |
| ismfld | NfInstancelId | C | 0..1 | This IE shall be present during PDU session modification procedures when I-SMF has changed, as specified in clause 4.23.4.3 of 3GPP TS 23.502 [3]. When present, it shall contain the identifier of the new I-SMF. | DTSSA |
| vSmfServiceInstancelId | string | O | 0..1 | This IE may be present during PDU session modification procedures when V-SMF has changed, as specified in clause 4.23.4.3 of 3GPP TS 23.502 [3]. When present, this IE shall contain the serviceInstancelId of the new 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 clauses 6.2 and 6.3 of 3GPP TS 23.527 [24]). | DTSSA |
| iSmfServiceInstancelId | string | O | 0..1 | This IE may be present during PDU session modification procedures when I-SMF has changed, as specified in clause 4.23.4.3 of 3GPP TS 23.502 [3]. When present, this IE shall contain the serviceInstancelId of the new I-SMF service instance serving the PDU session. This IE may be used by the SMF to identify PDU sessions affected by a failure or restart of the I-SMF service (see clauses 6.2 and 6.3 of 3GPP TS 23.527 [24]). | DTSSA |

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|---|------------------------|---|------|---|-------|
| dlServingPlmnRateCtl | integer | C | 0..1 | <p>The IE shall be present when the Serving PLMN Rate Control for Downlink data packets has changed since last update to the H-SMF (for HR PDU session) or SMF (for PDU sessions with an I-SMF).</p> <p>When present, this IE shall contain the maximum allowed number of Downlink NAS Data PDUs per deci hour of the serving PLMN, as specified in clause 5.31.14.2 of 3GPP TS 23.501 [2]. If Serving PLMN Rate Control is disabled, the IE shall be set to null value.</p> <p>Minimum: 10</p> | CIOT |
| dnaiList | array(Dnai) | C | 1..N | <p>This IE shall be present over N16a during UE Triggered Service Request procedure with I-SMF change, Xn based handover and Inter NG-RAN node N2 based handover with I-SMF change (see clauses 4.23.4.3, 4.23.11.3 and 4.23.7.3.3 in 3GPP TS 23.502 [3]).</p> <p>When present, it shall include the list of DNAs supported by the new I-SMF.</p> | DTSSA |
| supportedFeatures | SupportedFeatures | C | 0..1 | <p>This IE shall be present if the vsmfld or the ismfld is present (i.e. during a change of V-SMF or I-SMF) and at least one optional feature defined in clause 6.1.8 is supported by the new V-SMF or I-SMF.</p> <p>If this IE is absent when the vsmfld or the ismfld is present, the new V-SMF or I-SMF respectively shall be considered as not supporting any optional feature.</p> | |
| roamingChargingProfile | RoamingChargingProfile | O | 0..1 | <p>This IE may be present during an inter-PLMN V-SMF change. When present, it shall contain the Roaming Charging Profile applicable in the VPLMN (see clauses 5.1.9.1, 5.2.1.7 and 5.2.2.12.2 of 3GPP TS 32.255 [25]).</p> | |
| moExpDataCounter | MoExpDataCounter | C | 0..1 | <p>This IE shall be present if received from AMF. When present, this IE shall contain the MO Exception Data Counter.</p> | CIOT |
| vplmnQos | VplmnQos | O | 0..1 | <p>When present, this IE shall contain the VPLMN QoS to be applied to the QoS flow with default QoS of the PDU Session.</p> | VQOS |
| securityResult | SecurityResult | C | 0..1 | <p>This IE shall be present if received from NG-RAN. When present, this IE shall contain the Security Result associated to the PDU session. See clause 9.3.1.59 of 3GPP TS 38.413 [9].</p> | |
| upSecurityInfo | UpSecurityInfo | C | 0..1 | <p>This IE shall be present if received from NG-RAN during Xn handover procedure (see clause 5.2.2.8.2.16).</p> <p>When present, this IE shall contain the User Plane Security Information associated to the PDU session. See clause 9.3.1.60 of 3GPP TS 38.413 [9].</p> | |
| <p>NOTE 1: In shared networks, the PLMN ID that is communicated in this IE shall be that of the selected Core Network Operator.</p> <p>NOTE 2: An SMF complying with this version of the specification should report secondary RAT usage using the secondaryRatUsageInfo attribute that replaces the secondaryRatUsageReport attribute.</p> | | | | | |

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 | Applicability |
|---------------------------------|-------------------------------|---|-------------|--|---------------|
| n1SmlInfoToUe | RefToBinaryData | C | 0..1 | This IE shall be present if the H-SMF/SMF needs to send N1 SM information to the UE that does not need to be interpreted by the V-SMF/I-SMF. When present, this IE shall reference the n1SmlInfoToUe binary data (see clause 6.1.6.4.4). | |
| n4Info | N4Information | O | 0..1 | This IE may be present if the SMF needs to send N4 response information to the I-SMF (e.g. related with traffic usage reporting). | DTSSA |
| n4InfoExt1 | N4Information | O | 0..1 | This IE may be present if the SMF needs to send additional N4 response information to the I-SMF (e.g. related with traffic usage reporting). | DTSSA |
| n4InfoExt2 | N4Information | O | 0..1 | This IE may be present if the SMF needs to send additional N4 response information to the I-SMF (e.g. related with traffic usage reporting). | DTSSA |
| dnaiList | array(Dnai) | C | 1..N | This IE shall be present over N16a during UE Triggered Service Request procedure with I-SMF change, Xn based handover and Inter NG-RAN node N2 based handover with I-SMF change (see clauses 4.23.4.3, 4.23.11.3 and 4.23.7.3.3 in 3GPP TS 23.502 [3]). When present, it shall include the DNAI(s) of interest for this PDU Session. | DTSSA |
| supportedFeatures | SupportedFeatures | C | 0..1 | This IE shall be present if the supportedFeatures IE was received in the request and at least one optional feature defined in clause 6.1.8 is supported by the updated PDU session resource. | |
| roamingChargingProfile | RoamingChargingProfile | O | 0..1 | This IE may be present during an inter-PLMN V-SMF change. When present, it shall contain the Roaming Charging Profile selected by the HPLMN (see clauses 5.1.9.1, 5.2.1.7 and 5.2.2.12.2 of 3GPP TS 32.255 [25]). | |
| ipv6MultiHomingInd | boolean | C | 0..1 | This IE shall be present over N16a, if available and an I-SMF has been changed during the following procedures: Registration, Service Request, Xn based handover, Inter NG-RAN node N2 based handover (see clause 4.23 of 3GPP TS 23.502 [3]). When present, it shall be set as follows: - true: IPv6 multi-homing is permitted. - false (default): IPv6 multi-homing is not allowed. | DTSSA |
| upSecurity | UpSecurity | C | 0..1 | This IE shall be present if the "upSecurityInfo" IE was received in the request (i.e. during an Xn handover), and there is a mismatch between security policy received and stored (see clause 5.2.2.8.2.16). When present, this IE shall indicate the security policy for integrity protection and encryption for the user plane of the PDU session. | |
| maxIntegrityProtectedDataRateUl | MaxIntegrityProtectedDataRate | C | 0..1 | This IE shall be present if the upSecurity IE is present and indicates that integrity protection is preferred or required. When present, it shall indicate the maximum integrity protected data rate supported by the UE for uplink. | |
| maxIntegrityProtectedDataRateDl | MaxIntegrityProtectedDataRate | C | 0..1 | This IE shall be present if the upSecurity IE is present and indicates that integrity protection is preferred or required. When present, it shall indicate the maximum integrity protected data rate supported by the UE for downlink. | |

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 | Applicability |
|-------------------------|--|---|-------------|---|---------------|
| 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: <ul style="list-style-type: none"> - the last known 3GPP access user location; and - the timestamp, if available, indicating the UTC time when the addUeLocation information was acquired. | |
| secondaryRatUsageReport | array(SecondaryRatUsageReport) | O | 1..N | This IE may be present to report usage data for a secondary RAT for QoS flows. (NOTE) | |
| secondaryRatUsageInfo | array(SecondaryRatUsageInfo) | O | 1..N | This IE may be present to report usage data for a secondary RAT for QoS flows and/or the whole PDU session. | |
| n4Info | N4Information | O | 0..1 | This IE may be present if the I-SMF needs to send N4 information (e.g. traffic usage reporting) to the SMF for traffic offloaded at a PSA controlled by an I-SMF. | DTSSA |
| n4InfoExt1 | N4Information | O | 0..1 | This IE may be present if the I-SMF needs to send additional N4 information (e.g. traffic usage reporting) to the SMF for traffic offloaded at a PSA controlled by an I-SMF. | DTSSA |
| n4InfoExt2 | N4Information | O | 0..1 | This IE may be present if the I-SMF needs to send additional N4 information (e.g. traffic usage reporting) to the SMF for traffic offloaded at a PSA controlled by an I-SMF. | DTSSA |
| NOTE: | An SMF complying with this version of the specification should report secondary RAT usage using the secondaryRatUsageInfo attribute that replaces the secondaryRatUsageReport attribute. | | | | |

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 clause 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 clause 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 clause 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 | Applicability |
|---------------------------|------------------------------------|---|-------------|--|---------------|
| 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/SMF requests the V-SMF/I-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. | |
| n1SmlInfoToUe | RefToBinaryData | C | 0..1 | This IE shall be present if the H-SMF/SMF needs to send N1 SM information to the UE that does not need to be interpreted by the V-SMF/I-SMF. When present, this IE shall reference the n1SmlInfoToUe binary data (see clause 6.1.6.4.4). | |
| alwaysOnGranted | boolean | C | 0..1 | <p>This IE shall be present if:</p> <ul style="list-style-type: none"> - an alwaysOnRequested IE was received in an earlier V-SMF/I-SMF initiated Update request to change the PDU session to an always-on PDU session; or - the H-SMF/SMF determines, based on local policy, that the PDU session needs to be established as an always-on PDU session. <p>When present, it shall be set as follows:</p> <ul style="list-style-type: none"> - true: always-on PDU session granted. - false (default): always-on PDU session not granted. | |

| | | | | | |
|------------------------|---------------------|---|------|---|-------|
| hsmfPduSessionUri | Uri | C | 0..1 | <p>This IE shall be included if:</p> <ul style="list-style-type: none"> - an Update Request is sent to the V-SMF/I-SMF before the Create Response (e.g. for EPS bearer ID allocation as specified in clause 4.11.1.4.1 of 3GPP TS 23.502 [3], or for Secondary authorization/authentication as specified in clause 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/I-SMF. <p>This IE shall not be included otherwise.</p> <p>When present, this IE shall include the URI representing the PDU session resource in the H-SMF.</p> | |
| supportedFeatures | SupportedFeatures | C | 0..1 | This IE shall be present if "hsmfPduSessionUri" IE is present and at least one optional feature defined in clause 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/I-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 clause 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/I-SMF may use when sending the NAS message (PDU Session Release Command) towards the UE. | |
| maReleaseInd | MaReleaseIndication | C | 0..1 | This IE shall be present if one access of a MA PDU session is to be released, when H-SMF or SMF initiates MA PDU session release over one access. When present, it shall indicate the access requested to be released. | MAPDU |
| maAcceptedInd | boolean | C | 0..1 | <p>This IE shall be present if a request to modify a single access PDU session into a MA PDU session was accepted (see clause 4.22.6.3 of 3GPP TS 23.502 [3]).</p> <p>When present, it shall be set as follows:</p> <ul style="list-style-type: none"> - true: MA PDU session - false (default): single access PDU session | MAPDU |
| additionalCnTunnelInfo | TunnelInfo | C | 0..1 | <p>This IE shall be present for a MA-PDU session if the UE requested to establish resources for a MA PDU session over the other access.</p> <p>When present, it shall contain additional N9 tunnel information of the UPF controlled by the H-SMF or SMF.</p> | MAPDU |
| dnaiList | array(Dnai) | C | 0..N | <p>This IE shall be present if received from PCF during I-SMF Related Procedures with PCF (see clause 4.23.6.2 in 3GPP TS 23.502 [3]).</p> <p>When present, the IE shall include a list of DNAI(s) the SMF deems relevant for the PDU Session.</p> | DTSSA |
| n4Info | N4Information | O | 0..1 | This IE may be present if the SMF needs to send N4 information to the I-SMF for the control of traffic offloaded at a PSA controlled by an I-SMF. | DTSSA |

| | | | | | |
|--|---------------|---|------|--|-------|
| n4InfoExt1 | N4Information | O | 0..1 | This IE may be present if the SMF needs to send additional N4 information to the I-SMF for the control of traffic offloaded at a PSA controlled by an I-SMF. | DTSSA |
| n4InfoExt2 | N4Information | O | 0..1 | This IE may be present if the SMF needs to send additional N4 information to the I-SMF for the control of traffic offloaded at a PSA controlled by an I-SMF (e.g. during a change of PSA). | DTSSA |
| smallDataRateControl Enabled | boolean | C | 0..1 | This IE shall be present if the applicability of small data rate control on the PDU session changes. When present, it shall be set as follows: - true: small data rate control is applicable. - false: small data rate control is not applicable. | CIOT |
| 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 n1SmlInfoToUE 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 | Applicability |
|----------------------------|--------------------------------|---|-------------|---|---------------|
| qosFlowsAddModList | array(QosFlowItem) | C | 1..N | This IE shall be present if QoS flows have been successfully established or modified. For each GBR QoS flow, the V-SMF/I-SMF may also indicate an alternative QoS profile which the NG-RAN currently fulfils in the currentQosProfileIndex IE. | |
| 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/I-SMF has received known N1 SM information from the UE that does not need to be interpreted by the V-SMF/I-SMF. When present, this IE shall reference the n1SmInfoFromUe binary data (see clause 6.1.6.4.4). | |
| unknownN1SmInfo | RefToBinaryData | C | 0..1 | This IE shall be present if the V-SMF/I-SMF has received unknown N1 SM information from the UE. When present, this IE shall reference the unknownN1SmInfo binary data (see clause 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: <ul style="list-style-type: none"> - 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 for QoS flows. (NOTE) | |
| secondaryRatUsageInfo | array(SecondaryRatUsageInfo) | O | 1..N | This IE may be present to report usage data for a secondary RAT for QoS flows and/or the whole PDU session. | |
| n4Info | N4Information | O | 0..1 | This IE may be present if the I-SMF needs to send N4 response information to the SMF for the control of traffic offloaded at a PSA controlled by an I-SMF. | DTSSA |
| n4InfoExt1 | N4Information | O | 0..1 | This IE may be present if the I-SMF needs to send additional N4 response information to the SMF for the control of traffic offloaded at a PSA controlled by an I-SMF. | DTSSA |

| | | | | | |
|--|---------------|---|------|---|-------|
| n4InfoExt2 | N4Information | O | 0..1 | This IE may be present if the I-SMF needs to send additional N4 response information to the SMF for the control of traffic offloaded at a PSA controlled by an I-SMF (e.g. during a change of PSA). | DTSSA |
| NOTE: An SMF complying with this version of the specification should report secondary RAT usage using the secondaryRatUsageInfo attribute that replaces the secondaryRatUsageReport attribute. | | | | | |

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 | Applicability |
|---------------------|---------------------|---|-------------|---|---------------|
| statusInfo | StatusInfo | M | 1 | This IE shall contain status information about the PDU session. | |
| smallDataRateStatus | SmallDataRateStatus | C | 0..1 | This IE shall be present, if the NF Service Consumer has indicated support of CIoT and if the status is available. When present, it shall indicate the current small data rate control status for the PDU session. | CIOT |
| apnRateStatus | ApnRateStatus | C | 0..1 | This IE shall be present, if the NF Service Consumer has indicated support of CIoT and if the status is available. When present, it shall indicate the current APN rate control status for the PDN connection (APN rates are shared by all PDN connections of the UE to this APN). | CIOT |

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. |
| currentQosProfileIndex | Integer | O | 0..1 | When present, this IE shall indicate the index of the currently fulfilled alternative QoS profile. |

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 | Applicability |
|--------------------|-------------------|---|-------------|---|---------------|
| 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 clause 9.11.4.13 of 3GPP TS 24.501 [7] (starting from octet 4). | |
| 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 clause 9.11.4.12 of 3GPP TS 24.501 [7] (starting from octet 1), 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. | |
| associatedAnType | QosFlowAccessType | O | 0..1 | This IE may be present if the QoS Flow belongs to MA PDU session. When present, this IE shall contain the indicated access type associated with the QoS Flow. | MAPDU |

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 | Applicability |
|--------------------|-------------------|---|-------------|--|---------------|
| 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 clause 9.11.4.13 of 3GPP TS 24.501 [7] (starting from octet 4). | |
| 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 clause 9.11.4.12 of 3GPP TS 24.501 [7] (starting from octet 1), 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. | |
| associatedAnType | QosFlowAccessType | O | 0..1 | This IE may be present if the QoS Flow belongs to MA PDU session. When present, this IE shall contain the indicated access type associated with the QoS Flow. | MAPDU |

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 clause 9.11.4.13 of 3GPP TS 24.501 [7] (starting from octet 4). |
| 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 clause 9.11.4.12 of 3GPP TS 24.501 [7] (starting from octet 1), 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 clause 9.3.1.12 of 3GPP TS 38.413 [9]. |
| qosMonitoringReq | QosMonitoringReq | O | 0..1 | This IE may be present to indicate the measurement of UL, or DL, or both UL/DL delays for the associated QoS flow. See clause 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. | | | | |

Editor's note: It is FFS how to support the QoS Monitoring Reporting Frequency on N16a for QoS Flow QoS Monitoring, the QoS monitoring policy and QoS Monitoring Result on N16a for GTP-U Path QoS Monitoring.

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 Guaranteed Bit Rate in Downlink. See 3GPP TS 23.501 [2]. |
| guaFbrUl | BitRate | M | 1 | This IE shall contain the Guaranteed 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 GBR 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 indicate the maximum rate for lost packets that can be tolerated in the Uplink direction. See 3GPP TS 23.501 [2]. |
| alternativeQosProfileList | array(Alternative QosProfile) | O | 0..N | When present, this IE shall indicate alternative QoS profiles for the QoS flow. An empty array shall be interpreted as a request to delete any list of alternative QoS profiles associated with this QoS flow. |

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 | |
| currentQosProfileIndex | Integer | O | 0..1 | When present, this IE shall indicate the index of the currently fulfilled alternative QoS profile. |

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 | Applicability |
|---------------------|---------------------|---|-------------|--|---------------|
| ueEpsPdnConnection | EpsPdnCnxContainer | M | 1 | This IE shall contain an MME/SGSN UE EPS PDN Connection including the mapped EPS bearer context(s), if the SM context type was not present in the request or if it was present and indicated a request to retrieve the UE EPS PDN Connection. This IE shall be set to an empty string if the SM context type was present in the request and indicated a request to retrieve the complete SM context. | |
| smContext | SmContext | C | 0..1 | This IE shall be present if the SM context type was present in the request and indicated a request to retrieve the complete SM context. | DTSSA |
| smallDataRateStatus | SmallDataRateStatus | C | 0..1 | This IE shall be present during N26 based Interworking Procedures, if in the request the smContextType is set to "EPS_PD_N_CONNECTION" and if the status is available (see clauses 4.11.1.1 and 4.11.1.3.2 in 3GPP TS 23.502 [3]). When present, it shall indicate the small data rate control status for the PDU session. | CIOT |
| apnRateStatus | ApnRateStatus | C | 0..1 | This IE shall be present during N26 based Interworking Procedures, if in the request the smContextType is set to "EPS_PD_N_CONNECTION" and if the status is available (see clauses 4.11.1.1 and 4.11.1.3.2 in 3GPP TS 23.502 [3]). When present, it shall indicate the APN rate control status for the PDN connection (APN rates are shared by all PDN connections of the UE to this APN). | CIOT |
| dlDataWaitingInd | boolean | C | 0..1 | This IE shall be present, if the SM context type was not present in the request or if it was present and indicated a request to retrieve the UE EPS PDN Connection, and if downlink data buffered in the SMF/UPF needs to be forwarded to EPS (see clause 4.11.1.3.2A of 3GPP TS 23.502 [3]). When present, it shall be set as follows: - true: DL data needs to be sent to the UE; - false (default): no DL data needs to be sent to the UE. | CIOT |

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 | Applicability |
|----------------|------------|---|-------------|---|---------------|
| 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. | |
| anType | AccessType | C | 0..1 | This IE shall be present over N16a/N16 in MA PDU session scenarios, to indicate the access type associated to the N9 tunnel. | MAPDU |

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 | Applicability |
|-------------------|-------------------|---|-------------|---|---------------|
| 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. | |
| cnAssistedRanPara | CnAssistedRanPara | C | 0..1 | This attribute shall be present when the cause value is "CN_ASSISTED_RAN_PARAMETER_TUNING". When present, this IE shall include the SMF derived CN assisted RAN parameters tuning. | CARPT |
| anType | AccessType | C | 0..1 | This IE shall indicate the access type of PDU session. | HOFAIL |

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 | Applicability |
|---|------------------------|---|-------------|---|---------------|
| 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 clause 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 clause 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 clause 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 clause 6.3 of 3GPP TS 23.527 [24]). | |
| n4Info | N4Information | O | 0..1 | This IE may be present if the I-SMF needs to send N4 response information to the SMF for the control of traffic offloaded at a PSA controlled by an I-SMF. | DTSSA |
| n4InfoExt1 | N4Information | O | 0..1 | This IE may be present if the I-SMF needs to send additional N4 response information to the SMF for the control of traffic offloaded at a PSA controlled by an I-SMF. | DTSSA |
| n4InfoExt2 | N4Information | O | 0..1 | This IE may be present if the I-SMF needs to send additional N4 response information to the SMF for the control of traffic offloaded at a PSA controlled by an I-SMF (e.g. during a change of PSA). | DTSSA |
| 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] (starting from octet 1). |
| 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] (starting from octet 1). It shall be present, if it is available. |
| linkedBearerId | EpsBearerId | C | 0..1 | An implementation complying with this version of the specification shall include this attribute and set it to the default bearer ID associated with the PDU session moved to EPS. |

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] (starting from octet 1). |
| 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] (starting from octet 1). |

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 clause 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 during Xn based handover procedure with I-SMF/V-SMF insertion, change or removal. When present, it shall reference the N2 SM Message binary data (see clause 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. |
| recoveryTime | DateTime | O | 0..1 | Timestamp when the SMF service instance was (re)started (see clause 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 clause 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 clause 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 clauses 5.2.2.3.2 and 5.2.2.3.16. |
| recoveryTime | DateTime | O | 0..1 | Timestamp when the SMF service instance was (re)started (see clause 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 clause 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 clause 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 clause 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. |
| ethernetSupported | boolean | C | 0..1 | This IE shall be present if Ethernet PDN type is supported. It may be present otherwise. When present, this IE shall be set as follows: - true: Ethernet PDN type is supported; - false (default): Ethernet PDN type is not supported. |

6.1.6.2.39 Type: SmContext

Table 6.1.6.2.39-1: Definition of type SmContext

| Attribute name | Data type | P | Cardinality | Description |
|------------------|-------------------------|---|-------------|---|
| pduSessionId | PduSessionId | M | 1 | This IE shall contain the PDU Session ID. |
| dnn | Dnn | M | 1 | This IE shall contain the DNN of the PDU session. The DNN shall be the full DNN (i.e. with both the Network Identifier and Operator Identifier) for a HR PDU session, and it should be the full DNN in LBO and non-roaming scenarios. If the Operator Identifier is absent, the serving core network operator shall be assumed. |
| sNssai | Snssai | M | 1 | This IE shall contain the S-NSSAI for the serving PLMN. |
| hplmnSnssai | Snssai | C | 0..1 | This IE shall be present for a HR PDU session. When present, it shall contain the S-NSSAI for the HPLMN. |
| pduSessionType | PduSessionType | M | 1 | This IE shall indicate the PDU session type. |
| gpsi | Gpsi | C | 0..1 | This IE shall be present if it is available. When present, it shall contain the user's GPSI. |
| hSmfUri | Uri | C | 0..1 | This IE shall be present in HR roaming scenarios. When present, it shall contain the API URI of the Nsmf_PDUSession service of the H-SMF. The API URI shall be formatted as specified in clause 6.1.1. |
| smfUri | Uri | C | 0..1 | This IE shall be present for a PDU session with an I-SMF. When present, it shall contain the API URI of the Nsmf_PDUSession service of the SMF. The API URI shall be formatted as specified in clause 6.1.1. |
| pduSessionRef | Uri | C | 0..1 | This IE shall be present for a HR PDU session or a PDU session with an I-SMF. When present, this IE shall include the absolute URI of the PDU Session in H-SMF or SMF, including apiRoot (see clause 6.1.3.6.2) |
| 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 and/or UE Policy). It shall be the V-PCF in LBO roaming and the H-PCF in HR roaming. |
| pcfGroupId | NfGroupId | O | 0..1 | This IE may be present in non-roaming and HR roaming scenarios. When present, this IE shall contain the identity of the (home) PCF group serving the UE for Access and Mobility Policy and/or UE Policy. |
| pcfSetId | NfSetId | O | 0..1 | When present, it shall contain the NF Set ID of the PCF serving the UE for Access and Mobility Policy and/or UE Policy. It shall be the V-PCF Set ID in LBO roaming and the H-PCF Set ID in HR roaming. |
| selMode | DnnSelectionMode | C | 0..1 | This IE shall be present if it is available. When present, it shall indicate whether the DNN corresponds to an explicitly subscribed DNN or to the usage of a wildcard subscription. |
| 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. |
| sessionAmbr | Ambr | M | 1 | This IE shall contain the Session AMBR granted to the PDU session. |
| qosFlowsList | array(QosFlowSetupItem) | M | 1..N | This IE shall contain the set of QoS flow(s) established for the PDU session. It shall contain at least the QoS flow associated to the default QoS rule. The qosRules attribute of each QosFlowSetupItem shall be set to an empty string. |
| hSmfInstanceId | NfInstanceId | C | 0..1 | This IE shall be present for a HR PDU session. When present, it shall contain the identifier of the home SMF. |
| smfInstanceId | NfInstanceId | C | 0..1 | This IE shall be present for a PDU session with an I-SMF. When present, it shall contain the identifier of the SMF. |

| | | | | |
|-------------------------------|-------------------------------|---|------|---|
| enablePauseCharging | boolean | C | 0..1 | This IE shall be present for a HR PDU session, if available. When present, it shall indicate whether the use of Pause of Charging is enabled for the PDU session (see clause 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 a UE IPv4 address to the PDU session. |
| ueIpv6Prefix | Ipv6Prefix | C | 0..1 | This IE shall be present if a UE IPv6 prefix to the PDU session. |
| 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. |
| 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 available. When present, it shall indicate whether this is an always On PDU session and 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. |
| hSmfServiceInstanceIcd | string | O | 0..1 | This IE may be present for a HR PDU session. When present, this IE shall contain the serviceInstanceIcd 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 clause 6.2 of 3GPP TS 23.527 [24]). |
| smfServiceInstanceIcd | string | O | 0..1 | This IE may be present for a PDU session with an I-SMF. When present, this IE shall contain the serviceInstanceIcd of the SMF service instance serving the PDU session. This IE may be used by the I-SMF to identify PDU sessions affected by a failure or restart of the SMF service (see clause 6.2 of 3GPP TS 23.527 [24]). |
| recoveryTime | DateTime | O | 0..1 | This IE may be present if available. When present, this IE shall indicate the timestamp when the H-SMF or SMF service instance serving the PDU session was (re)started (see clause 6.3 of 3GPP TS 23.527 [24]). |
| forwardingInd | boolean | C | 0..1 | This IE shall be present, when downlink data packets are buffered at I-UPF. The SMF or I-SMF shall use this IE to inform the NF service consumer that a forwarding tunnel is needed for receiving the buffered downlink data packets, as specified in clause 4.23.4 of 3GPP TS 23.502 [3]. When present, this IE shall be set as follows: - true: a forwarding tunnel is needed for sending buffered downlink data packets; - false (default): forwarding tunnel is not needed |
| psaTunnelInfo | TunnelInfo | C | 0..1 | This IE shall be present if available. When present, this IE shall contain the N9 tunnel information of PDU Session Anchor UPF controlled by SMF or H-SMF. |
| homeProvidedChargingId | string | C | 0..1 | This IE shall be present for a HR PDU session, if available. When present, it shall contain the Home provided Charging ID of the PDU session (see 3GPP TS 32.255 [25]). |

| | | | | |
|------------------------|------------------------|---|------|---|
| chargingInfo | ChargingInformation | C | 0..1 | This IE shall be present for a HR PDU session, if available and if the NF Service Consumer requesting the SM Context pertains to the same PLMN (i.e. if the Retrieve SM Context Request does not contain the servingNetwork attribute set to a different PLMN ID). When present, it shall contain the addresses of the V-CHF used for the PDU session. |
| roamingChargingProfile | RoamingChargingProfile | C | 0..1 | This IE shall be present for a HR PDU session, if available and if the NF Service Consumer requesting the SM Context pertains to the same PLMN (i.e. if the Retrieve SM Context Request does not contain the servingNetwork attribute set to a different PLMN ID). When present, it shall contain the Roaming Charging Profile selected by the HPLMN (see clauses 5.1.9.1, 5.2.1.7 and 5.2.2.12.2 of 3GPP TS 32.255 [25]). |
| nefExtBufSupportInd | boolean | C | 0..1 | This IE shall be present with value "true", if the anchor NEF has indicated support of Extended Buffering for mobile terminated data during SMF-NEF connection establishment. When present, this IE shall be set as following: - true: Extended Buffering supported by NEF - false (default): Extended Buffering not supported by NEF |

6.1.6.2.40 Type: ExemptionInd

The ExemptionInd indicates that the included NAS SM message was exempted from one or more NAS SM congestion control, e.g. DNN, and/or S-NSSAI based congestion control, activated in the AMF.

Table 6.1.6.2.40-1: Definition of type ExemptionInd

| Attribute name | Data type | P | Cardinality | Description |
|--------------------|-----------|---|-------------|---|
| dnnCongestion | boolean | C | 0..1 | This IE shall be present and set to Yes if the included NAS Session Management message was exempted from the DNN based congestion activated in the AMF. true: Yes false (default): No |
| snsaiCongestion | boolean | C | 0..1 | This IE shall be present and set to Yes if the included NAS Session Management message was exempted from the S-NSSAI only based congestion activated in the AMF. true: Yes false (default): No |
| snsaiDnnCongestion | boolean | C | 0..1 | This IE shall be present and set to Yes if the included NAS Session Management message was exempted from the S-NSSAI and DNN based congestion activated in the AMF. true: Yes false (default): No |

6.1.6.2.41 Type: PsaInformation

Table 6.1.6.2.41-1: Definition of type PsaInformation

| Attribute name | Data type | P | Cardinality | Description |
|----------------|---------------|---|-------------|---|
| psaInd | PsaIndication | M | 1 | This IE shall indicate, for a PDU session with an I-SMF, if a PSA and UL CL or BP is inserted or removed by the I-SMF. |
| dnaiList | array(Dnai) | M | 1..N | This IE shall indicate the DNAI(s) supported by the PSA that is inserted or removed. |
| uelpv6Prefix | Ipv6Prefix | C | 0..1 | This IE shall be present if a PSA and UL CL or BP is inserted or removed, and IPv6 multi-homing applies to the PDU session. |
| psaUpfld | NfInstanceId | C | 0..1 | This IE shall be present if a PSA UPF is inserted by the I-SMF. When present, it shall contain the identifier of the PSA UPF. |

6.1.6.2.42 Type: DnaiInformation

Table 6.1.6.2.42-1: Definition of type DnaiInformation

| Attribute name | Data type | P | Cardinality | Description |
|---------------------|-----------|---|-------------|---|
| dnai | Dnai | M | 1 | |
| noDnaiChangeInd | boolean | C | 0..1 | This IE shall be sent by the SMF to the I-SMF during the insertion of a PSA and BP/UL CL controlled by I-SMF. When present, it shall be set as follows: - true: DNAI shall not be changed; - false: DNAI may be changed. |
| noLocalPsaChangeInd | boolean | C | 0..1 | This IE shall be sent by the SMF to the I-SMF during the insertion of a PSA and BP/UL CL controlled by I-SMF. When present, it shall be set as follows: - true: local PSA shall not be changed; - false: local PSA may be changed. |

6.1.6.2.43 Type: N4Information

Table 6.1.6.2.43-1: Definition of type N4Information

| Attribute name | Data type | P | Cardinality | Description |
|------------------|-----------------|---|-------------|--|
| n4MessageType | N4MessageType | M | 1 | This IE shall indicate the PFCP message signalled in the n4MessagePayload. |
| n4MessagePayload | RefToBinaryData | M | 1 | This IE shall reference the N4 Message Payload binary data (for the n4Info attribute) or the N4 Information Ext1 binary data (for the n4InfoExt1 attribute), see clause 6.1.6.4.5. |
| n4DnaiInfo | DnaiInformation | C | 0..1 | This IE shall be present if the N4 information relates to a PSA. When present, it shall indicate the DNAI related to the N4 Information. If this IE is not present, this indicates N4 information relates to an UL CL or BP. |

6.1.6.2.44 Type: IndirectDataForwardingTunnelInfo

Table 6.1.6.2.44-1: Definition of type IndirectDataForwardingTunnelInfo

| 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. |
| drbld | Drbld | C | 0..1 | This IE shall be present if this is an indirect data forwarding tunnel for a specific Data Radio Bearer (see clause 9.3.1.77 of 3GPP TS 38.413 [9]). This IE shall not present if the additionalTnINb IE is present. (NOTE) |
| additionalTnINb | AdditionalTnINb | C | 0..1 | This IE shall be present if this is an additional indirect data forwarding tunnel for multi-connectivity. When present, it shall be set to the value 1 to 3 to indicate whether this is the first, second or third additional indirect data forwarding tunnel for multi-connectivity. This IE shall not present if the drbld IE is present. (NOTE) |
| NOTE: If neither the drbld IE nor the additionalTnINb IE is present, the tunnel information shall correspond to the PDU session level indirect data forwarding tunnel (i.e. DL Forwarding UP TNL Information IE or UL Forwarding UP TNL Information IE of the Handover Request Acknowledge Transfer IE of clause 9.3.4.11 of 3GPP TS 38.413 [9]). | | | | |

6.1.6.2.45 Type: SmContextReleasedData

Table 6.1.6.2.45-1: Definition of type SmContextReleasedData

| Attribute name | Data type | P | Cardinality | Description | Applicability |
|---------------------|---------------------|---|-------------|---|---------------|
| smallDataRateStatus | SmallDataRateStatus | C | 0..1 | This IE shall be present, if the NF Service Consumer has indicated support of CIoT and if the status is available. When present, it shall indicate the current small data rate control status for the PDU session. | CIOT |
| apnRateStatus | ApnRateStatus | C | 0..1 | This IE shall be present, if the NF Service Consumer has indicated support of CIoT and if the status is available. When present, it shall indicate the current APN rate control status for the PDN connection (APN rates are shared by all PDN connections of the UE to this APN). | CIOT |

6.1.6.2.46 Type: ReleasedData

Table 6.1.6.2.46-1: Definition of type ReleasedData

| Attribute name | Data type | P | Cardinality | Description | Applicability |
|---------------------|---------------------|---|-------------|--|---------------|
| smallDataRateStatus | SmallDataRateStatus | C | 0..1 | This IE shall be present, if the NF Service Consumer has indicated support of CIoT and if available. When present, it shall indicate the current small data rate control status for the PDU session. | CIOT |
| apnRateStatus | ApnRateStatus | C | 0..1 | This IE shall be present, if the NF Service Consumer has indicated support of CIoT and if the status is available. When present, it shall indicate the current APN rate control status for the PDN connection (APN rates are shared by all PDN connections of the UE to this APN). | CIOT |
| n4Info | N4Information | O | 0..1 | This IE may be present if the SMF needs to send N4 information (e.g. acknowledgement of traffic usage reporting) to the I-SMF for traffic offloaded at a PSA controlled by an I-SMF. | DTSSA |
| n4InfoExt1 | N4Information | O | 0..1 | This IE may be present if the SMF needs to send additional N4 information (e.g. acknowledgement of traffic usage reporting) to the I-SMF for traffic offloaded at a PSA controlled by an I-SMF. | DTSSA |
| n4InfoExt2 | N4Information | O | 0..1 | This IE may be present if the SMF needs to send additional N4 information (e.g. acknowledgement of traffic usage reporting) to the I-SMF for traffic offloaded at a PSA controlled by an I-SMF. | DTSSA |

6.1.6.2.47 Type: SendMoDataReqData

Table 6.1.6.2.47-1: Definition of type SendMoDataReqData

| Attribute name | Data type | P | Cardinality | Description | Applicability |
|--|------------------|---|-------------|---|---------------|
| moData | RefToBinaryData | M | 1 | This IE shall reference the mobile originated data (see clause 6.1.6.4.6). | CIOT |
| moExpDataCounter | MoExpDataCounter | C | 0..1 | This IE shall be included if the UE has accessed the network by using "MO exception data" RRC establishment cause and when the AMF decides to send a non-zero value to the SMF. (NOTE) When present, this IE shall contain the MO Exception Data Counter. | CIOT |
| ueLocation | UserLocation | O | 0..1 | When present, this IE shall contain the user location. | CIOT |
| NOTE: The AMF increments the MO Exception Data Counter when the UE establishes/resumes RRC with "MO Exception Data" RRC cause. The AMF may defer sending the moExpDataCounter attribute to the SMF based on local configuration. The AMF resets the MO Exception Data Counter when receiving successful response from the SMF. The SMF however keeps incrementing the counter locally. | | | | | |

6.1.6.2.48 Type: CnAssistedRanPara

Table 6.1.6.2.48-1: Definition of type CnAssistedRanPara

| Attribute name | Data type | P | Cardinality | Description |
|--|----------------------------|---|-------------|---|
| stationaryIndication | StationaryIndication | O | 0..1 | Identifies whether the UE is stationary or mobile (see 3GPP TS 23.502 [3] clause 4.15.6.3). |
| communicationDurationTime | DurationSec | O | 0..1 | Indicates for how long the UE will normally stay in CM-Connected for data transmission (see 3GPP TS 23.502 [3] clause 4.15.6.3). |
| periodicTime | DurationSec | O | 0..1 | Identifies interval time of periodic communication (see 3GPP TS 23.502 [3] clause 4.15.6.3). |
| scheduledCommunicationTime | ScheduledCommunicationTime | O | 0..1 | Identifies time and day of the week when the UE is available for communication (see 3GPP TS 23.502 [3] clause 4.15.6.3). |
| scheduledCommunicationType | ScheduledCommunicationType | O | 0..1 | Indicates that the Scheduled Communication Type (see 3GPP TS 23.502 [3] clause 4.15.6.3). (NOTE 2) |
| trafficProfile | TrafficProfile | O | 0..1 | Identifies the type of data transmission: single packet transmission (UL or DL), dual packet transmission (UL with subsequent DL or DL with subsequent UL), and multiple packets transmission (see 3GPP TS 23.502 [3] clause 4.15.6.3). |
| batteryIndication | BatteryIndication | O | 0..1 | Indicates the power consumption type(s) of the UE (see 3GPP TS 23.502 [3] clause 4.15.6.3). |
| NOTE 1: At least one of optional parameters above shall be present. | | | | |
| NOTE 2: The value of attribute "scheduledCommunicationType" shall be used together with the value of "scheduledCommunicationTime". | | | | |

6.1.6.2.49 Type: UlclBpInformation

Table 6.1.6.2.49-1: Definition of type UlclBpInformation

| Attribute name | Data type | P | Cardinality | Description |
|----------------|---------------|---|-------------|--|
| ulclBpUpfId | NfnInstanceId | C | 0..1 | This IE shall be present if an UL CL or BP UPF separate from the local PSA is inserted by the I-SMF. When present, it shall contain the identifier of the UL CL or BP UPF. |

6.1.6.2.50 Type: TransferMoDataReqData

Table 6.1.6.2.50-1: Definition of type TransferMoDataReqData

| Attribute name | Data type | P | Cardinality | Description | Applicability |
|------------------|------------------|---|-------------|--|---------------|
| moData | RefToBinaryData | M | 1 | This IE shall reference the mobile originated data (see clause 6.1.6.4.6). | CIOT |
| moExpDataCounter | MoExpDataCounter | C | 0..1 | This IE shall be present if received from AMF. When present, this IE shall contain the MO Exception Data Counter. | CIOT |
| ueLocation | UserLocation | O | 0..1 | When present, this IE shall contain the user location. | CIOT |

6.1.6.2.51 Type: TransferMtDataReqData

Table 6.1.6.2.51-1: Definition of type TransferMtDataReqData

| Attribute name | Data type | P | Cardinality | Description | Applicability |
|----------------|-----------------|---|-------------|--|---------------|
| mtData | RefToBinaryData | M | 1 | This IE shall reference the mobile terminated data (see clause 6.1.6.4.7). | CIOT |

6.1.6.2.52 Type: TransferMtDataError

Table 6.1.6.2.52-1: Definition of type TransferMtDataError as a list of to be combined data types

| Data type | Cardinality | Description | Applicability |
|-----------------------|-------------|--|---------------|
| ProblemDetails | 1 | Detail information of the problem | |
| TransferMtDataAddInfo | 1 | Additional information to be returned in error response. | |

6.1.6.2.53 Type: TransferMtDataAddInfo

Table 6.1.6.2.53-1: Definition of type TransferMtDataAddInfo

| Attribute name | Data type | P | Cardinality | Description | Applicability |
|----------------|-------------|---|-------------|---|---------------|
| maxWaitingTime | DurationSec | C | 0..1 | This IE shall be present if available. When present, this IE shall contain the estimated maximum wait time (see clause 4.25.5 of 3GPP 23.502 [3]). | CIOT |

6.1.6.2.54 Type: VplmnQos

Table 6.1.6.2.54-1: Definition of type VplmnQos

| Attribute name | Data type | P | Cardinality | Description |
|----------------|-----------|---|-------------|--|
| 5qi | 5Qi | O | 0..1 | When present, this IE shall contain the suggested 5G QoS Identifier (5QI). |
| arp | Arp | O | 0..1 | When present, this IE shall contain the suggested Allocation and Retention Priority (ARP). |
| sessionAmbr | Ambr | O | 0..1 | When present, this IE shall contain the suggested Session AMBR. |
| maxFbrDl | BitRate | O | 0..1 | When present, this IE shall contain the suggested Maximum Bit Rate in Downlink. See 3GPP TS 23.501 [2]. |
| maxFbrUl | BitRate | O | 0..1 | When present, this IE shall contain the suggested Maximum Bit Rate in Uplink. See 3GPP TS 23.501 [2]. |
| guaFbrDl | BitRate | O | 0..1 | When present, this IE shall contain the suggested Guaranteed Bit Rate in Downlink. See 3GPP TS 23.501 [2]. |
| guaFbrUl | BitRate | O | 0..1 | This IE shall contain the suggested Guaranteed Bit Rate in Uplink. See 3GPP TS 23.501 [2]. |

6.1.6.2.55 Type: DdnFailureSubs

Table 6.1.6.2.55-1: Definition of type DdnFailureSubs

| Attribute name | Data type | P | Cardinality | Description |
|------------------------|--------------------------|---|-------------|--|
| ddnFailureSubsInd | boolean | M | 1 | When present, it shall be set as follows: - true: Notification of DDN failure is subscribed. - false (default): Notification of DDN failure is not subscribed. |
| ddnFailureSubsInfoList | array(DdnFailureSubInfo) | C | 1..N | This IE shall be present, if notification of DDN failure is subscribed, to provide DDN failure subscription details. |

6.1.6.2.56 Type: RetrieveData

Table 6.1.6.2.56-1: Definition of type RetrieveData

| Attribute name | Data type | P | Cardinality | Description | Applicability |
|------------------------|-----------|---|-------------|--|---------------|
| smallDataRateStatusReq | boolean | C | 0..1 | This IE shall be present and set to "true" if this is a request to retrieve the Small Data Rate Status of the PDU session. When present, it shall be set as follows: - true: small data rate control status is requested. - false (default): small data rate control status is not requested. | CIOT |

6.1.6.2.57 Type: RetrievedData

Table 6.1.6.2.57-1: Definition of type RetrievedData

| Attribute name | Data type | P | Cardinality | Description | Applicability |
|---------------------|---------------------|---|-------------|--|---------------|
| smallDataRateStatus | SmallDataRateStatus | C | 0..1 | This IE shall be present if the information has been requested in the request and is available. When present, it shall indicate the current small data rate control status for the PDU session. | CIOT |

6.1.6.2.58 Type: SecurityResult

Table 6.1.6.2.58-1: Definition of type SecurityResult

| Attribute name | Data type | P | Cardinality | Description |
|---------------------------------|------------------|---|-------------|---|
| integrityProtectionResult | ProtectionResult | C | 0..1 | This IE shall be included if available. If present, this IE indicates whether UP integrity protection is performed or not for the concerned PDU session. |
| confidentialityProtectionResult | ProtectionResult | C | 0..1 | This IE shall be included if available. If present, this IE indicates whether UP ciphering is performed or not for the concerned PDU session. |

6.1.6.2.59 Type: UpSecurityInfo

Table 6.1.6.2.59-1: Definition of type UpSecurityInfo

| Attribute name | Data type | P | Cardinality | Description |
|---------------------------------|-------------------------------|---|-------------|--|
| upSecurity | UpSecurity | M | 1 | This IE shall indicate the security policy for integrity protection and encryption for the user plane of the PDU session. See clause 9.3.1.60 of 3GPP TS 38.413 [9]. |
| maxIntegrityProtectedDataRateUI | MaxIntegrityProtectedDataRate | C | 0..1 | This IE shall be present if the upSecurity IE is present and indicates that integrity protection is preferred or required. See clause 9.3.1.60 of 3GPP TS 38.413 [9]. When present, it shall indicate the maximum integrity protected data rate supported by the UE for uplink. |
| maxIntegrityProtectedDataRateDI | MaxIntegrityProtectedDataRate | C | 0..1 | This IE shall be present if the upSecurity IE is present and indicates that integrity protection is preferred or required. When present, it shall indicate the maximum integrity protected data rate supported by the UE for downlink. |
| securityResult | SecurityResult | C | 0..1 | This IE shall be included if available. If present, this IE shall contain the Security Result associated to the PDU session. See clause 9.3.1.60 of 3GPP TS 38.413 [9]. |

6.1.6.2.60 Type: DdnFailureSubInfo

Table 6.1.6.2.60-1: Definition of type DdnFailureSubInfo

| Attribute name | Data type | P | Cardinality | Description |
|--------------------------|-----------------------------|---|-------------|--|
| notifyCorrelationId | string | M | 1 | This IE shall indicate the notification correlation Id provided by the NF service consumer (e.g. AMF) when subscribing to the notification of the DDN Failure, which shall be returned by the SMF when a DDN Failure is notified for this subscription. This parameter can be useful if the NF service consumer has multiple subscriptions for the same PDU session. |
| dddTrafficDescriptorList | array(DddTrafficDescriptor) | C | 1..N | This IE shall be present if it is received from the UDM. When present, it shall contain a list of Traffic Descriptors related to the event of DDN Failure for which the subscription applies. |

6.1.6.2.61 Type: AlternativeQosProfile

Table 6.1.6.2.61-1: Definition of type AlternativeQosProfile

| Attribute name | Data type | P | Cardinality | Description |
|-------------------|-----------------|---|-------------|---|
| index | Integer | M | 1 | When present, this IE shall contain the index identifying the alternative QoS profile. Minimum = 1. Maximum = 8. |
| guaFbrDI | BitRate | O | 0..1 | When present, this IE shall contain the Guaranteed Bit Rate in Downlink. See 3GPP TS 23.501 [2]. |
| guaFbrUI | BitRate | O | 0..1 | When present, this IE shall contain the Guaranteed Bit Rate in Uplink. See 3GPP TS 23.501 [2]. |
| packetDelayBudget | PacketDelBudget | O | 0..1 | When present, this IE shall indicate the packet delay budget. |
| packetErrRate | PacketErrRate | O | 0..1 | When present, this IE shall indicate the packet error rate. |

6.1.6.3 Simple data types and enumerations

6.1.6.3.1 Introduction

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

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 clause 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" 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". |
| EpsBearerContextStatus | string | EPS bearer context status, as defined in octets 3 and 4 of the EPS bearer context status IE in clause 9.9.2.1 of 3GPP TS 24.301 [27], in hexadecimal representation. Each character in the string shall take a value of "0" to "9" or "a" to "f" or "A" to "F" and shall represent 4 bits. The most significant character representing the 4 most significant bits of the EPS bearer context status shall appear first in the string, and the character representing the 4 least significant bit of the EPS bearer context status shall appear last in the string. Pattern: "[A-Fa-f0-9]{4}\$" Example: An EPS bearer context status IE where only the EBIs 2, 5, 6 and 9 are active shall be encoded as "6402". |
| DrbId | integer | Unsigned integer representing a Data Radio Bearer Identity, within the range 1 to 32, as specified in clause 9.3.1.53 of 3GPP TS 38.413 [9]. |
| AdditionalTnINb | integer | Unsigned integer, within the range 1 to 3, indicating whether this is the first, second or third additional indirect data forwarding tunnel for multi-connectivity. |
| ForwardingBearerContainer | string | String with format "byte" as defined in OpenAPI Specification [15], i.e. base64-encoded characters, encoding the Bearer Context IE within Context Acknowledge specified in Table 7.3.7-2 of 3GPP TS 29.274 [16]. |

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). |
| "SUSPENDED" | A N3 tunnel is suspended between the 5G-AN and UPF. |

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 clause 5.2.2.3.4.1. |
| "PREPARED" | A handover is prepared for the PDU session; see clause 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. |
| NOTE: | Clause 9.11.3.47 of 3GPP TS 24.501 [7] defines a specific Request type value in NAS PDUs for a MA PDU request. This shall be mapped to the maRequestInd attribute in the Create SM Context Request, Update SM Context Request, Create Request and Update Request. Accordingly, no corresponding value is defined in the RequestType enumeration. |

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 |
| "REL_DUE_TO_5G_AN_REQUEST" | 5G-AN Requested PDU Session Resource Release |

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. |
| "PDU_SESSION_RESUMED" | Resume the user plane connection of the PDU session. |
| "CN_ASSISTED_RAN_PARAMETER_TUNING" | SMF derived CN assisted RAN parameters tuning. |
| "ISMF_CONTEXT_TRANSFER" | The PDU session shall be transferred from old I-SMF to new I-SMF. |
| "SMF_CONTEXT_TRANSFER" | The PDU session shall be transferred from old SMF to new SMF. |
| "REL_DUE_TO_PS_TO_CS_HO" | Release due to 5G SRVCC from NG-RAN to 3GPP UTRAN, as specified in clause 6.5.4 of 3GPP TS 23.216 [35]. |
| "REL_DUE_TO_SUBSCRIPTION_CHANGE" | Release due to UE subscription changes, e.g. removal of subscribed DNNs, or ODB changes which causes PDU session release. |
| "HO_CANCEL" | Handover cancellation |
| "REL_DUE_TO_SLICE_NOT_AUTHORIZED" | Release due to Network Slice-Specific Authentication and Authorization failure or revocation. |
| "PDU_SESSION_HAND_OVER_FAILURE" | Failure to handover PDU session to another access |
| "DDN_FAILURE_STATUS" | DDN failure status reporting |
| "REL_DUE_TO_CP_ONLY_NOT_APPLICABLE" | Release due to Control Plane Only indication associated with PDU Session is not applicable any longer |

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 | Applicability |
|-------------------|--|---------------|
| "RELEASED" | The SM context or PDU session resource is released. | |
| "UNCHANGED" | The status of SM context or PDU session resource is not changed. | |
| "TRANSFERRED" | The SM context shall be transferred. | |
| "UPDATED" | The access type of PDU session is changed. | HOFAIL |

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. This may correspond to: - a PDU session or an MA-PDU session with a 3GPP access; or - a MA PDU Session with a non-3GPP access for a UE registered to the same PLMN over both 3GPP and non-3GPP accesses, i.e. served by the same AMF for both accesses. |
| "WITHOUT_N26" | The PDU session may possibly be moved to EPS, without N26 interface supported during EPS interworking procedures. This may correspond to: - a PDU session or an MA-PDU session with a 3GPP access; or - a MA PDU Session with a non-3GPP access for a UE registered to the same PLMN over both 3GPP and non-3GPP accesses, i.e. served by the same AMF for both accesses. |
| "IWK_NON_3GPP" | The PDU session via non-3GPP access may possibly be moved to EPS. |

6.1.6.3.12 Enumeration: N2SmlInfoType

Table 6.1.6.3.12-1: Enumeration N2SmlInfoType

| 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 Data Usage Report Transfer |
| "PDU_RES_MOD_IND_FAIL" | PDU Session Resource Modify Indication Unsuccessful 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 |

6.1.6.3.14 Enumeration: MaReleaseIndication

The enumeration MaReleaseIndication indicates the access type over which the MA PDU session is requested to be released.

Table 6.1.6.3.14-1: Enumeration MaReleaseIndication

| Enumeration value | Description |
|------------------------|---|
| "REL_MAPDU_OVER_3GPP" | The MA PDU session over 3GPP access is to be released or has been released. |
| "REL_MAPDU_OVER_N3GPP" | The MA PDU session over Non-3GPP access is to be released or has been released. |

6.1.6.3.15 Enumeration: SmContextType

The enumeration SmContextType represents the type of SM context information requested during a Retrieve SM Context service operation. It shall comply with the provisions defined in table 6.1.6.3.15-1.

Table 6.1.6.3.15-1: Enumeration SmContextType

| Enumeration value | Description |
|----------------------|--|
| "EPS_PDN_CONNECTION" | UE EPS PDN Connection. |
| "SM_CONTEXT" | Complete SM Context (i.e. 5G SM context including EPS context information as defined in clause 6.1.6.2.39) |

6.1.6.3.16 Enumeration: PsaIndication

The enumeration PsaIndication indicates whether a PSA and an UL CL or BP has been inserted or removed to/from the data path of a PDU session by an I-SMF. It shall comply with the provisions defined in table 6.1.6.3.16-1.

Table 6.1.6.3.16-1: Enumeration PsaIndication

| Enumeration value | Description |
|-------------------|--|
| "PSA_INSERTED" | A PSA and UL CL or BP has been inserted into the data path of the PDU session. |
| "PSA_REMOVED" | A PSA and UL CL or BP has been removed from the data path of the PDU session. |

6.1.6.3.17 Enumeration: N4MessageType

The enumeration N4MessageType indicates the PFCP message type sent within a N4 Message Payload. It shall comply with the provisions defined in table 6.1.6.3.17-1.

Table 6.1.6.3.17-1: Enumeration N4MessageType

| Enumeration value | Description |
|--------------------|-------------------------------------|
| "PFCP_SES_EST_REQ" | PFCP Session Establishment Request |
| "PFCP_SES_EST_RSP" | PFCP Session Establishment Response |
| "PFCP_SES_MOD_REQ" | PFCP Session Modification Request |
| "PFCP_SES_MOD_RSP" | PFCP Session Modification Response |
| "PFCP_SES_DEL_REQ" | PFCP Session Deletion Request |
| "PFCP_SES_DEL_RSP" | PFCP Session Deletion Response |
| "PFCP_SES_REP_REQ" | PFCP Session Report Request |
| "PFCP_SES_REP_RSP" | PFCP Session Report Response |

6.1.6.3.18 Enumeration: QosFlowAccessType

The enumeration QoSFlowAccessType indicates the access type which the QoS Flow is associated with.

Table 6.1.6.3.18-1: Enumeration QosFlowAccessType

| Enumeration value | Description |
|---------------------|---|
| "3GPP" | The QoS Flow is only associated with 3GPP access. |
| "NON_3GPP" | The QoS Flow is only associated with Non-3GPP access. |
| "3GPP_AND_NON_3GPP" | The QoS Flow is associated with both 3GPP access and Non-3GPP access. |

6.1.6.3.19 Enumeration: UnavailableAccessIndication

The enumeration UnavailableAccessIndication indicates the access type of the MA PDU session that is unavailable.

Table 6.1.6.3.19-1: Enumeration UnavailableAccessIndication

| Enumeration value | Description |
|--------------------|---|
| "3GA_UNAVAILABLE" | The 3GPP access of the MA PDU session is unavailable. |
| "N3GA_UNAVAILABLE" | The Non-3GPP access of the MA PDU session is unavailable. |

6.1.6.3.20 Enumeration: ProtectionResult

The enumeration ProtectionResult indicates whether the security policy indicated as "preferred" is performed or not.

Table 6.1.6.3.20-1: Enumeration ProtectionResult

| Enumeration value | Description |
|-------------------|---|
| "PERFORMED" | The security policy indicated as "preferred" is performed |
| "NOT_PERFORMED" | The security policy indicated as "preferred" is not performed |

6.1.6.3.21 Enumeration: QosMonitoringReq

The enumeration QosMonitoringReq indicates the measurement of UL, or DL, or both UL/DL delays.

Table 6.1.6.3.21-1: Enumeration QosMonitoringReq

| Enumeration value | Description |
|-------------------|-----------------------------------|
| "UL" | Measurement of UL delay. |
| "DL" | Measurement of DL delay. |
| "BOTH" | Measurement of both UL/DL delays. |

6.1.6.4 Binary data

6.1.6.4.1 Introduction

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

Table 6.1.6.4.1-1: Binary Data Types

| Name | Clause defined | Content type |
|--------------------|----------------|----------------|
| N1 SM Message | 6.1.6.4.2 | vnd.3gpp.5gnas |
| N2 SM Information | 6.1.6.4.3 | vnd.3gpp.ngap |
| n1SmInfoFromUe | 6.1.6.4.4 | vnd.3gpp.5gnas |
| n1SmInfoToUe | 6.1.6.4.4 | vnd.3gpp.5gnas |
| unknownN1SmInfo | 6.1.6.4.4 | vnd.3gpp.5gnas |
| N4 Message Payload | 6.1.6.4.5 | vnd.3gpp.pfcp |

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 clause 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 |
| PDU Session Resource Modify Indication Unsuccessful Transfer | 9.3.4.22 | 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 Data Usage Report Transfer | 9.3.4.23 | SECONDARY RAT DATA USAGE REPORT |

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.

Clause 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 Modification Request (NOTE 3) |
| 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) |
| Mapped EPS bearer contexts | 9.11.4.8 | PDU Session Modification Request |
| NOTE 1: The 5GSM capability IE shall be encoded as received from the UE. It may contain UE capabilities that the V-SMF (or I-SMF) only needs to transfer to the H-SMF (or 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 (or I-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/N16a and not within the n1SmInfoToUE binary data. | | |
| NOTE 3: This information is defined as a "V" IE (i.e. without a Type field) in other NAS messages, e.g. PDU Session Establishment Request, in which case it shall be sent as separate maximum integrity protected data rate IEs over N16/N16a 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 (NOTE) |
| Mapped EPS bearer contexts | 9.11.4.8 | PDU Session Establishment Accept PDU Session Modification Command |
| ATSSS container | 9.11.4.22 | PDU Session Establishment Accept PDU Session Modification Command |
| NOTE: This IE indicates the 5GSM cause the H-SMF (or SMF) requires the V-SMF (or I-SMF) to send to the UE. The V-SMF (or I-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/N16a 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 clause 11.2.1.1.3 of 3GPP TS 24.007 [8]) of a 5GS NAS IE uniquely identifies an IE in a given message.

6.1.6.4.5 N4 Message Payload

The N4 Message Payload shall encode a PFCP session related message as specified in 3GPP TS 29.244 [29], using the vnd.3gpp.pfcp content-type.

6.1.6.4.6 Mobile Originated Data

Mobile Originated Data shall encode the Data Contents of the CIoT small data container or Payload Container specified in 3GPP TS 24.501 [7], using the vnd.3gpp.5gnas content-type, as summarized in Table 6.1.6.4.6-1.

Table 6.1.6.4.6-1: Mobile Originated Data

| Mobile Originated Data | Reference (3GPP TS 24.501 [7]) | Related NAS SM message |
|--|-------------------------------------|---|
| Data contents in octet 4 to octet up to 257 of CIoT small data container contents. | 9.11.3.18B (Figure 9.11.3.18B.2) | Control Plane Service Request |
| Payload container contents in octets 4 to n | 9.11.3.39 (Figure 9.11.3.39.1) | Control Plane Service Request UL NAS Transport |

6.1.6.4.7 Mobile Terminated Data

Mobile Terminated Data shall encode the Data Contents of the Payload Container specified in 3GPP TS 24.501 [7], using the vnd.3gpp.5gnas content-type, as summarized in Table 6.1.6.4.7-1.

Table 6.1.6.4.7-1: Mobile Terminated Data

| Mobile Terminated Data | Reference (3GPP TS 24.501 [7]) | Related NAS SM message |
|---|-----------------------------------|------------------------|
| Payload container contents in octets 4 to n | 9.11.3.39 (Figure 9.11.3.39.1) | DL NAS Transport |

6.1.7 Error Handling

6.1.7.1 General

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

The Cause codes mapping performed by AMF between the following HTTP responses returned by the SMF services to the AMF and the 5GMM related values is specified in clause 4.3.2 of 3GPP TS 29.524 [34].

6.1.7.2 Protocol Errors

Protocol errors handling shall be supported as specified in clause 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. |
| 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. |
| 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 mobility 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. |
| DEFAULT_EPS_BEARER_INACTIVE | 403 Forbidden | It is used during EPS to 5GS mobility if the default EPS bearer context of the PDU session is reported as inactive by the UE in the epsBearerCtxStatus attribute. |
| 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. |
| LATE_OVERLAPPING_REQUEST | 403 Forbidden | The request is rejected because it collides with an existing SM context or PDU session context with a more recent origination timestamp (see clause 5.2.3.3). |
| DEFAULT_EBI_NOT_TRANSFERRED | 403 Forbidden | It is used during 5GS to EPS mobility if the EBI of the default EPS bearer is included in the notToTransferEbiList attribute. |
| CONTEXT_NOT_FOUND | 404 Not Found | It is used when no context corresponding to the request exists in the SMF. |
| HIGHER_PRIORITY_REQUEST_ONGOING | 409 Conflict | The request is rejected temporarily due to procedure for higher priority session in progress. |
| UE_IN_CM_IDLE_STATE | 409 Conflict | The request is rejected due to the UE being in CM-IDLE state for the PDU session associated to non-3GPP access. |
| 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. |
| UPF_NOT_RESPONDING | 504 Gateway Timeout | The request is rejected due to no response received from the UPF. |

| | | |
|------------------|---------------------------|--------------------------------------|
| UE_NOT_REACHABLE | 504 Gateway Timeout | The UE is not reachable for service. |
|------------------|---------------------------|--------------------------------------|

6.1.8 Feature Negotiation

The feature negotiation mechanism specified in clause 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. In scenarios with a change of NF Service Consumer (e.g. change of AMF, V-SMF or I-SMF change), the new 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 update an SM context or a PDU session resource to change the NF Service Consumer.

The SMF shall determine the supported features for the created SM context or PDU session resource, or for the updated SM context or PDU session resource in scenarios with a change of NF Service Consumer, as specified in clause 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 or the modification of the resource.

The syntax of the supportedFeatures attribute is defined in clause 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 |
|---|---------|-----|---|
| 1 | CIOT | O | <p>Cellular IoT</p> <p>Support of this feature implies the support of all the CIoT features specified in clause 5.31 of 3GPP TS 23.501 [2], including in particular corresponding SMF PDUSession service's extensions to support:</p> <ul style="list-style-type: none"> - NB-IoT and LTE-M RAT types; - Control Plane CIoT 5GS Optimisation; - Rate control of user data; - Idle mode mobility with data forwarding between EPS and 5GS using N26 interface. <p>The SMF shall indicate its support of this feature in supportedFeatures attribute in its profile registered in NRF.</p> <p>A NF service consumer (e.g. AMF) shall only select SMF(s) that supports this feature for PDU sessions with Control Plane CIoT 5GS Optimisation enabled.</p> |
| 2 | MAPDU | O | <p>Multi-Access PDU Session</p> <p>An SMF that supports this feature shall support the procedures specified in 3GPP TS 23.501 [2] and 3GPP TS 23.502 [3] related to Access Traffic Steering, Switching and Splitting.</p> |
| 3 | DTSSA | O | <p>Deployments Topologies with specific SMF Service Areas</p> <p>A NF Service Consumer and an SMF that support this feature shall support the procedures specified in clause 5.34 of 3GPP TS 23.501 [2] and in clause 4.23 of 3GPP TS 23.502 [3].</p> |
| 4 | CARPT | O | <p>SMF derived CN Assisted RAN parameters Tuning.</p> <p>A NF Service Consumer (e.g. AMF) and an SMF that support this feature shall support exchanging SMF derived CN assisted RAN parameters in Notify SM Context Status service operation (see clause 5.2.2.5.1).</p> |
| 5 | CTXTR | O | <p>This feature bit indicates whether the NF Service Consumer (e.g. AMF) and SMF supports Network Function/NF Service Context Transfer Procedures specified in clause 4.26 of 3GPP TS 23.502 [3].</p> <p>The SMF shall only trigger these context transfer procedures if the NF Service Consumer has indicated support of this feature.</p> |
| 6 | VQOS | O | <p>VPLMN QoS</p> <p>An SMF that supports this feature shall support QoS modification initiated by VPLMN, as specified in clause 4.3.3.3 of 3GPP TS 23.502 [3].</p> |
| 7 | HOFAIL | M | <p>This feature bit indicates whether the NF Service Consumer (e.g. AMF, V-SMF, I-SMF) and SMF supports the Notify (SM Context) Status procedure to indicate a handover failure with the ResourceStatus set to "UPDATED" between 3GPP access and non-3GPP access as specified in clauses 5.2.2.5.1 and 5.2.2.10.1.</p> <p>The SMF shall only trigger such a resource status notify procedure if the NF Service Consumer has indicated support of this feature.</p> |
| <p>Feature number: The order number of the feature within the supportedFeatures attribute (starting with 1).</p> <p>Feature: A short name that can be used to refer to the bit and to the feature.</p> <p>M/O: Defines if the implementation of the feature is mandatory ("M") or optional ("O").</p> <p>Description: A clear textual description of the feature.</p> | | | |

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], clause 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.

This Annex takes precedence when being discrepant to other parts of the specification with respect to the encoding of information elements and methods within the API(s).

NOTE: The semantics and procedures, as well as conditions, e.g. for the applicability and allowed combinations of attributes or values, not expressed in the OpenAPI definitions but defined in other parts of the specification also apply.

Informative copies of the OpenAPI specification files contained in this 3GPP Technical Specification are available on a Git-based repository hosted in ETSI Forge, that uses the GitLab software version control system (see 3GPP TS 29.501 [5] clause 5.3.1 and 3GPP TR 21.900 [7] clause 5B).

A.2 Nsmf_PDUSession API

```

openapi: 3.0.0

info:
  version: '1.1.0'
  title: 'Nsmf_PDUSession'
  description: |
    SMF PDU Session Service.
    © 2020, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: 3GPP TS 29.502 V16.4.0; 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 clause 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: # message with binary body part(s)
            schema:
              type: object
              properties: # Request parts
                jsonData:
                  $ref: '#/components/schemas/SmContextCreateData'
                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
    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
                            headers:
                                Location:
                                    required: true
                                    description: 'A URI pointing to the endpoint of another NF service consumer to
which the notification should be sent'
                                    schema:
                                        type: string
                        '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/{apiVersion}/sm-contexts/{smContextRef}'
      required: true
      schema:
        type: string

'307':
  description: temporary redirect
  headers:
    Location:
      description: 'An alternative URI of the resource located on an alternative service
instance within the SMF that was selected by the AMF'
      required: true
      schema:
        type: string

'308':
  description: permanent redirect
  headers:
    Location:
      description: 'An alternative URI of the resource located on an alternative service
instance within the SMF that was selected by the AMF'
      required: true
      schema:
        type: string

'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
          binaryDataN2SmMessage:
            type: string
            format: binary
      encoding:
        jsonData:
          contentType: application/json
        binaryDataN1SmMessage:
          contentType: application/vnd.3gpp.5gnas
      headers:
        Content-Id:
          schema:
            type: string
        binaryDataN2SmMessage:
          contentType: application/vnd.3gpp.ngap
      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
        binaryDataN2SmMessage:
          type: string
          format: binary
    encoding:
      jsonData:
        contentType: application/json
      binaryDataN1SmMessage:
        contentType: application/vnd.3gpp.5gnas
        headers:
          Content-Id:
            schema:
              type: string
      binaryDataN2SmMessage:
        contentType: application/vnd.3gpp.ngap
        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
          binaryDataN2SmMessage:
            type: string
            format: binary
      encoding:
        jsonData:
          contentType: application/json
        binaryDataN1SmMessage:
          contentType: application/vnd.3gpp.5gnas
          headers:
            Content-Id:
              schema:
                type: string
        binaryDataN2SmMessage:
          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 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
    binaryDataN2SmMessage:
      type: string
      format: binary
encoding:
  jsonData:
    contentType: application/json
  binaryDataN1SmMessage:
    contentType: application/vnd.3gpp.5gnas
  headers:
    Content-Id:
      schema:
        type: string
  binaryDataN2SmMessage:
    contentType: application/vnd.3gpp.ngap
  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
    binaryDataN2SmMessage:
      type: string
      format: binary
encoding:
  jsonData:
    contentType: application/json
  binaryDataN1SmMessage:
    contentType: application/vnd.3gpp.5gnas
  headers:
    Content-Id:
      schema:
        type: string
  binaryDataN2SmMessage:
    contentType: application/vnd.3gpp.ngap
  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
    binaryDataN2SmMessage:

```

```

        type: string
        format: binary
    encoding:
        jsonData:
            contentType: application/json
        binaryDataN1SmMessage:
            contentType: application/vnd.3gpp.5gnas
            headers:
                Content-Id:
                    schema:
                        type: string
        binaryDataN2SmMessage:
            contentType: application/vnd.3gpp.ngap
            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'
      '504':
        $ref: 'TS29571_CommonData.yaml#/components/responses/504'
    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:
      '200':
        description: successful release of a PDU session with content in the response
        content:
          application/json: # message without binary body part
            schema:
              $ref: '#/components/schemas/SmContextReleasedData'
      '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'

/sm-contexts/{smContextRef}/send-mo-data:
  post:
    summary: Send MO Data
    tags:
      - Individual SM context
    operationId: SendMoData
    parameters:
      - name: smContextRef
        in: path
        description: SM context reference
        required: true
        schema:
          type: string
    requestBody:
      description: representation of the payload of Send MO Data Request
      required: true
      content:
        multipart/related: # message with a binary body part
          schema:
            type: object
            properties:
              jsonData:
                $ref: '#/components/schemas/SendMoDataReqData'
              binaryMoData:
                type: string
                format: binary
            encoding:
              jsonData:
                contentType: application/json
              binaryMoData:
                contentType: application/vnd.3gpp.5gnas
            headers:
              Content-Id:
                schema:
                  type: string
    responses:
      '204':
        description: successful sending of MO data
      '400':
        $ref: 'TS29571_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29571_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29571_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29571_CommonData.yaml#/components/responses/404'
      '411':
        $ref: 'TS29571_CommonData.yaml#/components/responses/411'
      '413':
        $ref: 'TS29571_CommonData.yaml#/components/responses/413'
      '415':
        $ref: 'TS29571_CommonData.yaml#/components/responses/415'
      '429':
        $ref: 'TS29571_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29571_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29571_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29571_CommonData.yaml#/components/responses/default'

```



```

/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 or 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:
              $ref: '#/components/requestBodies/NotifyStatusRequestBody'
            responses:
              '204':
                description: successful notification of 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:
                $ref: 'TS29571_CommonData.yaml#/components/responses/default'
      statusNotification-ismf:
        '{$request.body#/ismfPduSessionUri}':
          post:
            summary: Notify Status

```

```

tags:
  - Individual PDU session (I-SMF)
operationId: NotifyStatus-ismf
requestBody:
  $ref: '#/components/requestBodies/NotifyStatusRequestBody'
responses:
  '204':
    description: successful notification of 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:
        $ref: '#/components/requestBodies/VsmfUpdateRequestBody'
      responses:
        '200':
          $ref: '#/components/responses/VsmfUpdateResponse200'
        '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'
        '409':
          $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'

update-ismf:
  '{$request.body#/ismfPduSessionUri}/modify':
    post:
      summary: Update (initiated by SMF)
      tags:
        - Individual PDU session (I-SMF)
      operationId: ModifyPduSession-ismf
      requestBody:
        $ref: '#/components/requestBodies/VsmfUpdateRequestBody'

```

```

responses:
  '200':
    $ref: '#/components/responses/VsmfUpdateResponse200'
  '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'

transferMtData:
  '{ $request.body#/vsmfPduSessionUri }/transfer-mt-data':
    post:
      summary: Transfer MT Data (by H-SMF)
      tags:
        - Individual PDU session (V-SMF)
      operationId: TransferMtData
      requestBody:
        description: representation of the payload of Transfer MT Data Request
        required: true
        content:
          multipart/related: # message with a binary body part
            schema:
              type: object
              properties:
                jsonData:
                  $ref: '#/components/schemas/TransferMtDataReqData'
                binaryMtData:
                  type: string
                  format: binary
            encoding:
              jsonData:
                contentType: application/json
              binaryMtData:
                contentType: application/vnd.3gpp.5gnas
            headers:
              Content-Id:
                schema:
                  type: string
      responses:
        '204':
          description: successful transferring of MT data
        '400':
          $ref: 'TS29571_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29571_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29571_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29571_CommonData.yaml#/components/responses/404'
        '411':
          $ref: 'TS29571_CommonData.yaml#/components/responses/411'
        '413':
          $ref: 'TS29571_CommonData.yaml#/components/responses/413'
        '415':
          $ref: 'TS29571_CommonData.yaml#/components/responses/415'
        '429':
          $ref: 'TS29571_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29571_CommonData.yaml#/components/responses/500'

```

```

    '503':
      $ref: 'TS29571_CommonData.yaml#/components/responses/503'
    '504':
      description: unsuccessful delivery of mobile terminated data - gateway timeout
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/TransferMtDataError'
      default:
        $ref: 'TS29571_CommonData.yaml#/components/responses/default'

transferMtData-ismf:
  '{$request.body#/ismfPduSessionUri}/transfer-mt-data':
    post:
      summary: Transfer MT Data (by SMF)
      tags:
        - Individual PDU session (I-SMF)
      operationId: TransferMtData-ismf
      requestBody:
        description: representation of the payload of Transfer MT Data Request
        required: true
        content:
          multipart/related: # message with a binary body part
            schema:
              type: object
              properties:
                jsonData:
                  $ref: '#/components/schemas/TransferMtDataReqData'
                binaryMtData:
                  type: string
                  format: binary
              encoding:
                jsonData:
                  contentType: application/json
                binaryMtData:
                  contentType: application/vnd.3gpp.5gnas
              headers:
                Content-Id:
                  schema:
                    type: string
        responses:
          '204':
            description: successful transferring of MT data
          '400':
            $ref: 'TS29571_CommonData.yaml#/components/responses/400'
          '401':
            $ref: 'TS29571_CommonData.yaml#/components/responses/401'
          '403':
            $ref: 'TS29571_CommonData.yaml#/components/responses/403'
          '404':
            $ref: 'TS29571_CommonData.yaml#/components/responses/404'
          '411':
            $ref: 'TS29571_CommonData.yaml#/components/responses/411'
          '413':
            $ref: 'TS29571_CommonData.yaml#/components/responses/413'
          '415':
            $ref: 'TS29571_CommonData.yaml#/components/responses/415'
          '429':
            $ref: 'TS29571_CommonData.yaml#/components/responses/429'
          '500':
            $ref: 'TS29571_CommonData.yaml#/components/responses/500'
          '503':
            $ref: 'TS29571_CommonData.yaml#/components/responses/503'
          '504':
            description: unsuccessful delivery of mobile terminated data - gateway timeout
            content:
              application/json:
                schema:
                  $ref: '#/components/schemas/TransferMtDataError'
            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:

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    $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-pdusection/{apiVersion}/pdu-sessions/{pduSessionRef}'
        required: true
        schema:
          type: string
'307':
  description: temporary redirect
  headers:
    Location:
      description: 'An alternative URI of the resource located on an alternative service
instance within the SMF that was selected by the AMF'
      required: true
      schema:
        type: string
'308':
  description: permanent redirect
  headers:
    Location:
      description: 'An alternative URI of the resource located on an alternative service
instance within the SMF that was selected by the AMF'
      required: true
      schema:
        type: string
'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 or I-SMF)
    tags:
      - Individual PDU session (H-SMF or 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'
          binaryDataN1SmInfoFromUe:
            type: string
            format: binary
          binaryDataUnknownN1SmInfo:
            type: string
            format: binary
          binaryDataN4Information:
            type: string
            format: binary
          binaryDataN4InformationExt1:
            type: string
            format: binary
          binaryDataN4InformationExt2:
            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
          binaryDataN4Information:
            contentType: application/vnd.3gpp.pfcp
            headers:
              Content-Id:
                schema:
                  type: string
          binaryDataN4InformationExt1:
            contentType: application/vnd.3gpp.pfcp
            headers:
              Content-Id:
                schema:
                  type: string
          binaryDataN4InformationExt2:
            contentType: application/vnd.3gpp.pfcp
            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
            binaryDataN4Information:

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```

        type: string
        format: binary
    binaryDataN4InformationExt1:
        type: string
        format: binary
    binaryDataN4InformationExt2:
        type: string
        format: binary
    encoding:
        jsonData:
            contentType: application/json
        binaryDataN1SmInfoToUe:
            contentType: application/vnd.3gpp.5gnas
        headers:
            Content-Id:
                schema:
                    type: string
        binaryDataN4Information:
            contentType: application/vnd.3gpp.pfcp
        headers:
            Content-Id:
                schema:
                    type: string
        binaryDataN4InformationExt1:
            contentType: application/vnd.3gpp.pfcp
        headers:
            Content-Id:
                schema:
                    type: string
        binaryDataN4InformationExt2:
            contentType: application/vnd.3gpp.pfcp
        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 or SMF)
        operationId: ReleasePduSession
        parameters:
            - name: pduSessionRef
              in: path
              description: PDU session reference
              required: true
              schema:
                  type: string
        requestBody:
            description: data sent to H-SMF or SMF when releasing the PDU session
            required: false
            content:
                application/json: # message without binary body part
                    schema:
                        $ref: '#/components/schemas/ReleaseData'

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```

multipart/related: # message with binary body part(s)
  schema:
    type: object
    properties:
      jsonData:
        $ref: '#/components/schemas/ReleaseData'
      binaryDataN4Information:
        type: string
        format: binary
      binaryDataN4InformationExt1:
        type: string
        format: binary
      binaryDataN4InformationExt2:
        type: string
        format: binary
    encoding:
      jsonData:
        contentType: application/json
      binaryDataN4Information:
        contentType: application/vnd.3gpp.pfcp
      headers:
        Content-Id:
          schema:
            type: string
      binaryDataN4InformationExt1:
        contentType: application/vnd.3gpp.pfcp
      headers:
        Content-Id:
          schema:
            type: string
      binaryDataN4InformationExt2:
        contentType: application/vnd.3gpp.pfcp
      headers:
        Content-Id:
          schema:
            type: string

responses:
  '200':
    description: successful release of a PDU session with content in the response
    content:
      application/json: # message without binary body part
        schema:
          $ref: '#/components/schemas/ReleasedData'
      multipart/related: # message with binary body part(s)
        schema:
          type: object
          properties:
            jsonData:
              $ref: '#/components/schemas/ReleasedData'
            binaryDataN4Information:
              type: string
              format: binary
            binaryDataN4InformationExt1:
              type: string
              format: binary
            binaryDataN4InformationExt2:
              type: string
              format: binary
          encoding:
            jsonData:
              contentType: application/json
            binaryDataN4Information:
              contentType: application/vnd.3gpp.pfcp
            headers:
              Content-Id:
                schema:
                  type: string
            binaryDataN4InformationExt1:
              contentType: application/vnd.3gpp.pfcp
            headers:
              Content-Id:
                schema:
                  type: string
            binaryDataN4InformationExt2:
              contentType: application/vnd.3gpp.pfcp
            headers:
              Content-Id:

```



```

        schema:
          type: string
      '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'

/pdu-sessions/{pduSessionRef}/retrieve:
  post:
    summary: Retrieve
    tags:
      - Individual PDU session (H-SMF or SMF)
    operationId: RetrievePduSession
    parameters:
      - name: pduSessionRef
        in: path
        description: PDU session reference
        required: true
        schema:
          type: string
    requestBody:
      description: representation of the payload of the Retrieve Request
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/RetrieveData'
    responses:
      '200':
        description: successful information retrieval
        content:
          application/json: # message without binary body part
            schema:
              $ref: '#/components/schemas/RetrievedData'
      '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'
      '504':
        $ref: 'TS29571_CommonData.yaml#/components/responses/504'
    default:
      $ref: 'TS29571_CommonData.yaml#/components/responses/default'

/pdu-sessions/{pduSessionRef}/transfer-mo-data:
  post:
    summary: Transfer MO Data

```

```

tags:
  - Individual PDU session (H-SMF or SMF)
operationId: TransferMoData
parameters:
  - name: pduSessionRef
    in: path
    description: PDU session reference
    required: true
    schema:
      type: string
requestBody:
  description: representation of the payload of Transfer MO Data Request
  required: true
  content:
    multipart/related: # message with a binary body part
      schema:
        type: object
        properties:
          jsonData:
            $ref: '#/components/schemas/TransferMoDataReqData'
          binaryMoData:
            type: string
            format: binary
        encoding:
          jsonData:
            contentType: application/json
          binaryMoData:
            contentType: application/vnd.3gpp.5gnas
            headers:
              Content-Id:
                schema:
                  type: string
responses:
  '204':
    description: successful transferring of MO data
  '400':
    $ref: 'TS29571_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29571_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29571_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29571_CommonData.yaml#/components/responses/404'
  '411':
    $ref: 'TS29571_CommonData.yaml#/components/responses/411'
  '413':
    $ref: 'TS29571_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29571_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29571_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29571_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29571_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29571_CommonData.yaml#/components/responses/default'

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'
  selectedDnn:
    $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/PlmnIdNid'
  requestType:
    $ref: '#/components/schemas/RequestType'
  nlSmMsg:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/RefToBinaryData'
  anType:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/AccessType'
  additionalAnType:
    $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'
  smfUri:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
  additionalHsmfUri:
    type: array
    items:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
    minItems: 1
  additionalSmfUri:
    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'
  pcfGroupId:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/NfGroupId'
  pcfSetId:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/NfSetId'
  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
  directForwardingFlag:
    type: boolean
  targetId:
    $ref: 'TS29518_Namf_Communication.yaml#/components/schemas/NgRanTargetId'
  epsBearerCtxStatus:
    $ref: '#/components/schemas/EpsBearerContextStatus'
  cpCiotEnabled:
    type: boolean
    default: false
  cpOnlyInd:
    type: boolean
    default: false
  invokeNef:
    type: boolean
    default: false
  maRequestInd:
    type: boolean
    default: false
  maNwUpgradeInd:
    type: boolean
    default: false
  n2SmInfo:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/RefToBinaryData'
  n2SmInfoType:
    $ref: '#/components/schemas/N2SmInfoType'
  n2SmInfoExt1:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/RefToBinaryData'
  n2SmInfoTypeExt1:
    $ref: '#/components/schemas/N2SmInfoType'
  smContextRef:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
  upCnxState:
    $ref: '#/components/schemas/UpCnxState'
  smallDataRateStatus:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/SmallDataRateStatus'
  apnRateStatus:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/ApnRateStatus'
  extendedNasSmTimerInd:
    type: boolean
    default: false
  dlDataWaitingInd:
    type: boolean
    default: false
  ddnFailureSubs:
    $ref: '#/components/schemas/DdnFailureSubs'
  smfTransferInd:
    type: boolean
    default: false
  oldSmfId:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'
  oldSmContextRef:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
  wAgfInfo:
    $ref: 'TS29510_Nnrf_NFManagement.yaml#/components/schemas/WAgfInfo'
  tngfInfo:
    $ref: 'TS29510_Nnrf_NFManagement.yaml#/components/schemas/TngfInfo'
  twifInfo:
    $ref: 'TS29510_Nnrf_NFManagement.yaml#/components/schemas/TwifInfo'
  required:
    - servingNfId

```

- servingNetwork
- anType
- smContextStatusUri

```

SmContextCreatedData:
  type: object
  properties:
    hSmfUri:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
    smfUri:
      $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'
    gpsi:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
    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'
    servingNfId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'
    guami:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Guami'
    servingNetwork:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/PlmnIdNid'
    backupAmfInfo:
      type: array
      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/BackupAmfInfo'
      minItems: 1
      nullable: true
    anType:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/AccessType'
    additionalAnType:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/AccessType'
    anTypeToReactivate:
      $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
  n9ForwardingTunnel:
    $ref: '#/components/schemas/TunnelInfo'
  n9DlForwardingTnlList:
    type: array
    items:
      $ref: '#/components/schemas/IndirectDataForwardingTunnelInfo'
    minItems: 1
  n9UlForwardingTnlList:
    type: array
    items:
      $ref: '#/components/schemas/IndirectDataForwardingTunnelInfo'
    minItems: 1
  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'
  maReleaseInd:
    $ref: '#/components/schemas/MaReleaseIndication'
  maNwUpgradeInd:
    type: boolean
    default: false
  maRequestInd:
    type: boolean
    default: false
  exemptionInd:
    $ref: '#/components/schemas/ExemptionInd'
  supportedFeatures:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  moExpDataCounter:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/MoExpDataCounter'
  extendedNasSmTimerInd:
    type: boolean
  forwardingFteid:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Bytes'

```

```
forwardingBearerContexts:
  type: array
  items:
    $ref: '#/components/schemas/ForwardingBearerContainer'
  minItems: 1
ddnFailureSubs:
  $ref: '#/components/schemas/DdnFailureSubs'

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
    n3DlForwardingTnlList:
      type: array
      items:
        $ref: '#/components/schemas/IndirectDataForwardingTunnelInfo'
      minItems: 1
    n3UlForwardingTnlList:
      type: array
      items:
        $ref: '#/components/schemas/IndirectDataForwardingTunnelInfo'
      minItems: 1
    cause:
      $ref: '#/components/schemas/Cause'
    maAcceptedInd:
      type: boolean
      default: false
    supportedFeatures:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
    forwardingFteid:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Bytes'
    forwardingBearerContexts:
      type: array
      items:
        $ref: '#/components/schemas/ForwardingBearerContainer'
      minItems: 1

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'
  ismfReleaseOnly:
    type: boolean
    default: false

SmContextReleasedData:
  type: object
  properties:
    smallDataRateStatus:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SmallDataRateStatus'
    apnRateStatus:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/ApnRateStatus'

SmContextStatusNotification:
  type: object
  properties:
    statusInfo :
      $ref: '#/components/schemas/StatusInfo'
    smallDataRateStatus:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SmallDataRateStatus'
    apnRateStatus:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/ApnRateStatus'
    ddnFailureStatus:
      type: boolean
      default: false
    notifyCorrelationIdsForddnFailure:
      type: array
      items:
        type: string
      minItems: 1
    newSmfId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'
    newSmfSetId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/NfSetId'
    oldSmfId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'
    oldSmContextRef:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
  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'
    selectedDnn:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
    sNssai:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
    vsmfId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'
    ismfId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'
    servingNetwork:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/PlmnIdNid'
    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'
ismfPduSessionUri:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
vcnTunnelInfo:
  $ref: '#/components/schemas/TunnelInfo'
icnTunnelInfo:
  $ref: '#/components/schemas/TunnelInfo'
n9ForwardingTunnelInfo:
  $ref: '#/components/schemas/TunnelInfo'
additionalCnTunnelInfo:
  $ref: '#/components/schemas/TunnelInfo'
anType:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/AccessType'
additionalAnType:
  $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'
pcfId:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'
pcfGroupId:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/NfGroupId'
pcfSetId:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/NfSetId'
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
iSmfServiceInstanceId:
  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'
epsBearerCtxStatus:
  $ref: '#/components/schemas/EpsBearerContextStatus'
amfNfId:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'
guami:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/Guami'

```

```

maxIntegrityProtectedDataRateUl:
  $ref: '#/components/schemas/MaxIntegrityProtectedDataRate'
maxIntegrityProtectedDataRateDl:
  $ref: '#/components/schemas/MaxIntegrityProtectedDataRate'
cpCiotEnabled:
  type: boolean
  default: false
cpOnlyInd:
  type: boolean
  default: false
invokeNef:
  type: boolean
  default: false
maRequestInd:
  type: boolean
  default: false
maNwUpgradeInd:
  type: boolean
  default: false
dnaiList:
  type: array
  items:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnai'
  minItems: 1
presenceInLadn:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/PresenceState'
secondaryRatUsageInfo:
  type: array
  items:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/SecondaryRatUsageInfo'
  minItems: 1
smallDataRateStatus:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/SmallDataRateStatus'
apnRateStatus:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/ApnRateStatus'
dlServingPlmnRateCtl:
  type: integer
  minimum: 10
upSecurityInfo:
  $ref: '#/components/schemas/UpSecurityInfo'
required:
  - dnn
  - servingNetwork
  - anType
oneOf:
  - required: [ vsmfId, vsmfPduSessionUri ]
  - required: [ ismfId, ismfPduSessionUri ]

PduSessionCreatedData:
  type: object
  properties:
    pduSessionType:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/PduSessionType'
    sscMode:
      type: string
      pattern: '^[0-7]$\''
    hcnTunnelInfo:
      $ref: '#/components/schemas/TunnelInfo'
    cnTunnelInfo:
      $ref: '#/components/schemas/TunnelInfo'
    additionalCnTunnelInfo:
      $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'
    smfInstanceId:
      $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'
  maxIntegrityProtectedDataRateDl:
    $ref: '#/components/schemas/MaxIntegrityProtectedDataRate'
  alwaysOnGranted:
    type: boolean
    default: false
  gpsi:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
  upSecurity:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/UpSecurity'
  roamingChargingProfile:
    $ref: 'TS32291_Nchf_ConvergedCharging.yaml#/components/schemas/RoamingChargingProfile'
  hSmfServiceInstanceId:
    type: string
  smfServiceInstanceId:
    type: string
  recoveryTime:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
  dnaiList:
    type: array
    items:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnai'
    minItems: 1
  ipv6MultiHomingInd:
    type: boolean
    default: false
  maAcceptedInd:
    type: boolean
    default: false
  homeProvidedChargingId:
    type: string
  nefExtBufSupportInd:
    type: boolean
    default: false
  smallDataRateControlEnabled:
    type: boolean
    default: false
  required:
    - pduSessionType
    - sscMode
  oneOf:
    - required: [ hSmfInstanceId ]
    - required: [ smfInstanceId ]

HsmfUpdateData:
  type: object
  properties:
    requestIndication:
      $ref: '#/components/schemas/RequestIndication'
    pei:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Pei'
    vcnTunnelInfo:
      $ref: '#/components/schemas/TunnelInfo'
    icnTunnelInfo:
      $ref: '#/components/schemas/TunnelInfo'
    additionalCnTunnelInfo:
      $ref: '#/components/schemas/TunnelInfo'
    servingNetwork:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/PlmnIdNid'
  anType:

```

```

    $ref: 'TS29571_CommonData.yaml#/components/schemas/AccessType'
  additionalAnType:
    $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
  secondaryRatUsageInfo:
    type: array
    items:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SecondaryRatUsageInfo'
    minItems: 1
  anTypeCanBeChanged:
    type: boolean
    default: false
  maReleaseInd:
    $ref: '#/components/schemas/MaReleaseIndication'
  maNwUpgradeInd:
    type: boolean
    default: false
  maRequestInd:
    type: boolean
    default: false

```

```

unavailableAccessInd:
  $ref: '#/components/schemas/UnavailableAccessIndication'
psaInfo:
  type: array
  items:
    $ref: '#/components/schemas/PsaInformation'
  minItems: 1
ulclBpInfo:
  $ref: '#/components/schemas/UlclBpInformation'
n4Info:
  $ref: '#/components/schemas/N4Information'
n4InfoExt1:
  $ref: '#/components/schemas/N4Information'
n4InfoExt2:
  $ref: '#/components/schemas/N4Information'
presenceInLadn:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/PresenceState'
vsmfPduSessionUri:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
vsmfId:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'
vSmfServiceInstanceId:
  type: string
ismfPduSessionUri:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
ismfId:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'
iSmfServiceInstanceId:
  type: string
dlServingPlmnRateCtl:
  type: integer
  minimum: 10
  nullable: true
dnaiList:
  type: array
  items:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnai'
  minItems: 1
supportedFeatures:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
roamingChargingProfile:
  $ref: 'TS32291_Nchf_ConvergedCharging.yaml#/components/schemas/RoamingChargingProfile'
moExpDataCounter:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/MoExpDataCounter'
vplmnQos:
  $ref: '#/components/schemas/VplmnQos'
securityResult:
  $ref: '#/components/schemas/SecurityResult'
upSecurityInfo:
  $ref: '#/components/schemas/UpSecurityInfo'
required:
  - requestIndication

HsmfUpdatedData:
  type: object
  properties:
    n1SmInfoToUe:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/RefToBinaryData'
    n4Info:
      $ref: '#/components/schemas/N4Information'
    n4InfoExt1:
      $ref: '#/components/schemas/N4Information'
    n4InfoExt2:
      $ref: '#/components/schemas/N4Information'
    dnaiList:
      type: array
      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnai'
      minItems: 1
    supportedFeatures:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
    roamingChargingProfile:
      $ref: 'TS32291_Nchf_ConvergedCharging.yaml#/components/schemas/RoamingChargingProfile'
    upSecurity:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UpSecurity'
    maxIntegrityProtectedDataRateUl:
      $ref: '#/components/schemas/MaxIntegrityProtectedDataRate'
    maxIntegrityProtectedDataRateDl:

```

```

    $ref: '#/components/schemas/MaxIntegrityProtectedDataRate'
  ipv6MultiHomingInd:
    type: boolean
    default: false

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
    secondaryRatUsageInfo:
      type: array
      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/SecondaryRatUsageInfo'
      minItems: 1
    n4Info:
      $ref: '#/components/schemas/N4Information'
    n4InfoExt1:
      $ref: '#/components/schemas/N4Information'
    n4InfoExt2:
      $ref: '#/components/schemas/N4Information'

ReleasedData:
  type: object
  properties:
    smallDataRateStatus:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SmallDataRateStatus'
    apnRateStatus:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/ApnRateStatus'
    n4Info:
      $ref: '#/components/schemas/N4Information'
    n4InfoExt1:
      $ref: '#/components/schemas/N4Information'
    n4InfoExt2:
      $ref: '#/components/schemas/N4Information'

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: 'TS29571_CommonData.yaml#/components/schemas/Arp'
      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'
nlSmInfoToUe:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/RefToBinaryData'
alwaysOnGranted:
  type: boolean
  default: false
hsmfPduSessionUri:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
supportedFeatures:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
cause:
  $ref: '#/components/schemas/Cause'
nlsmCause:
  type: string
backOffTimer:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
maReleaseInd:
  $ref: '#/components/schemas/MaReleaseIndication'
maAcceptedInd:
  type: boolean
  default: false
additionalChTunnelInfo:
  $ref: '#/components/schemas/TunnelInfo'
dnaiList:
  type: array
  items:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnai'
n4Info:
  $ref: '#/components/schemas/N4Information'
n4InfoExt1:
  $ref: '#/components/schemas/N4Information'
n4InfoExt2:
  $ref: '#/components/schemas/N4Information'
smallDataRateControlEnabled:
  type: boolean
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
    nlSmInfoFromUe:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/RefToBinaryData'
    unknownNlSmInfo:
      $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: 'TS29571_CommonData.yaml#/components/schemas/Arp'
  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
secondaryRatUsageInfo:
  type: array
  items:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/SecondaryRatUsageInfo'
  minItems: 1
n4Info:
  $ref: '#/components/schemas/N4Information'
n4InfoExt1:
  $ref: '#/components/schemas/N4Information'
n4InfoExt2:
  $ref: '#/components/schemas/N4Information'

StatusNotification:
  type: object
  properties:
    statusInfo :
      $ref: '#/components/schemas/StatusInfo'
    smallDataRateStatus:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SmallDataRateStatus'
    apnRateStatus:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/ApnRateStatus'
  required:
    - statusInfo

QosFlowItem:
  type: object
  properties:
    qfi:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Qfi'
    cause:
      $ref: '#/components/schemas/Cause'
    currentQosProfileIndex:
      type: integer
      minimum: 1
      maximum: 8
  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'
    associatedAnType:
      $ref: '#/components/schemas/QosFlowAccessType'
  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'
    associatedAnType:
      $ref: '#/components/schemas/QosFlowAccessType'
  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'
    qosMonitoringReq:
      $ref: '#/components/schemas/QosMonitoringReq'
  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'
    alternativeQosProfileList:
      type: array
      items:
        $ref: '#/components/schemas/AlternativeQosProfile'
  required:
    - maxFbrDl

```

```
- maxFbrUl
- guaFbrDl
- guaFbrUl

QosFlowNotifyItem:
  type: object
  properties:
    qfi:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Qfi'
    notificationCause:
      $ref: '#/components/schemas/NotificationCause'
    currentQosProfileIndex:
      type: integer
      minimum: 1
      maximum: 8
  required:
    - qfi
    - notificationCause

SmContextRetrieveData:
  type: object
  properties:
    targetMmeCap:
      $ref: '#/components/schemas/MmeCapabilities'
    smContextType:
      $ref: '#/components/schemas/SmContextType'
    servingNetwork:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/PlmnId'
    notToTransferEbiList:
      type: array
      items:
        $ref: '#/components/schemas/EpsBearerId'
      minItems: 1

SmContextRetrievedData:
  type: object
  properties:
    ueEpsPdnConnection:
      $ref: '#/components/schemas/EpsPdnCnxContainer'
    smContext:
      $ref: '#/components/schemas/SmContext'
    smallDataRateStatus:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SmallDataRateStatus'
    apnRateStatus:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/ApnRateStatus'
    dlDataWaitingInd:
      type: boolean
      default: false
  required:
    - ueEpsPdnConnection

MmeCapabilities:
  type: object
  properties:
    nonIpSupported:
      type: boolean
      default: false
    ethernetSupported:
      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'
    anType:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/AccessType'
  required:
    - gtpTeid

StatusInfo:
  type: object
```

```
properties:
  resourceStatus:
    $ref: '#/components/schemas/ResourceStatus'
  cause:
    $ref: '#/components/schemas/Cause'
  cnAssistedRanPara:
    $ref: '#/components/schemas/CnAssistedRanPara'
  anType:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/AccessType'
required:
  - resourceStatus

EpsPdnCnxInfo:
  type: object
  properties:
    pgwS8cFteid:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Bytes'
    pgwNodeName:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Bytes'
    linkedBearerId:
      $ref: '#/components/schemas/EpsBearerId'
  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'
    n2SmInfo:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/RefToBinaryData'
    n2SmInfoType:
      $ref: '#/components/schemas/N2SmInfoType'
    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: 'TS29571_CommonData.yaml#/components/schemas/Arp'
      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'
    n4Info:
      $ref: '#/components/schemas/N4Information'
    n4InfoExt1:

```

```

    $ref: '#/components/schemas/N4Information'
  n4InfoExt2:
    $ref: '#/components/schemas/N4Information'
  required:
    - error

SmContext:
  type: object
  properties:
    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'
    pduSessionType:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/PduSessionType'
    gpsi:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
    hSmfUri:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
    smfUri:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
    pduSessionRef:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
    pcfId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'
    pcfGroupId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/NfGroupId'
    pcfSetId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/NfSetId'
    selMode:
      $ref: '#/components/schemas/DnnSelectionMode'
    udmGroupId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/NfGroupId'
    routingIndicator:
      type: string
    sessionAmbr:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Ambr'
    qosFlowsList:
      type: array
      items:
        $ref: '#/components/schemas/QosFlowSetupItem'
      minItems: 1
    hSmfInstanceId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'
    smfInstanceId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'
    enablePauseCharging:
      type: boolean
      default: false
    ueIpv4Address:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv4Addr'
    ueIpv6Prefix:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Prefix'
    epsPdnCnxInfo:
      $ref: '#/components/schemas/EpsPdnCnxInfo'
    epsBearerInfo:
      type: array
      items:
        $ref: '#/components/schemas/EpsBearerInfo'
      minItems: 1
    maxIntegrityProtectedDataRate:
      $ref: '#/components/schemas/MaxIntegrityProtectedDataRate'
    alwaysOnGranted:
      type: boolean
      default: false
    upSecurity:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UpSecurity'
    hSmfServiceInstanceId:
      type: string
    smfServiceInstanceId:
      type: string
    recoveryTime:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
    forwardingInd:

```

```

    type: boolean
    default: false
  psaTunnelInfo:
    $ref: '#/components/schemas/TunnelInfo'
  homeProvidedChargingId:
    type: string
  chargingInfo:
    $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/ChargingInformation'
  roamingChargingProfile:
    $ref: 'TS32291_Nchf_ConvergedCharging.yaml#/components/schemas/RoamingChargingProfile'
  nefExtBufSupportInd:
    type: boolean
    default: false
  required:
    - pduSessionId
    - dnn
    - sNssai
    - pduSessionType
    - sessionAmbr
    - qosFlowsList

ExemptionInd:
  type: object
  properties:
    dnnCongestion:
      type: boolean
      default: false
    snssaiOnlyCongestion:
      type: boolean
      default: false
    snssaiDnnCongestion:
      type: boolean
      default: false

PsaInformation:
  type: object
  properties:
    psaInd:
      $ref: '#/components/schemas/PsaIndication'
    dnaiList:
      type: array
      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnai'
      minItems: 1
    ueIpv6Prefix:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Prefix'
    psaUpfId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'

DnaiInformation:
  type: object
  properties:
    dnai:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnai'
    noDnaiChangeInd:
      type: boolean
    noLocalPsaChangeInd:
      type: boolean
  required:
    - dnai

N4Information:
  type: object
  properties:
    n4MessageType:
      $ref: '#/components/schemas/N4MessageType'
    n4MessagePayload:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/RefToBinaryData'
    n4DnaiInfo:
      $ref: '#/components/schemas/DnaiInformation'
  required:
    - n4MessageType
    - n4MessagePayload

IndirectDataForwardingTunnelInfo:
  type: object
  properties:
    ipv4Addr:

```

```
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv4Addr'
  ipv6Addr:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Addr'
  gtpTeid:
    $ref: '#/components/schemas/Teid'
  drbId:
    $ref: '#/components/schemas/DrbId'
  additionalTnlNb:
    $ref: '#/components/schemas/AdditionalTnlNb'
  required:
  - gtpTeid
  not:
    required: [ drbId, additionalTnlNb ]

SendMoDataReqData:
  type: object
  properties:
    moData:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/RefToBinaryData'
    moExpDataCounter:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/MoExpDataCounter'
    ueLocation:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UserLocation'
  required:
  - moData

CnAssistedRanPara:
  type: object
  properties:
    stationaryIndication:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/StationaryIndication'
    communicationDurationTime:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
    periodicTime:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
    scheduledCommunicationTime:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/ScheduledCommunicationTime'
    scheduledCommunicationType:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/ScheduledCommunicationType'
    trafficProfile:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/TrafficProfile'
    batteryIndication:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/BatteryIndication'

UlclBpInformation:
  type: object
  properties:
    ulclBpUpfId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'

TransferMoDataReqData:
  type: object
  properties:
    moData:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/RefToBinaryData'
    moExpDataCounter:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/MoExpDataCounter'
    ueLocation:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UserLocation'
  required:
  - moData

TransferMtDataReqData:
  type: object
  properties:
    mtData:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/RefToBinaryData'
  required:
  - mtData

TransferMtDataError:
  allOf:
  - $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
  - $ref: '#/components/schemas/TransferMtDataAddInfo'

TransferMtDataAddInfo:
  type: object
  properties:
```

```
    maxWaitingTime:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'

VplmnQos:
  type: object
  properties:
    5qi:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/5Qi'
    arp:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Arp'
    sessionAmbr:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Ambr'
    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'

DdnFailureSubs:
  type: object
  properties:
    ddnFailureSubsInd:
      type: boolean
      default: false
    ddnFailureSubsInfoList:
      type: array
      items:
        $ref: '#/components/schemas/DdnFailureSubInfo'
      minItems: 1

DdnFailureSubInfo:
  type: object
  required:
    - notifyCorrelationId
  properties:
    notifyCorrelationId:
      type: string
    dddTrafficDescriptorList:
      type: array
      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DddTrafficDescriptor'
      minItems: 1

RetrieveData:
  type: object
  properties:
    smallDataRateStatusReq:
      type: boolean
      default: false

RetrievedData:
  type: object
  properties:
    smallDataRateStatus:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SmallDataRateStatus'

SecurityResult:
  type: object
  properties:
    integrityProtectionResult:
      $ref: '#/components/schemas/ProtectionResult'
    confidentialityProtectionResult:
      $ref: '#/components/schemas/ProtectionResult'

UpSecurityInfo:
  type: object
  properties:
    upSecurity:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UpSecurity'
    maxIntegrityProtectedDataRateUl:
      $ref: '#/components/schemas/MaxIntegrityProtectedDataRate'
    maxIntegrityProtectedDataRateDl:
      $ref: '#/components/schemas/MaxIntegrityProtectedDataRate'
    securityResult:
      $ref: '#/components/schemas/SecurityResult'
```



```
    required:
      - upSecurity

AlternativeQosProfile:
  type: object
  properties:
    index:
      type: integer
      minimum: 1
      maximum: 8
    guaFbrDl:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRate'
    guaFbrUl:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRate'
    packetDelayBudget:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/PacketDelBudget'
    packetErrRate:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/PacketErrRate'
  required:
    - index

#
# 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-Fa-f0-9]{8}$'

EpsBearerContextStatus:
  type: string
  pattern: '^[A-Fa-f0-9]{4}$'

DrbId:
  type: integer
  minimum: 1
  maximum: 32

AdditionalTnlNb:
  type: integer
  minimum: 1
  maximum: 3

ForwardingBearerContainer:
  type: string

#
# ENUMERATIONS
#
UpCnxState:
  anyOf:
    - type: string
      enum:
        - ACTIVATED
        - DEACTIVATED
        - ACTIVATING
        - SUSPENDED
    - 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
  - SUSPENDED

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
      - REL_DUE_TO_5G_AN_REQUEST
  - 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
    - REL_DUE_TO_5G_AN_REQUEST

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
    - PDU_SESSION_RESUMED
    - CN_ASSISTED_RAN_PARAMETER_TUNING
    - ISMF_CONTEXT_TRANSFER
    - SMF_CONTEXT_TRANSFER
    - REL_DUE_TO_PS_TO_CS_HO
    - REL_DUE_TO_SUBSCRIPTION_CHANGE
    - HO_CANCEL
    - REL_DUE_TO_SLICE_NOT_AUTHORIZED
    - PDU_SESSION_HAND_OVER_FAILURE
    - DDN_FAILURE_STATUS
    - REL_DUE_TO_CP_ONLY_NOT_APPLICABLE
  - 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
  - PDU_SESSION_RESUMED
  - CN_ASSISTED_RAN_PARAMETER_TUNING
  - ISMF_CONTEXT_TRANSFER
  - SMF_CONTEXT_TRANSFER
  - REL_DUE_TO_PS_TO_CS_HO
  - REL_DUE_TO_SUBSCRIPTION_CHANGE
  - HO_CANCEL
  - REL_DUE_TO_SLICE_NOT_AUTHORIZED
  - PDU_SESSION_HAND_OVER_FAILURE
  - DDN_FAILURE_STATUS
  - REL_DUE_TO_CP_ONLY_NOT_APPLICABLE

```

```
ResourceStatus:
  anyOf:
  - type: string
    enum:
      - RELEASED
      - UNCHANGED
      - TRANSFERRED
      - UPDATED
  - 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
    - UNCHANGED
    - UPDATED

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
      - IWK_NON_3GPP
  - 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
    - IWK_NON_3GPP

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
- PDU_RES_MOD_IND_FAIL
- 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
- PDU_RES_MOD_IND_FAIL

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

MaReleaseIndication:
anyOf:
- type: string
  enum:
    - REL_MAPDU_OVER_3GPP
    - REL_MAPDU_OVER_N3GPP
- 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_MAPDU_OVER_3GPP
    - REL_MAPDU_OVER_N3GPP

SmContextType:
anyOf:
- type: string
  enum:
    - EPS_PDN_CONNECTION
    - SM_CONTEXT
- 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
    - EPS_PDN_CONNECTION
    - SM_CONTEXT

PsaIndication:
  anyOf:
  - type: string
    enum:
    - PSA_INSERTED
    - PSA_REMOVED
  - 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
    - PSA_INSERTED
    - PSA_REMOVED

N4MessageType:
  anyOf:
  - type: string
    enum:
    - PFCP_SES_EST_REQ
    - PFCP_SES_EST_RSP
    - PFCP_SES_MOD_REQ
    - PFCP_SES_MOD_RSP
    - PFCP_SES_DEL_REQ
    - PFCP_SES_DEL_RSP
    - PFCP_SES_REP_REQ
    - PFCP_SES_REP_RSP
  - 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
    - PFCP_SES_EST_REQ
    - PFCP_SES_EST_RSP
    - PFCP_SES_MOD_REQ
    - PFCP_SES_MOD_RSP
    - PFCP_SES_DEL_REQ
    - PFCP_SES_DEL_RSP
    - PFCP_SES_REP_REQ
    - PFCP_SES_REP_RSP

QosFlowAccessType:
  anyOf:
  - type: string
    enum:
    - 3GPP
    - NON_3GPP
    - 3GPP_AND_NON_3GPP
  - 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
    - 3GPP
    - NON_3GPP
    - 3GPP_AND_NON_3GPP

UnavailableAccessIndication:
  anyOf:
  - type: string
    enum:
    - 3GA_UNAVAILABLE
    - N3GA_UNAVAILABLE
  - 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
    - 3GA_UNAVAILABLE
    - N3GA_UNAVAILABLE

```

```

ProtectionResult:
  anyOf:
  - type: string
    enum:
    - PERFORMED
    - NOT_PERFORMED
  - 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
    - PERFORMED
    - NOT_PERFORMED

```

```

QosMonitoringReq:
  anyOf:
  - type: string
    enum:
    - UL
    - DL
    - BOTH
  - 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
    - UL
    - DL
    - BOTH

```

```

#
# HTTP request bodies
#
requestBodies:
  'VsmfUpdateRequestBody':
    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
            binaryDataN4Information:
              type: string
              format: binary
            binaryDataN4InformationExt1:
              type: string
              format: binary
            binaryDataN4InformationExt2:
              type: string
              format: binary
          encoding:
            jsonData:
              contentType: application/json
            binaryDataN1SmInfoToUe:
              contentType: application/vnd.3gpp.5gnas
          headers:
            Content-Id:
              schema:

```

```

        type: string
binaryDataN4Information:
  contentType: application/vnd.3gpp.pfcp
  headers:
    Content-Id:
      schema:
        type: string
binaryDataN4InformationExt1:
  contentType: application/vnd.3gpp.pfcp
  headers:
    Content-Id:
      schema:
        type: string
binaryDataN4InformationExt2:
  contentType: application/vnd.3gpp.pfcp
  headers:
    Content-Id:
      schema:
        type: string

'NotifyStatusRequestBody':
  description: representation of the status notification
  required: true
  content:
    application/json:
      schema:
        $ref: '#/components/schemas/StatusNotification'

#
# HTTP responses
#
responses:
  'VsmfUpdateResponse200':
    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
            binaryDataN4Information:
              type: string
              format: binary
            binaryDataN4InformationExt1:
              type: string
              format: binary
            binaryDataN4InformationExt2:
              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
            binaryDataN4Information:
              contentType: application/vnd.3gpp.pfcp
            headers:
              Content-Id:

```



```

        schema:
          type: string
binaryDataN4InformationExt1:
  contentType: application/vnd.3gpp.pfcp
  headers:
    Content-Id:
      schema:
        type: string
binaryDataN4InformationExt2:
  contentType: application/vnd.3gpp.pfcp
  headers:
    Content-Id:
      schema:
        type: string
'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
  binaryDataN4Information:
    type: string
    format: binary
  binaryDataN4InformationExt1:
    type: string
    format: binary
  binaryDataN4InformationExt2:
    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
  binaryDataN4Information:
    contentType: application/vnd.3gpp.pfcp
    headers:
      Content-Id:
        schema:
          type: string
  binaryDataN4InformationExt1:
    contentType: application/vnd.3gpp.pfcp
    headers:
      Content-Id:
        schema:
          type: string
  binaryDataN4InformationExt2:
    contentType: application/vnd.3gpp.pfcp
    headers:
      Content-Id:
        schema:
          type: string
```

Annex B (Informative): HTTP Multipart Messages

B.1 Example of HTTP multipart message

B.1.1 General

This clause 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; type="application/json"; 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": "nlmsg"
  },
  "anType": "3GPP_ACCESS",
  "smContextStatusUri": "<URI>"
}
-----Boundary
Content-Type: application/vnd.3gpp.5gnas
Content-Id: nlmsg

{ ... 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 | Indirect 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 |
| 2018-12 | 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 targetServingNfld | 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 |
| 2019-06 | CT#84 | CP-191029 | 0106 | 1 | F | Change of access type in home routed roaming scenario | 15.4.0 |
| 2019-06 | CT#84 | CP-191029 | 0107 | 1 | F | EPS bearer synchronization upon EPS to 5GS idle mode mobility using N26 | 15.4.0 |
| 2019-06 | CT#84 | CP-191029 | 0109 | | F | Removing multiple redundant appearances of major version number | 15.4.0 |
| 2019-06 | CT#84 | CP-191029 | 0112 | 1 | F | Application Error "S-NSSAI_CONGESTION" | 15.4.0 |
| 2019-06 | CT#84 | CP-191029 | 0113 | 3 | F | Clarification on Sending SMContextStatusNotify | 15.4.0 |
| 2019-06 | CT#84 | CP-191029 | 0117 | 1 | F | Essential Correction of HPLMN SNSSAI during SM Context Creation | 15.4.0 |
| 2019-06 | CT#84 | CP-191029 | 0118 | 2 | F | Handover Preparation Failure | 15.4.0 |
| 2019-06 | CT#84 | CP-191029 | 0129 | 2 | F | Storage of OpenAPI specification files | 15.4.0 |
| 2019-06 | CT#84 | CP-191029 | 0133 | 2 | F | Location header in redirect response | 15.4.0 |
| 2019-06 | CT#84 | CP-191029 | 0135 | 2 | F | Correct Nsmf_PDUSession_Create to support Mobility Restriction | 15.4.0 |
| 2019-06 | CT#84 | CP-191029 | 0139 | 1 | F | Correction of Procedure of Handover using UpdateSmContext | 15.4.0 |
| 2019-06 | CT#84 | CP-191029 | 0141 | 1 | F | Secondary RAT Usage reporting at PDU session level | 15.4.0 |
| 2019-06 | CT#84 | CP-191029 | 0142 | | F | Mapped EPS bearer contexts in n1SmInfoFromUe | 15.4.0 |
| 2019-06 | CT#84 | CP-191029 | 0143 | 1 | F | Target ID sent to the SMF | 15.4.0 |
| 2019-06 | CT#84 | CP-191029 | 0144 | | F | Copyright Note in YAML file | 15.4.0 |
| 2019-06 | CT#84 | CP-191029 | 0145 | 1 | F | Correction on GPSI for PDU session | 15.4.0 |
| 2019-06 | CT#84 | CP-191029 | 0148 | | F | 3GPP TS 29.502 API version update | 15.4.0 |
| 2019-06 | CT#84 | CP-191048 | 0147 | | B | 3GPP TS 29.502 API version update | 16.0.0 |
| 2019-06 | CT#84 | CP-191049 | 0116 | 4 | F | Updates to CreateSMContext for eNS Support | 16.0.0 |
| 2019-06 | CT#84 | | | | B | PDU Session Establishment support Control Plane CloT Optimization | 16.0.0 |
| 2019-06 | CT#84 | CP-191050 | 0130 | 4 | | | |
| 2019-06 | CT#84 | CP-191051 | 0115 | 2 | B | ATSSS: MA-PDU Session Establishment | 16.0.0 |
| 2019-06 | CT#84 | CP-191051 | 0136 | 2 | B | MA PDU Session Update | 16.0.0 |
| 2019-06 | CT#84 | CP-191051 | 0137 | 5 | B | MA PDU Session Release over a Single Access | 16.0.0 |
| 2019-06 | CT#84 | CP-191054 | 0108 | 1 | B | Updates to reference model for ETSUN | 16.0.0 |
| 2019-06 | CT#84 | | | | B | Update SM context service operation for additional PDU Session Anchor and Branching Point or UL CL controlled by I-SMF | 16.0.0 |
| 2019-06 | CT#84 | CP-191054 | 0124 | 1 | | | |
| 2019-06 | CT#84 | CP-191054 | 0123 | 2 | B | Update Retrieve SM Context service operation from Source I-SMF or SMF | 16.0.0 |
| 2019-06 | CT#84 | CP-191054 | 0110 | 2 | B | SM context transfer between I-SMFs or V-SMFs | 16.0.0 |
| 2019-06 | CT#84 | | | | B | Update Release SM Context service operation for I-SMF change and removal | 16.0.0 |
| 2019-06 | CT#84 | CP-191054 | 0122 | 2 | | | |
| 2019-06 | CT#84 | CP-191054 | 0121 | 6 | B | Update Create SM context service operation for the I-SMF insertion and change | 16.0.0 |

| | | | | | | | |
|---------|-------|---------------------------|------|---|---|---|--------|
| 2019-06 | CT#84 | CP-191054 | 0134 | 3 | B | Update Create SM context service operation for the I-SMF insertion and change | 16.0.0 |
| 2019-06 | CT#84 | CP-191059 | 0140 | 1 | F | EPS Interworking Indication for N3GPP | 16.0.0 |
| 2019-06 | CT#84 | CP-191059 | 0131 | 3 | F | Exemption Indication | 16.0.0 |
| 2019-09 | CT#85 | CP-192193 | 0149 | 3 | B | I-SMF insertion implications on Nsmf_PDUSession_Update across N16a | 16.1.0 |
| 2019-09 | CT#85 | CP-192193 | 0151 | 3 | B | Implications of Policy Update Procedures with I-SMF on Nsmf_PDUSession_Update across N16a | 16.1.0 |
| 2019-09 | CT#85 | CP-192193 | 0153 | 1 | B | Implications of I-SMF insertion on Create service operation | 16.1.0 |
| 2019-09 | CT#85 | CP-192193 | 0154 | | B | PDU session establishment with I-SMF insertion - Create SM Context service operation | 16.1.0 |
| 2019-09 | CT#85 | CP-192193 | 0155 | 1 | B | Transfer of NAS SM Information between I-SMF and SMF | 16.1.0 |
| 2019-09 | CT#85 | CP-192193 | 0156 | | B | Updates to resources model and operations for PDU sessions with an I-SMF | 16.1.0 |
| 2019-09 | CT#85 | CP-192193 | 0157 | | B | Release of a PDU session with an I-SMF | 16.1.0 |
| 2019-09 | CT#85 | CP-192193 | 0158 | | B | Notify status of a PDU session with an I-SMF | 16.1.0 |
| 2019-09 | CT#85 | CP-192193 | 0159 | | B | Update of a PDU session with an I-SMF | 16.1.0 |
| 2019-09 | CT#85 | CP-192029 | 0160 | | B | Insertion of a PSA and UL CL/BP into the data path of a PDU session with an I-SMF | 16.1.0 |
| 2019-09 | CT#85 | CP-192193 | 0161 | 1 | B | Removal of a PSA and UL CL/BP from the data path of a PDU session with an I-SMF | 16.1.0 |
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| V16.4.0 | July 2020 | Publication |
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