### 5.2.8 SMF Services

#### 5.2.8.1 General

The following table shows the SMF Services and SMF Service Operations.

Table 5.2.8.1-1: NF services provided by the SMF

|  |  |  |  |
| --- | --- | --- | --- |
| Service Name | Service Operations | Operation  Semantics | Example Consumer(s) |
| Nsmf\_PDUSession | Create | Request/Response | V-SMF/I-SMF |
|  | Update | Request/Response | V-SMF/I-SMF, H-SMF |
|  | Release | Request/Response | V-SMF/I-SMF |
|  | CreateSMContext | Request/Response | AMF |
|  | UpdateSMContext | Request/Response | AMF |
|  | ReleaseSMContext | Request/Response | AMF |
|  | SMContextStatusNotify | Subscribe/Notify | AMF |
|  | StatusNotify | Subscribe/Notify | V-SMF/I-SMF |
|  | ContextRequest | Request/Response | AMF, V-SMF/I-SMF, SMF |
|  | ContextPush | Request/Response | SMF |
|  | SendMOData | Request/Response | AMF |
|  | TransferMOData | Request/Response | V-SMF/I-SMF |
|  | TransferMTData | Request/Response | SMF, H-SMF |
| Nsmf\_EventExposure | Subscribe | Subscribe/Notify | NEF, AMF, NWDAF |
|  | Unsubscribe |  | NEF, AMF, NWDAF |
|  | Notify |  | NEF, AMF, NWDAF |
|  | AppRelocationInfo |  | AF |
| Nsmf\_NIDD | Delivery | Request/Response | NEF |
| Nsmf\_TrafficCorrelation | Notify | Subscribe/Notify | NEF |

#### 5.2.8.2 Nsmf\_PDUSession Service

##### 5.2.8.2.1 General

**Service description:** This service operates on the PDU Sessions. The following are the key functionalities of this NF service:

- (between AMF and SMF) Creation / Deletion / Modification of AMF-SMF interactions for PDU Sessions;

The resource handled between AMF and SMF via Create / Update / Release SM context operations corresponds to the AMF-SMF association for a PDU Session;

When the AMF has got no association with an SMF to support a PDU Session, the AMF creates such association via the Nsmf\_PDUSession\_CreateSMContext operation. The context created is identified via the SM Context ID. Otherwise (e.g. at hand-over between 3GPP and Non 3GPP access) the AMF uses the Nsmf\_PDUSession\_UpdateSMContext operation.

NOTE 1: In TS 29.502 [36] SM Context ID is referred to as smContextRef for N11 and pduSessionRef and pduSessionUri for N16.

When the UE is handed-over from an (old) AMF towards another (new) AMF, the old AMF provides the new AMF with the SMF addressing information corresponding to the AMF-SMF association related with each PDU Session of that UE. The new AMF can thus further act upon the association with the SMF via Nsmf\_PDUSession\_UpdateSMContext and Nsmf\_PDUSession\_ReleaseSMContext operations. This may take place:

- at inter AMF change due to AMF planned maintenance or due to AMF failure described in clause 5.21.2 of TS 23.501 [2];

- at inter AMF mobility in CM-CONNECTED state described in clause 4.9.1.3;

- at inter AMF mobility in CM-IDLE state described in clause 4.2.2.2.

- (between AMF and SMF) Passing MO Small Data from AMF to SMF in clause 4.24.1.

- (between V-SMF and H-SMF) Creation / Deletion / Modification of PDU Sessions;

- (between V-SMF/I-SMF and (H-)SMF) Transferring MO Small Data from V-SMF/I-SMF to (H-)SMF in clause 4.25.4.

- (between V-SMF/I-SMF and (H-)SMF) Transferring MT Small Data from (H-)SMF to V-SMF/I-SMF in clause 4.24.5.

Even though the V-SMF creates the PDU Session resource onto the H-SMF, each of the V-SMF and of the H-SMF needs to be able to modify a PDU Session and/or to ask for PDU Session Release. Thus, at Nsmf\_PDUSession\_Create, V-SMF informs the H-SMF about addressing information for its corresponding PDU Session resource, allowing H-SMF to use later on the Nsmf\_PDUSession\_Update and Nsmf\_PDUSession\_Release and Nsmf\_PDUSession\_StatusNotify operations.

NOTE 2: The PDU Session resource in V-SMF is created when the AMF requests to create SM context of this PDU Session

NOTE 3: H-SMF also informs the consumer (V-SMF) about addressing information about its PDU Session resource, but this is part of normal resource creation operation in REST and not specific to this service.

##### 5.2.8.2.2 Nsmf\_PDUSession\_Create service operation

**Service operation name:** Nsmf\_PDUSession\_Create.

**Description:** Create a new PDU Session in the H-SMF or SMF or create an association with an existing PDN connection in the home SMF+PGW-C.

**Input, Required:** SUPI, V-SMF ID or I-SMF ID, V-SMF SM Context ID or I-SMF SM Context ID, DNN, V-CN Tunnel Info or I-UPF Tunnel Info, addressing information allowing the H-SMF to request the V-SMF to issue further operations about the PDU Session or addressing information allowing the SMF to request the I-SMF to issue further operations about the PDU Session, Serving Network (PLMN ID, or PLMN ID and NID, see clause 5.18 of TS 23.501 [2]).

**Input, Optional:** S-NSSAI, Alternative S-NSSAI, PCO, Requested PDU Session Type, 5GSM Core Network Capability, Requested SSC mode, PDU Session ID, Number Of Packet Filters, UE location information, subscription get notified of PDU Session status change, PEI, GPSI, AN type, PCF ID, PCF Group ID, DNN Selection Mode, UE's Routing Indicator optionally with Home Network Public Key identifier or UDM Group ID for the UE, Always-on PDU Session Requested, Control Plane CIoT 5GS Optimisation Indication, information provided by V-SMF related to charging in home routed scenario (see TS 32.255 [45]), AMF ID, EPS Bearer Status, extended NAS-SM timer indication, DNAI list supported by I-SMF (from I-SMF to SMF), HO Preparation Indication. MA PDU request indication, MA PDU Network-Upgrade Allowed indication, Indication on whether the UE is registered in both accesses; QoS constraints from the VPLMN (as defined in clause 5.7.1.11 of TS 23.501 [2]), Satellite backhaul category, Notification of the SM Policy Association Establishment and Termination, PCF binding information, Disaster Roaming service indication, HR-SBO request indication, VPLMN EASDF/Local DNS Server/Resolver IP address, DNS security information of VPLMN EASDF/Local DNS Server/Resolver, [ECS Address Configuration Information associated with PLMN ID of visited network], Indication of UE supports non-3GPP access path switching, [URSP rule enforcement reports].

**Output, Required:** Result Indication and if success a SM Context ID and in addition: QFI(s), QoS Profile(s), Session-AMBR, QoS Rule(s), QoS Flow level QoS parameters if any for the QoS Flow(s) associated with the QoS rule(s), H-CN Tunnel Info or PSA UPF Tunnel Info, Enable pause of charging indication, Selected PDU Session Type and SSC mode.

**Output, Optional:** PDU Session ID, S-NSSAI, Cause, PCO, UE IP address, IPv6 Prefix allocated to the PDU Session, information needed by V-SMF in the case of EPS interworking such as the PDN Connection Type, EPS bearer context(s), linked EBI, Reflective QoS Timer, Always-on PDU Session Granted, information provided by H-SMF related to charging in home routed scenario (see TS 32.255 [45]), DNAI(s) of interest for this PDU Session (from SMF to I-SMF), indication of multi-homing support (from SMF to I-SMF). MA PDU session Accepted indication, Indication on whether Small Data Rate Control applies or not, HR-SBO authorization result, VPLMN Specific Offloading Information for HR-SBO, Offload Identifier(s), HPLMN DNS Server address, Local DNS Server/Resolver address in VPLMN, HPLMN address information (e.g. H-UPF IP address on N6), AF traffic influence information (from H-SMF to V-SMF in case AF interacts with HPLMN to influence HR-SBO session at VPLMN), Internal Group Identifier(s).

The V-SMF SM Context ID in the Input provides addressing information allocated by the V-SMF (to be used for service operations towards the V-SMF for this PDU Session).

The I-SMF SM Context ID in the Input provides addressing information allocated by the I-SMF (to be used for service operations towards the I-SMF for this PDU Session).

See clause 4.3.2.2.2 clause 4.11.1.2.2 clause 4.11.1.3.3 and clause 4.24 for details on the usage of this service operation.

See clauses 4.22.2.2 and 4.22.3 for detailed usage of this service operation for ATSSS.

See clause 6.7 of TS 23.548 [74] for HR-SBO request indication, HR-SBO authorization result, VPLMN EASDF address, VPLMN Specific Offloading Information for HR-SBO, Offload Identifier(s), HPLMN DNS Server address, HPLMN address information.

See clause 6.5.2.6 of TS 23.548 [74] for details on the EAS Configuration Address Information provisioning in roaming.

##### 5.2.8.2.3 Nsmf\_PDUSession\_Update service operation

**Service operation name:** Nsmf\_PDUSession\_Update.

**Description:** Update the established PDU Session.

This service operation is invoked by the V-SMF towards the H-SMF in the case of UE or serving network requested PDU Session Modification in order for the V-SMF to transfer the PDU Session Modification request. It can also be invoked by the V-SMF to indicate to the H-SMF that the access type of the PDU session can be changed. This service operation is also invoked by the V-SMF to insert or remove UL CL or BP controlled by the V-SMF.

This service operation is invoked by the I-SMF towards the SMF in the case of UE or serving network requested PDU Session Modification in order for the I-SMF to transfer the PDU Session Modification request. It can also be invoked by the I-SMF to indicate to the SMF that the access type of the PDU session can be changed. This service operation is also invoked by the I-SMF towards the SMF to insert or remove ULCL or BP controlled by the I-SMF or to report usage offloaded via UL CL or BP controlled by I-SMF.

This service operation is invoked by the H-SMF towards the V-SMF for both UE initiated and HPLMN initiated PDU Session Modification and PDU Session Release cases in order to have the SM PDU Session Modification request or SM PDU Session Release request sent to the UE. It can also be invoked by the H-SMF towards the V-SMF to release the 5GC and 5G-AN resources in e.g. handover from 5GC-N3IWF to EPS and from 5GS to EPC/ePDG, wherein the UE is not notified.

This service operation is invoked by the SMF towards the I-SMF for both UE initiated and SMF/PCF initiated PDU Session Modification and PDU Session Release cases in order to have the SM PDU Session Modification request or SM PDU Session Release request sent to the UE. It can also be invoked by the SMF towards the I-SMF to release the 5GC and 5G-AN resources in e.g. handover from 5GC-N3IWF to EPS and from 5GS to EPC/ePDG, wherein the UE is not notified. This service operation is also invoked by the SMF towards the I-SMF to provide updated N4 information or updated DNAI list of interest for this PDU Session when SMF receives updated PCC rules.

This service operation is invoked by the V-SMF or I-SMF and the H-SMF or SMF in the case of PDU Session Establishment authentication/authorization by a DN-AAA Server defined in clause 4.3.2.3: it is used to carry DN Request Container information between the DN-AAA Server and the UE.

**Input, Required:** SM Context ID.

**Input, Optional:** UE location information (ULI), UE Time Zone, AN type, indication of PDU Session Release, H-SMF SM Context ID (from H-SMF to V-SMF) or SMF SM Context ID (from SMF to I-SMF), QoS Rule and QoS Flow level QoS parameters if any for the QoS Flow associated with the QoS rule (from H-SMF to V-SMF or from SMF to I-SMF), EPS bearer context(s) and Linked EBI (from H-SMF to V-SMF or from SMF to I-SMF), N9 Tunnel Info (from V-SMF to H-SMF or from I-SMF to SMF), Information requested by UE for e.g. QoS (from V-SMF to H-SMF or from I-SMF to SMF), 5GSM Core Network Capability, Information necessary for V-SMF or I-SMF to build SM Message towards the UE (from H-SMF to V-SMF or from SMF to I-SMF), Trigger PDU release indication (V-SMF to H-SMF or from I-SMF to SMF), Start Pause of Charging indication, Stop Pause of Charging indication, DN Request Container information, indication that the UE shall not be notified, EBI Allocation Parameters (ARP list), Secondary RAT usage data, indication that the access type of the PDU session can be changed (V-SMF to H-SMF or from I-SMF to SMF) or from SMF to I-SMF), extended NAS-SM timer indication, DNAI list supported by I-SMF (from I-SMF to SMF), indication of multi-homing support (from SMF to I-SMF), indication of ULCL or BP insertion (from I-SMF to SMF), indication of ULCL or BP removal (from I-SMF to SMF), IPv6 prefix @local PSA (from I-SMF to SMF), DNAI(s) supported by local PSA (from I-SMF to SMF), Tunnel info of ULCL or BP (from I-SMF to SMF), N4 information (from I-SMF to SMF or from SMF to I-SMF), Handover Complete Indication, Relocation Cancel Indication. MA PDU request indication, MA PDU Network-Upgrade Allowed indication, Indication on whether the UE is registered in both accesses, MA PDU session Accepted indication, access for MA PDU Session Release, access type for GBR QoS flow, Indication of access unavailability (with access type), QoS Monitoring Indication (from SMF to I-SMF), QoS Monitoring reporting frequency(from SMF to I-SMF), QoS monitoring policy (from SMF to I-SMF), QoS Monitoring Result from (I-SMF to SMF), Notification of the SM Policy Association Establishment and Termination, PCF binding information, Satellite backhaul category, N9 forwarding tunnel to support the EAS session continuity required (from SMF to I-SMF), traffic filter for N9 forwarding (from SMF to I-SMF), value of the timer to detect the end of activity on the N9 forwarding tunnel to support the EAS session continuity (from SMF to I-SMF), EAS rediscovery indication, EAS information to be refreshed for EAS re-discovery, ECS Address Configuration Information, Alternative HPLMN S-NSSAI, HR-SBO authorization result, VPLMN Specific Offloading Information for HR-SBO, Offload Identifier(s), HPLMN address information, VPLMN EASDF/Local DNS Server/Resolver IP address, DNS security information of V-EASDF/Local DNS Server/Resolver, DNS Server address provided by HPLMN, AF traffic influence information (from H-SMF to V-SMF in case AF interacts with HPLMN to influence HR-SBO session at VPLMN), Indication of UE supports non-3GPP access path switching, [URSP rule enforcement reports].

**Output, Required:** Result indication, <ARP, Cause> pair*.*

**Output, Optional:** UE location information, AN Type, SM information from UE (from V-SMF to H-SMF or from I-SMF to SMF), list of Rejected QoS Flows (from V-SMF to H-SMF or from I-SMF to SMF), a list of <ARP, EBI> pair, Secondary RAT Usage Data, DNAI(s) of interest for this PDU Session (from SMF to I-SMF), N4 Information (from SMF to I-SMF), QFI(s), QoS Profile(s), Session-AMBR, QoS Rule(s), QoS Flow level QoS parameters if any for the QoS Flow(s) associated with the QoS rule(s), EPS bearer context(s), linked EBI, DNAI(s) of interest for this PDU Session, HR-SBO authorization result, VPLMN Specific Offloading Information for HR-SBO, Offload Identifier(s), HPLMN address information, DNS Server address provided by HPLMN (e.g. Local DNS Server/Resolver address in VPLMN), Internal Group Identifier(s)*.*

The H-SMF SM Context ID in the Input provides addressing information allocated by the H-SMF (to be used for service operations towards the H-SMF for this PDU Session).

The SMF SM Context ID in the Input provides addressing information allocated by the SMF (to be used for service operations towards the SMF for this PDU Session).

See clause 4.3.3.3 for an example usage of this service operation.

See clauses 4.22.6.3, 4.22.7, 4.22.8.3 and 4.22.10.3 for detailed usage of this service operation for ATSSS.

See clause 6.7.3 of TS 23.548 [74] for detailed usage of this service for EAS re-discovery.

##### 5.2.8.2.4 Nsmf\_PDUSession\_Release service operation

**Service operation name:** Nsmf\_PDUSession\_Release.

**Description:** It causes the immediate and unconditional deletion of the resources associated with the PDU Session. This service operation is used by V-SMF to request the H-SMF or used by I-SMF to request the SMF to release the resources related to a PDU Session for the serving network initiated PDU release case (e.g. implicit De-registration of UE in the serving network).

**Input, Required:** SM Context ID.

**Input, Optional:** Secondary RAT Usage Data, N4 information.

**Output, Required:** Result Indication*.*

**Output, Optional:** Small Data Rate Control Status, APN Rate Control Status*.*

See clause 4.3.4.3 for an example usage of this service operation.

##### 5.2.8.2.5 Nsmf\_PDUSession\_CreateSMContext service operation

**Service operation name:** Nsmf\_PDUSession\_CreateSMContext.

**Description:** It creates an AMF-SMF association to support a PDU Session.

**Input, Required:** SUPI or PEI, DNN, AMF ID (AMF Instance ID), RAT Type, Serving Network (PLMN ID, or PLMN ID and NID, see clause 5.18 of TS 23.501 [2]).

**Input, Optional:** PEI, S-NSSAI(s), Alternative S-NSSAI, Slice Area Restriction indication, PDU Session ID, N1 SM container, UE location information, UE Time Zone, AN type, H-SMF identifier/address, list of alternative H-SMF(s) if available, old PDU Session ID (if the AMF also received an old PDU Session ID from the UE as specified in clause 4.3.5.2), Subscription For PDU Session Status Notification, Subscription for DDN Failure Notification, NEF Correlation ID, indication that the SUPI has not been authenticated, PCF ID, PCF Group ID, Same PCF Selection Indication, DNN Selection Mode, UE PDN Connection Context, GPSI, UE presence in LADN service area, indication that "the PDU Session is subject to LADN per LADN DNN and S-NSSAI", GUAMI, backup AMF(s) (if NF Type is AMF), Trace Requirements, Control Plane CIoT 5GS Optimisation indication, Small Data Rate Control Status, APN Rate Control Status. Backup AMF(s) sent only once by the AMF to the SMF in its first interaction with the SMF, UE's Routing Indicator optionally with Home Network Public Key identifier or UDM Group ID for the UE, EPS Interworking indication, EPS Bearer Status. Target ID (for EPS to 5GS handover), "Invoke NEF" flag, target DNAI, additional following for SM context transfer: SMF transfer indication, Old SMF ID, SM context ID in old SMF (see clause 4.26.5.3), HO Preparation Indication, indication of no NG-RAN change. MA PDU request indication, MA PDU Network-Upgrade Allowed indication, Indication on whether the UE is registered in both accesses, Satellite backhaul category, GEO Satellite ID, PVS FQDN(s) and/or PVS IP address(es) and Onboarding Indication in the case of ON-SNPN, Disaster Roaming service indication, HR-SBO allowed indication, Indication of UE supports non-3GPP access path switching.

**Output, Required:** Result Indication and if successful SM Context ID.

**Output, Optional:** Cause, PDU Session ID, N2 SM information, N1 SM container, S-NSSAI(s).

When the PDU Session is for Emergency services for a UE without USIM, the AMF provides the PEI and not the SUPI as identifier of the UE. When the PDU Session is for Emergency services of an unauthenticated UE with an USIM, the AMF shall provide both the SUPI and the PEI and shall provide an indication that the SUPI has not been authenticated.

See clause 4.3.2.2.1 clause 4.3.2.2.2 clause 4.11.1.2.2 and clause 4.11.1.3.3 for details on the usage of this service operation.

See clauses 4.22.2.1 and 4.22.3 for detailed usage of this service operation for ATSSS.

See clause 6.7 of TS 23.548 [74] for HR-SBO allowed indication.

##### 5.2.8.2.6 Nsmf\_PDUSession\_UpdateSMContext service operation

**Service operation name:** Nsmf\_PDUSession\_UpdateSMContext.

**Description:** It allows to update the AMF-SMF association to support a PDU Session and/or to provide SMF with N1/N2 SM information received from the UE or from the AN, or allows to establish forwarding tunnel between UPFs controlled by different SMFs (e.g. by UPF controlled by old I-SMF and UPF controlled by new I-SMF).

**Input, Required:** SM Context ID.

**Input, Optional:** N1 SM container received from the UE, N2 SM information received from the AN (e.g. N3 addressing information, notification indicating that the QoS targets cannot be fulfilled for a QFI, Secondary RAT Usage Data), Operation Type (e.g. UP activate, UP deactivate, UP To Be Switched), Serving GW Address(es) and Serving GW DL TEID(s) for data forwarding during HO from 5GS to EPS, UE location information, AN type, UE Time Zone, H-SMF identifier/address, EPS Interworking indication, EBI(s) to be revoked, PDU Session(s) to be re-activated, Direct Forwarding Flag, ARP list, S-NSSAI, Data Forwarding Tunnel (setup/release), UE presence in LADN service area, Target ID, Target AMF ID, GUAMI, backup AMF(s) (if NF Type is AMF), Indication of Access Type can be changed, RAT Type. Backup AMF(s) sent only once by the AMF to the SMF in its first interaction with the SMF. Release indication and release cause, forwarding tunnel information, Handover Complete Indication, Relocation Cancel Indication. MA PDU request indication, MA PDU Network-Upgrade Allowed indication, Indication on whether the UE is registered in both accesses, access on which signalling was received, Subscription to DDN Failure Notification, NEF Correlation ID, MO Exception Data Counter, access for MA PDU Session Release, list of NWDAF IDs and corresponding Analytics ID(s), Satellite backhaul category, GEO Satellite ID, N9 forwarding tunnel to support the EAS session continuity required, target UL CL tunnel info for N9 forwarding tunnel to support the EAS session continuity, value of the timer to detect the end of activity on the N9 forwarding tunnel to support the EAS session continuity, CN based MT handling indication, Alternative S-NSSAI, Indication of UE supporting non-3GPP access path switching, Indication of non-3GPP access path switching while using old AN resources, Slice Area Restriction indication.

**Output, Required:** Result Indication.

**Output, Optional:** PDU Session ID, Cause,releasedEBI list, allocated EBI information, N2 SM information (e.g. QFI, UE location information, notification indication indicating that the QoS targets cannot be fulfilled), N1 SM container to be transferred to the AN/UE, type of N2 SM information. MA PDU session Accepted indication, list of NWDAF IDs and corresponding Analytics ID(s), source UL CL tunnel info for N9 forwarding tunnel info to support the EAS session continuity.

See clause 4.3.3.2 and clause 4.3.3.3 for an example usage of this service operation.

See clause 4.9.1.2.2 for the usage of the "UP To Be Switched" Operation Type.

For the use of the "EBI(s) to be revoked" information, see clause 4.11.1.4.1.

For the use of the "Direct Forwarding Flag", see clause 4.11.1.2.2.2.

For the use of the "Indication of Access Type can be changed", see clause 4.2.3.2.

For the use of "release indication and release cause", see clause 4.3.4.2.

For the use of the "forwarding tunnel information", see clause 4.23.4.3.

If the consumer NF is AMF and the SMF determines that some EBIs are not needed, the SMF will put the EBIs back in the released EBI list.

If the consumer NF is AMF and Inter-system mobility happens, the SMF sends allocated EBI information to AMF.

If the ARP of QoS flow is changed, the SMF uses this operation to update EBI-ARP information in the AMF.

If the AMF does not have PDU Session ID, the PDU Session ID is not required for Input and is required for Output.

If consumer NF is AMF and SMF includes N2 SM information in the Output, the SMF indicates type of N2 SM information.

The Small Data Rate Control Status is included if a PDU Session is being released and the UPF or NEF provided Small Data Rate Control Status for the AMF to store. APN Rate Control Status is included if a PDU Session is being released and the UPF or NEF provided APN Rate Control Status for the AMF to store.

NOTE: The N2 SM information is not interpreted by the AMF.

See clauses 4.22.6.3, 4.22.9 and 4.22.10.2 for detailed usage of this service operation for ATSSS.

##### 5.2.8.2.7 Nsmf\_PDUSession\_ReleaseSMContext service operation

**Service operation name:** Nsmf\_PDUSession\_ReleaseSMContext.

**Description:** It allows to release the AMF-SMF association for a certain PDU Session because the PDU Session has been released.

**Input, Required:** SM Context ID.

**Input, Optional:** UE location information, AN type, UE Time Zone, N2 SM Info (Secondary RAT Usage Data), V-SMF only, I-SMF only.

**Output, Required:** Result Indication.

**Output, Optional:** Cause, Small Data Rate Control Status, APN Rate Control Status.

See clause 4.3.4.2 and clause 4.3.4.3 for an example usage of this service.

If the consumer NF is AMF and the PDU Session indicated by the PDU Session ID had been assigned some EBIs, the AMF locally determines that the corresponding EBI(s) are released.

For the use of the "V-SMF only" indication, see clause 4.11.1.2.

For the use of the "I-SMF only" indication, see clause 4.23.7.3.

##### 5.2.8.2.8 Nsmf\_PDUSession\_SMContextStatusNotify service operation

**Service operation name:** Nsmf\_PDUSession\_SMContextStatusNotify.

**Description:** This service operation is used by the SMF to notify its consumers about the status of an SM context related to a PDU Session (e.g. PDU Session Release due to local reasons within the SMF, PDU Session handover to a different system or access type, SMF context transfer, triggering I-SMF selection for the PDU Session). The SMF may use this service operation to update the SMF derived CN assisted RAN parameters tuning in the AMF. The SMF may report the DDN Failure with NEF Correlation ID to the AMF.

**Input, Required:** Status information.

**Input, Optional:** Cause, SMF derived CN assisted RAN parameters tuning, New SMF ID for SM Context Transfer (see clause 4.26.5.3) or SMF set ID, Small Data Rate Control Status, APN Rate Control Status, DDN Failure detected in (I-/V-)SMF, target DNAI information, list of NWDAF IDs and corresponding Analytics ID(s).

**Output, Required:** Result Indication.

**Output, Optional:** None.

The target DNAI information indicates the target DNAI for the current PDU session or target DNAI for next PDU session.

##### 5.2.8.2.9 Nsmf\_PDUSession\_StatusNotify service operation

**Service operation name:** Nsmf\_PDUSession\_StatusNotify.

**Description:** This service operation is used by the SMF to notify its consumers about the status of a PDU Session (e.g. PDU Session is released due to local reasons within the H-SMF, PDU Session handover to a different system or access type, triggering I-SMF reselection for the PDU Session).

**Input, Required:** Status information.

**Input, Optional:** Cause, Small Data Rate Control Status, APN Rate Control Status, target DNAI information.

**Output, Required:** Result Indication.

**Output, Optional:** None.

##### 5.2.8.2.10 Nsmf\_PDUSession\_ContextRequest service operation

**Service operation name:** Nsmf\_PDUSession\_ContextRequest.

**Description:** This service operation is used by the NF Consumer to request for SM Context (e.g. during EPS IWK, HO, SM Context transfer indication), or during mobility procedure with I-SMF (or V-SMF) changes or may be triggered by OAM.

**Input, Required:** SM Context ID, SM context type.

**Input, Optional:** Target MME Capability, EBI list not to be transferred, PDU Session ID (include PDU Session ID when available), SMF transfer indication, indication of no NG-RAN change.

**Output, Required:** One of the following:

- SM Context Container.

- Endpoint where SM Context can be retrieved.

**Output, Optional:** Small Data Rate Control Status.

The SM context type indicates the type of SM context to be requested, e.g. PDN Connection Context, 5G SM Context or both. The SM context type may also indicate that only a specific part of 5G SM Context is requested, e.g. only the AF Coordination Information part. If the SM context type is PDN Connection Context, the SM Context included in the SM Context container is the PDN Connection Context. If the SM context type is all, the SM Context included in the SM Context container includes both the PDN Connection Context and the 5G SM Context.

Table 5.2.8.2.10-1 illustrates the SM Context that may be transferred between I-SMF(s) or between V-SMF(s) in home-routed roaming case.

Table 5.2.8.2.10-1: SM Context of a PDU Session transferred between I-SMF(s) or between V-SMF(s) or between I/V-SMF and (H-)SMF

| Field | Description |
| --- | --- |
| SUPI | SUPI (Subscription Permanent Identifier) is the subscriber's permanent identity in 5GS. |
| Trace Requirements | Trace reference: Identifies a record or a collection of records for a particular trace. |
|  | Trace type: Indicates the type of trace |
|  | OMC identity: Identifies the OMC that shall receive the trace record(s). |
| S-NSSAI | The S-NSSAI of the PDU Session for the serving PLMN. |
| HPLMN S-NSSAI | The S-NSSAI of the PDU Session for the HPLMN (Home-Routed PDU Session) |
| Network Slice Instance id | The network Slice Instance information for the PDU Session |
| DNN | The associated DNN for the PDU Session. |
| AMF Information | The associated AMF instance identifier and GUAMI. |
| Access Type | The current access type for this PDU Session. |
| RAT Type | RAT Type for this PDU Session. |
| PDU Session ID | The identifier of the PDU Session. |
| H-SMF Information or SMF Information | The associated H-SMF identifier and H-SMF address for the HR PDU Session ( applies only for a V-SMF), or the SMF identifier and SMF address for PDU Session (applies for I-SMF). |
| Context ID of the PDU Session in H-SMF or Context ID of the PDU Session in SMF | The context ID of the PDU Session in H-SMF or in SMF. |
| Forwarding Indication | An indication on whether forwarding tunnel needs be established in order to forward buffered DL data. |
| Uplink Tunnel Info of UPF controlled by the SMF / H-SMF | The Tunnel Information to be used to send UL traffic towards the UPF controlled by the SMF / H-SMF that interfaces the UPF controlled by the I-SMF. |
| Tunnel Info of NG-RAN | The N3 Tunnel Information in the NG-RAN for the PDU Session. This information is transferred if the target I/V-SMF indicates no NG-RAN change. |
| Disaster Roaming | An indication that the UE is registered for Disaster Roaming service. |
| EAS information to be refreshed for EAS re-discovery | Identifies EAS(s) which needs to be refreshed corresponding to the old target DNAI if available. See details in clause 6.7.3 of TS 23.548 [74]. This applies only for a V-SMF (for V-SMF change case) or H-SMF (for V-SMF insertion case). |
| AF TI Container | Container to carry the AF Traffic Influence Information. |
| Authorization Result for HR-SBO | Indicates whether HR-SBO is authorized. See details in clause 6.7.3 of TS 23.548 [74]. This applies only for a V-SMF (for V-SMF change within same PLMN case). |
| VPLMN Specific Offloading Information | Includes traffic description information authorized for HR-SBO in VPLMN and the corresponding policy for the traffic. See details in clause 6.7.3 of TS 23.548 [74] (for V-SMF change within same PLMN case). |
| Offload Identifier | Identifies a certain VPLMN Specific Offloading Information. A HPLMN ID is expected to be included in this Identifier, see details in clause 6.7.2 of TS 23.548 [74] (for V-SMF change within same PLMN case). |
| HPLMN address information | Identifies the address information in HPLMN (e.g. H-UPF IP address on N6). See details in clause 6.7.3 of TS 23.548 [74]. This applies for a V-SMF (for V-SMF change within the same PLMN case), H-SMF (for V-SMF insertion). |
| DNS Server address provided by HPLMN | Identifies the DNS Server provided by HPLMN to VPLMN for HR-SBO. See details in clause 6.7.3 of TS 23.548 [74]. This applies for a V-SMF (for V-SMF change within the same PLMN case), H-SMF (for V-SMF insertion). |
| **AF Coordination Information:** | |
| Source DNAI | The DNAI from where the UE is moving. |
| UE IP address in Source DNAI | The UE IP address in the Source DNAI. |
| List of Notification Correlation IDs | Notification Correlation IDs for UP path change event as received in the PCC Rules |
| For each notification correlation ID: Uplink buffering indication | Uplink buffering indication as received from the AF for this notification correlation id during Early Notification. |
| **For each QoS Flow in the PDU Session:** | |
| 5G QoS Identifier (5QI) | Identifier for the authorized QoS parameters for the service data flow. |
| ARP | The Allocation and Retention Priority for the service data flow consisting of the priority level, the pre-emption capability and the pre-emption vulnerability. |
| GFBR | Guaranteed Flow Bit Rate (GFBR) - UL and DL. |
| MFBR | Maximum Flow Bit Rate (MFBR) - UL and DL. |
| Priority Level | Indicates a priority in scheduling resources among QoS Flows. |
| Averaging Window | Represents the duration over which the guaranteed and maximum bitrate shall be calculated. |
| Maximum Data Burst Volume | Denotes the largest amount of data that is required to be transferred within a period of 5G-AN PDB. |
| Reflective QoS Control | Indicates to apply reflective QoS for the SDF in the TFT. |
| QoS Notification Control (QNC) | Indicates whether notifications are requested from 3GPP RAN when the GFBR can no longer (or can again) be guaranteed for a QoS Flow during the lifetime of the QoS Flow. |
| Maximum Packet Loss Rate | Maximum Packet Loss Rate - UL and DL. |
| **Mapped EPS Bearer Context for Each QFI to support interworking with EPS:** | |
| EPS Bearer Id | An EPS bearer identity uniquely identifies an EPS bearer for one UE accessing via E-UTRAN. |
| TI | The GERAN/UTRAN Transaction ID (if any) that is associated with the EPS Bearer ID which is part of the Bearer Context received from the MME. |
| BSS Container | The GERAN BSS Container (if any) that is associated with the EPS Bearer ID which is part of the Bearer Context received from the MME. |
| Mapped EPS Bearer QoS | ARP, GBR, MBR, QCI. |
| PGW-U tunnel Information | PGW-U S5/S8 GTP-U tunnel IP address and TEID information. |
| TFT | Traffic Flow Template. |

##### 5.2.8.2.11 Nsmf\_PDUSession\_ContextPush service operation

**Service operation name:** Nsmf\_PDUSession\_ContextPushRequest

**Description:** This service operation is used by the SMF as Service Consumer to push one SM Context to a another SMF as NF Service Producer. It may be triggered by OAM.

**Input, Required:** One of the following:

- SM Context of identified PDU session.

- Endpoint where SM Context of identified PDU session can be retrieved.

The SM context includes SM context in I-SMF(or V-SMF) and SM context in SMF (or H-SMF) separately.

See Table 5.2.8.2.10-1 for single SM Context stored in I-SMF or V-SMF that may be transferred to another SMF instance.

Editor's note: The SM context stored in SMF(or H-SMF) is to be defined.

**Output, Required:** Result Indication.

**Output, Optional:** Cause.

See clause 4.26.2 for an example usage of this service operation.

##### 5.2.8.2.12 Nsmf\_PDUSession\_SendMOData service operation

**Service operation name:** Nsmf\_PDUSession\_SendMOData

**Description:** When the AMF has received MO Small Data from the UE in NAS procedure, this service operation allows the AMF to send the MO Small Data to the SMF.

**Input, Required:** SM Context ID, N1 container received from the UE.

**Input, Optional:** AN type, MO Exception Data Counter.

**Output, Required:** Result Indication.

**Output, Optional:** Cause.

See clause 4.24.1 for an example usage of this service operation.

##### 5.2.8.2.13 Nsmf\_PDUSession\_TransferMOData service operation

**Service operation name:** Nsmf\_PDUSession\_TransferMOData

**Description:** When the V-SMF/I-SMF has received MO Small Data from AMF, this service operation allows the V-SMF/I-SMF to forward the MO Small Data to the (H-)SMF.

**Input, Required:** SM Context ID, MO Small Data.

**Input, Optional:** MO Exception Data Counter.

**Output, Required:** Result Indication.

**Output, Optional:** Cause.

See clause 4.25.4 for an example usage of this service operation.

##### 5.2.8.2.14 Nsmf\_PDUSession\_TransferMTData service operation

**Service operation name:** Nsmf\_PDUSession\_TransferMTData

**Description:** When the (H-)SMF has received MT Small Data from the NEF, this service operation allows the (H-)SMF to send the MT Small Data to the V-SMF/I-SMF.

**Input, Required:** SM Context ID, MT Small Data.

**Input, Optional:** None.

**Output, Required:** Result Indication.

**Output, Optional:** Cause, Estimated Maximum Wait time.

See clause 4.24.5 for an example usage of this service operation.

#### 5.2.8.3 Nsmf\_EventExposure Service

##### 5.2.8.3.1 General

**Service description:** This service provides events related to PDU Sessions towards consumer NF. The service operations exposed by this service allow other NFs to subscribe and get notified of events happening on PDU Sessions. The following are the key functionalities of this NF service.

- Allow consumer NFs to Subscribe and unsubscribe for an Event ID on PDU Session(s);

- Allow the NWDAF to collect data for network data analytics from SMF as specified in TS 23.288 [50] and from UPF as specified in clause 4.15.4.5;

- Notifying events on the PDU Session to the subscribed NFs; and

- Allow consumer NFs to acknowledge or respond to an event notification.

The following events can be subscribed by a NF consumer (Event ID is defined in clause 4.15.1):

- UE IP address / Prefix allocation/change: The event notification may contain a new UE IP address / Prefix or an indication of which UE IP address / Prefix has been released.

- PDU Session Establishment and/or PDU Session Release.

The event notification may contain following information:

- PDU Session Type.

- DNN.

- UE IP address/Prefix.

- UP path change: a notification corresponding to this event is sent when the UE IP address / Prefix and / or DNAI and /or the N6 traffic routing information has changed.

The event notification may contain following information:

- the type of notification ("EARLY" or "LATE").

- for both the source and target UP path between the UE and the DN, the corresponding information is provided when it has changed:

- DNAI.

- UE IP address / Prefix.

- N6 traffic routing information.

- Candidate DNAI(s) for the PDU Session.

- Change of common EAS.

NOTE 1: UP path change notification, DNAI and N6 traffic routing information are further described in clause 5.6.7 of TS 23.501 [2].

- QoS Monitoring: the event notification may contain the QoS Monitoring report for the QoS parameter(s) to be measured defined in clause 5.45 of TS 23.501 [2]. Implicit subscription of the PCF on behalf of the NEF/AF as part of setting PCC rule(s) may trigger SMF to send this event notification.

- Change of Access Type; The event notification contains the new Access Type for the PDU Session. For MA PDU Session the Change of Access Type may include two Access Type information that the user is currently using.

- Change of RAT Type; the event notification contains the new RAT Type for the PDU Session.

- PLMN change; The event notification contains the new PLMN Identifier for the PDU Session and may indicate:

- whether local traffic offload is possible, i.e., mobility of the PDU session either towards HPLMN or towards a VPLMN where HR-SBO is supported and allowed; and

- DNN and S-NSSAI of HPLMN.

- Change of Satellite backhaul category; The event notification contains the new Satellite backhaul category for the PDU session.

- Downlink data delivery status. The event notification contains the status of downlink data buffering in the core network including:

- First downlink packet per source of the downlink IP traffic in extended buffering and Estimated maximum wait time.

- First downlink packet per source of the downlink IP traffic discarded.

- First downlink packet per source of the downlink IP traffic transmitted after previous buffering and/or discarding of corresponding packet(s).

- QFI allocation: The event notification is sent whenever a new QoS Flow is established and contains:

- If the Target of Event Reporting is a PDU Session and the QoS Flow is associated with this PDU Session, both the allocated QFI and either one of the following (Application Identifier or IP Packet Filter Set or Ethernet Packet Filter Set). The 5QI corresponding to the QoS Flow and the DNN, S-NSSAI corresponding to the PDU Session are also sent.

- If the Target of Event Reporting is a SUPI and the PDU Session is associated with this SUPI, both the allocated QFI and either one of the following (Application Identifier or IP Packet Filter Set or Ethernet Packet Filter Set). The 5QI corresponding to the QoS Flow and the DNN, S-NSSAI corresponding to the PDU Session are also sent.

- If the Target of Event Reporting is an Internal-Group-Id and the PDU Session is associated with this Internal-Group-Id (i.e. the PDU Session belongs to a UE belonging to this Internal-Group-Id), both the allocated QFI and either one of the following (Application Identifier or IP Packet Filter Set or Ethernet Packet Filter Set). The 5QI corresponding to the QoS Flow and the DNN, S-NSSAI, PDU Session ID, SUPI corresponding to the PDU Session are also sent.

- If the Target of Event Reporting is any UE, both the allocated QFI and either one of the following (Application Identifier or IP Packet Filter Set or Ethernet Packet Filter Set). The 5QI corresponding to the QoS Flow and the DNN, S-NSSAI, PDU Session ID, SUPI corresponding to the PDU Session are also sent.

NOTE 2: When the consumer NF is the NWDAF, the event QFI allocation is used to collect data for analytics as specified in TS 23.288 [50].

- Total number of Session Management transactions:

- The total number of Session Management transaction is used to collect the number of SM transactions of a SUPI or Internal Group ID, for example Dispersion Analytics as specified in TS 23.288 [50]. The transaction count is incremented when the NAS transactions from PDU Session Establishment, PDU Session Authentication, PDU Session Modification and PDU Session Release procedures is concluded. Only the periodic reporting mode applies.

- Information on PDU Session for WLAN (i.e. Access Type is Non-3GPP and RAT Type is TRUSTED\_WLAN).

- User plane status information: The event notification contains:

- PDU Session ID.

- User Plane Inactivity Timer (as specified in TS 29.244 [69]).

- PDU Session status (activated, deactivated).

NOTE 3: When the consumer NF is the NWDAF, the event user plane status information is used to collect data for UE Communication analytics as specified in TS 23.288 [50].

- Session Management Congestion Control Experience for PDU Session: The event notification contains the data related to Session Management Congestion Control experience per PDU Session as described in TS 23.288 [50].

- UE session behaviour trends (see clause 4.15.4.3);

- UE communications trends (see clause 4.15.4.3);

- UP with redundant transmission: the event notification indicates if redundant transmission (see clause 5.33.2.2 of TS 23.501 [2]) has been activated or not for the PDU session;

- User Data Usage Measures (see clause 4.15.4.5): SMF conveys the subscription to UPF on behalf of the consumer. Consumer receives the events directly from UPF; and

- User Data Usage Trends (see clause 4.15.4.5): SMF conveys the subscription to UPF on behalf of the consumer. Consumer receives the events directly from UPF.

When the consumer NF is the NWDAF, the event Information on PDU Session for WLAN is used to collect data for WLAN performance analytics as specified in TS 23.288 [50].

When the consumer NF is the NWDAF, the event Session Management Congestion Control Experience for PDU Session is used to collect data for Session Management Congestion Control Experience analytics as specified in TS 23.288 [50].

When the consumer NF is the NWDAF, the events QoS Monitoring, User Data Usage Measures and User Data Usage Trends are used to collect data from UPF for analytics as specified in clause 4.15.4.5 and in TS 23.288 [50]. SMF conveys the subscription to UPF on behalf of the NWDAF.

The consumer NF may request to subscribe the UPF exposure events (including event ID of exposed UPF event of QoS monitoring, User Data Usage Measures and User Data Usage Trends) via SMF indirectly by Nsmf\_EventExposure. After receiving this subscription request, the SMF does a third-party subscription onto UPF on behalf of this consumer. The consumer should also provide the subscribed UPF event to SMF.

Event Filters are used to specify the conditions to match for notifying the events (i.e. "List of Parameter values to match"). If there are no conditions to match for a specific Event ID, then the Event Filter is not provided. The following table provides as an example how the conditions to match for event reporting can be specified for various Event IDs for SMF exposure.

Table 5.2.8.3.1-1: Example of Event Filters for SMF exposure events

|  |  |
| --- | --- |
| Event ID for SMF exposure | Event Filter (List of Parameter Values to Match) |
| DNAI Change | None |
| Candidate DNAI(s) has changed | None |
| PDU Session Release | <Parameter Type = S-NSSAI, Value = S-NSSAI1> |
| PDU Session Establishment | <Parameter Type = S-NSSAI, Value = S-NSSAI1> |
| QoS Monitoring | <Parameter Type = S-NSSAI, Value = S-NSSAI1>  <Parameter Type = DNN, Value = DNN1>  <Parameter Type = Application Identifier, Value = Application Identifier1>  <Parameter Type = AoI, value = AoI1>  <Parameter Type = UPF Id, value = UPF Id1>  <Parameter Type = DNAI, value = DNAI1> |
| QFI allocation | <Parameter Type = DNN, Value = DNN1>  <Parameter Type = S-NSSAI, Value = S-NSSAI1> |
| QFI allocation | <Parameter Type = Application Identifier, Value = Application Identifier1> |
| Transaction Count | <Parameter Type = TAI, Value = TA1> (NOTE)  <Parameter Type = S-NSSAI, Value = S-NSSAI1> |
| User plane status information | <Parameter Type = Application Identifier, Value = Application Identifier1>  <Parameter Type = SUPI, Value = SUPI1> |
| Information on PDU Session for WLAN | <Parameter Type = Access Type, Value = Non-3GPP> && <Parameter Type = RAT Type, Value = TRUSTED\_WLAN> |
| Session Management Congestion Control Experience for PDU Session | <Parameter Type = DNN, Value = DNN1>  <Parameter Type = S-NSSAI, Value = S-NSSAI1> |
| UP with redundant transmission | <Parameter Type = DNN, Value = DNN1> |
| User Data Usage Measures | <Parameter Type = S-NSSAI, Value = S-NSSAI1>  <Parameter Type = DNN, Value = DNN1>  <Parameter Type = Application Identifier, Value = Application Identifier1> (NOTE 2)  <Parameter Type = Flow Info, Value = Packet Filter Set1> (NOTE 2)  <Parameter Type = AoI, value = AoI1>  <Parameter Type = SSID/BSSID, Value = SSID/BSSID1> |
| User Data Usage Trends | <Parameter Type = S-NSSAI, Value = S-NSSAI1>  <Parameter Type = DNN, Value = DNN1>  <Parameter Type = Application Identifier, Value = Application Identifier1> (NOTE 2)  <Parameter Type = Flow Info, Value = Packet Filter Set1> (NOTE 2)  <Parameter Type = AoI, value = AoI1> |
| NOTE 1: Optionally the SMF can fetch the location information from the AMF but transaction information correlation at the location can also be achieved without it and through transaction information associated with the requested time period, which corresponds to the UE's time span at the location of interest.  NOTE 2: These Parameters are exclusive and only one of them can be provided. | |

The target of SMF event reporting may correspond to a PDU Session ID, an UE ID (SUPI), an Internal Group Identifier, an indication that any UE is targeted (e.g. on a specific DNN), or an indication that any PDU session is the target.

When acknowledgment is expected the SMF also provides Notification Correlation Information to the consumer NF in the event notification.

The consumer NF may provide the following event-specific information when acknowledging an event notification:

- For UP path change event:

- N6 traffic routing information related to the target DNAI.

NOTE 4: Acknowledgement to a UP path change event notification is further described in clause 5.6.7 of TS 23.501 [2].

##### 5.2.8.3.2 Nsmf\_EventExposure\_Notify service operation

**Service operation name:** Nsmf\_EventExposure\_Notify

**Description:** Report UE PDU Session related event(s) to the NF which has subscribed to the event report service.

**Input Required:** Event ID, Notification Correlation Information, UE ID(s) (SUPI(s) and if available GPSI(s)), PDU Session ID(s), time stamp.

SMF reports multiple PDU Sessions events when those happen at the same time and as indicated in the time stamp. The SMF reports the PDU Session ID, SUPI and if available GPSI(s) per each PDU Session event.

**Input, Optional:** Event specific parameter list as described in clause 5.2.8.3.1, capability of supporting EAS IP replacement in 5GC.

**Output Required:** Result Indication.

**Output, Optional:** Redirection information*.*

When the SMF detects the event subscribed by the NF consumer, the SMF reports the subscribed event together with the Notification Target Address (+ Notification Correlation ID) to the Event Receiving NF.

The optional event specific parameter list provides the values that matched for generating the event notification. The parameter values to match are specified during the event subscription (see clause 5.2.8.3.3).

See clause 4.3.6.3 for details on usage of this service operation toward Application Function.

If the NF consumer is AMF and the result of the service operation fails, the AMF shall set corresponding cause value in result indication which can be used by the SMF for further action. If the related UE is not served by the AMF and the AMF knows which AMF is serving the UE, the AMF provides redirection information which can be used by the SMF to resend UE related message to the AMF that serves the UE.

NOTE: In the case of UP plane path, as described in clause 4.3.6.2, this notification can be the result of an implicit subscription of the NEF/AF by the PCF as part of setting PCC rule(s) via the Npcf\_SMPolicyControl service (see clause 5.2.5.4).

##### 5.2.8.3.2A Nsmf\_EventExposure\_AppRelocationInfo service operation

**Service operation name:** Nsmf\_EventExposure\_AppRelocationInfo

**Description:** Acknowledge the notification from the SMF regarding UE PDU Session related event(s).

**Input Required:** Notification Correlation Information, cause code.

The Notification Correlation Information is provided by the SMF in the event notification.

Cause code indicates this acknowledgement is positive or negative.

**Input, Optional:** Event specific parameter list as described in clause 5.2.8.3.1, Indication that buffering of uplink traffic should start, Information for EAS IP Replacement in 5GC.

**Output Required:** None.

**Output, Optional:** None.

See clause 4.3.6.3 for details on usage of this service operation for example for the usage of the Indication that buffering of uplink traffic should start.

##### 5.2.8.3.3 Nsmf\_EventExposure\_Subscribe service operation

**Service operation name:** Nsmf\_EventExposure\_Subscribe.

**Description:** This service operation is used by an NF to subscribe or modify a subscription for event notifications on a specified PDU Session or for all PDU Sessions of one UE, group of UE(s) or any UE.

**Input, Required:** NF ID, Target of Event Reporting as defined in clause 5.2.8.3.1, (set of) Event ID(s) defined in clause 5.2.8.3.1, Notification Target Address (+ Notification Correlation ID), Event Reporting Information defined in Table 4.15.1-1*.*

**Input, Optional:** Event Filter(s) associated with each Event ID; Event Filter(s) are defined in clause 5.2.8.3.1, Subscription Correlation ID (in the case of modification of the event subscription), Expiry time, DNN, S-NSSAI, DNAI, UPFId, UPF event exposure information (Type of measurement, granularity of measurement, reporting suggestion information, etc. associated with the UPF Event IDs as described in clause 4.15.4.5)*.*

NOTE: The SMF is generally meant to determine the UPF to contact for a subscription related to UPF event exposure. UPF ID is only provided to indicate a UP Path as defined in Table 6.4.1-1 of TS 23.288 [50], i.e. when the NWDAF has received the target UPF as part of statistics of observed service experience on an UP path involving that UPF.

**Output, Required:** When the subscription is accepted: Subscription Correlation ID (required for management of this subscription), Expiry time (required if the subscription can be expired based on the operator's policy)*.*

**Output, Optional:** First corresponding event report is included, if available (see clause 4.15.1)*.*

Notification Target Address (+ Notification Correlation ID) is used to correlate Notifications sent by SMF or UPF with this subscription.

##### 5.2.8.3.4 Nsmf\_EventExposure\_UnSubscribe service operation

**Service operation name:** Nsmf\_EventExposure\_UnSubscribe.

**Description:** This service operation is used by an NF to unsubscribe event notifications.

**Input, Required:** Subscription Correlation ID*.*

**Input, Optional:** None*.*

**Output, Required:** None*.*

**Output, Optional:** None*.*

#### 5.2.8.4 Nsmf\_NIDD Service

##### 5.2.8.4.1 General

This service is used for NIDD transfer between SMF and another NF. See clause 4.25.5.

##### 5.2.8.4.2 Nsmf\_NIDD\_Delivery service operation

**Service operation name:** Nsmf\_NIDD\_Delivery

**Description:** This service operation is used by the NF consumer to deliver the unstructured data between NF consumer and SMF to support NIDD via NEF.

**Inputs Required:** User Identity, PDU Session ID, unstructured data, Reliable Data Service Configuration (Optional).

**Inputs, Optional:** None.

**Outputs Required:** Cause.

**Outputs, Optional:** Extended Buffering Time.

#### 5.2.8.5 Nsmf\_TrafficCorrelation service

##### 5.2.8.5.1 General

**Service description:** This service allows SMF to notify NF Consumer (NEF) about 5GC determined information for a set of UEs identified by Traffic Correlation ID.

NOTE: The NEF stores this in the UDR together with AF requests to influence traffic routing information.

##### 5.2.8.5.2 Nsmf\_TrafficCorrelation\_Notify service operation

**Service operation name:** Nsmf\_TrafficCorrelation\_Notify

**Description:** The NF notifies with 5GC determined information.

**Inputs, Required:** SMF ID, number of PDU sessions for the traffic correlation ID, traffic correlation ID.

**Inputs, Optional:** EAS ID, DNAI(s).

NOTE At least one of EAS ID or DNAI(s) needs to be included in the Input.

**Outputs, Required:** Result Indication.

**Outputs, Optional:** None.

### 