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# Contents

# Foreword

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# 1 Scope

The present specification provides the stage 3 definition of the Session Management Event Exposure Service (Nsmf_EventExposure) of the 5G System.

The stage 2 definition and procedures of the Session Management Event Exposure Service are contained in 3GPP TS 23.502 [3] and 3GPP TS 23.503 [6]. The 5G System Architecture is defined in 3GPP TS 23.501 [2].

Stage 3 call flows for policy and charging control use cases are provided in 3GPP TS 29.513 [7].

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

The Session Management Event Exposure Service is provided by the Session Management Function (SMF). This service exposes events related to PDU Sessions observed at the SMF.

# 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 23.503: "Policy and Charging Control Framework for the 5G System; Stage 2".

[7] 3GPP TS 29.513: "5G System; Policy and Charging Control signalling flows and QoS parameter mapping; Stage 3".

[8] IETF RFC 9113: "HTTP/2".

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

[10] OpenAPI: "OpenAPI Specification Version 3.0.0", https://spec.openapis.org/oas/v3.0.0.

[11] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces Stage 3".

[12] 3GPP TS 29.510: "5G System; Network Function Repository Services; Stage 3".

[13] 3GPP TS 29.518: "5G System; Access and Mobility Management Services; Stage 3".

[14] 3GPP TS 29.512: "5G System; Session Management Policy Control Service; Stage 3".

[15] 3GPP TS 33.501: "Security architecture and procedures for 5G system".

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

[18] IETF RFC 9457: "Problem Details for HTTP APIs".

[19] 3GPP TR 21.900: "Technical Specification Group working methods".

[20] 3GPP TS 29.522: "5G System; Network Exposure Function Northbound APIs; Stage 3".

[21] 3GPP TS 23.288: "Architecture enhancements for 5G System (5GS) to support network data analytics services".

[22] 3GPP TS 29.514: "5G System; Policy Authorization Service; Stage 3".

[23] 3GPP TS 29.244: "Interface between the Control Plane and the User Plane of EPC Nodes".

[24] 3GPP TS 29.122: "T8 reference point for Northbound APIs".

[25] 3GPP TS 29.591: "5G System; Network Exposure Function Southbound Services; Stage 3".

[26] 3GPP TS 29.564: "5G System; User Plane Function Services; Stage 3".

[27] 3GPP TS 29.554: "5G System; Background Data Transfer Policy Control Service; Stage 3".

[28] 3GPP TS 29.519: "5G System; Usage of the Unified Data Repository service for Policy Control Data, Application Data and Structured Data for Exposure; Stage 3".

# 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].

| | |
|---|---|
| AF | Application Function |
| AMBR | Aggregate Maximum Bit Rate |
| AMF | Access and Mobility Management Function |
| API | Application Programming Interface |
| DCCF | Data Collection Coordination Function |
| DDD | Downlink Data Delivery |
| DNAI | DN Access Identifier |
| DNN | Data Network Name |
| EAS | Edge Application Server |
| FQDN | Fully Qualified Domain Name |
| GPSI | Generic Public Subscription Identifier |
| GUAMI | Globally Unique AMF Identifier |
| HTTP | Hypertext Transfer Protocol |
| H-SMF | Home SMF |
| I-SMF | Intermediate SMF |
| JSON | JavaScript Object Notation |
| NEF | Network Exposure Function |
| NF | Network Function |
| NID | Network Identifier |
| NRF | Network Repository Function |
| NSSAI | Network Slice Selection Assistance Information |
| NWDAF | Network Data Analytics Function |
| PCF | Policy Control Function |
| PRA | Presence Reporting Area |

| | |
|---|---|
| QFI | QoS Flow Identifier |
| SMCC | Session Management Congestion Control |
| SMCCE | Session Management Congestion Control Experience |
| SMF | Session Management Function |
| SNPN | Stand-alone Non-Public Network |
| SUPI | Subscription Permanent Identifier |
| S-NSSAI | Single Network Slice Selection Assistance Information |
| SSC | Session and Service Continuity |
| UDM | Unified Data Management |
| UPF | User Plane Function |
| V-SMF | Visited SMF |

# 4 Session Management Event Exposure Service

## 4.1 Service Description

### 4.1.1 Overview

The Session Management Event Exposure Service, as defined in 3GPP TS 23.502 [3] and 3GPP TS 23.503 [6], is provided by the Session Management Function (SMF).

This service:

- allows NF service consumers to subscribe and unsubscribe for events on a PDU session; and
- notifies recipient of notification(s) subscribed by NF service consumers with a corresponding subscription about observed events on the PDU session.

The types of observed events applicable for (H-)SMF (i.e. in non-roaming and LBO scenarios) include:

- UP path change (e.g. addition and/or removal of PDU session anchor);
- access type change;
- RAT type change;
- PLMN change;
- PDU session release;
- PDU session establishment;
- Downlink data delivery status;
- UE IP address/prefix change;
- QFI allocation;
- QoS monitoring;
- SM congestion control experience for PDU Session;
- Dispersion;
- Satellite backhaul category change;
- WLAN information for PDU Session;
- Redundant transmission experience for PDU Session;
- UPF events; and/or
- Traffic Correlation.

The types of observed events applicable for V-SMF include:

- Downlink data delivery status;
- UP Path Change (for the HR-SBO scenario).

The types of observed events applicable for I-SMF include:

- Downlink data delivery status;
- UPF events.

## 4.1.2 Service Architecture

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

The Session Management Event Exposure Service (Nsmf_EventExposure) is part of the Nsmf service-based interface exhibited by the Session Management Function (SMF).

The known NF service consumers of the Nsmf_EventExposure service are:

- Network Exposure Function (NEF),
- Access and Mobility Management Function (AMF),
- Application Function (AF),
- Unified Data Management (UDM),
- Network Data Analytics Function (NWDAF), and
- Data Collection Coordination Function (DCCF).

The PCF accesses the Session Management Event Exposure Service at the SMF via the N7 Reference point.

NOTE: The PCF can implicitly subscribe on behalf of the AF or NEF to the UP_PATH_CH, TRAFFIC_CORRELATION event and/or the QOS_MON event by including the information on AF or NEF subscription within the PCC rule.

The AMF accesses the Session Management Event Exposure Service at the SMF via the N11 Reference point.

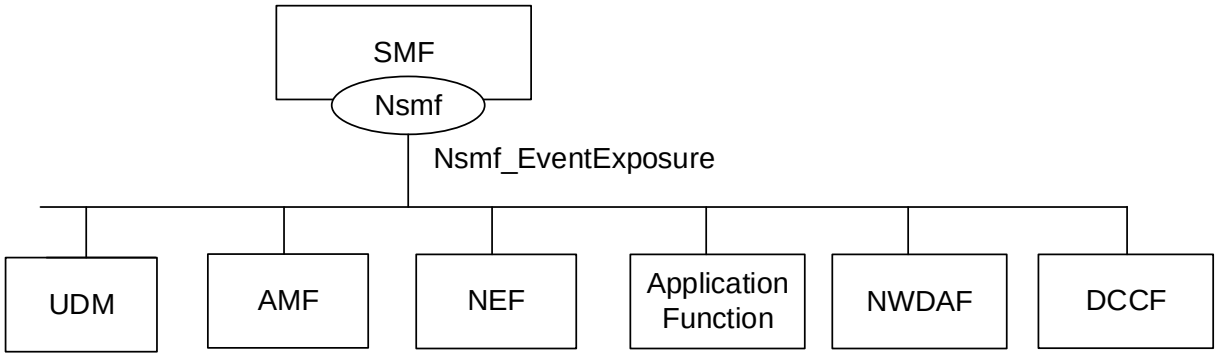


**Figure 4.1.2-1: Reference Architecture for the Nsmf_EventExposure Service; SBI representation**

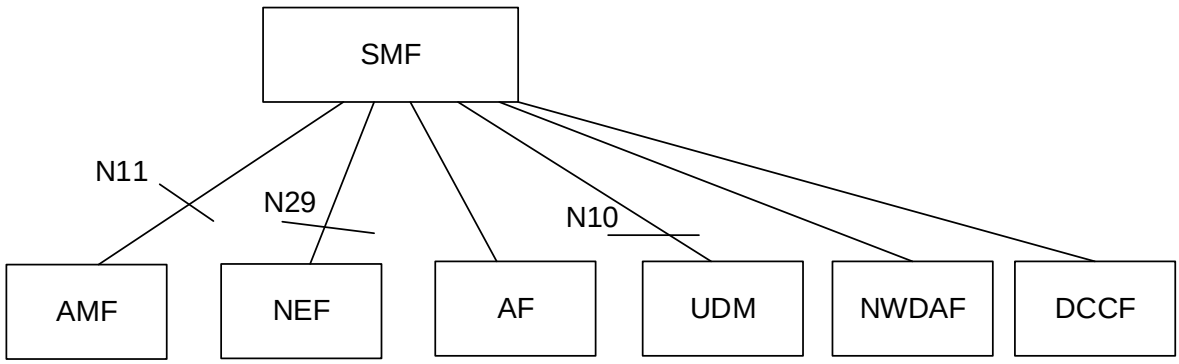


**Figure 4.1.2-2: Reference Architecture for the Nsmf_EventExposure Service: reference point representation**

## 4.1.3 Network Functions

### 4.1.3.1 Session Management Function (SMF)

The Session Management function (SMF) provides:

- Session Management e.g. Session establishment, modification and release;
- UE IP address allocation & management;
- Selection and control of UP function;
- Termination of interfaces towards Policy control functions; and
- Control part of policy enforcement and QoS.

### 4.1.3.2 NF Service Consumers

The Network Exposure Function (NEF);

- provides means to securely expose the services and capabilities provided by 3GPP network functions to e.g. 3rd parties or internal exposure consumer NF.

The Access and Mobility Management function (AMF) provides:

- Registration management;
- Connection management;
- Reachability management; and
- Mobility Management.

The Application Function (AF)

- interacts with the 3GPP Core Network to provide services.

The Unified Data Management (UDM).

- has access to subscriber information, can determine the SMF serving a user based on that data, and can then subscribe to event notifications for a user (e.g. when triggered by the NEF).

The Network Data Analytics Function (NWDAF)

- collects data based on event subscription provided by AMF, SMF, UPF, PCF, UDM, AF (directly or via NEF) and OAM;

- retrieves information about NFs;
- performs on demand provision of analytics to NF service consumers, as indicated in clause 6, 3GPP TS 23.288 [21].

The Data Collection Coordination Function (DCCF)

- coordinates the collection and distribution of data and analytics.

# 4.2 Service Operations

## 4.2.1 Introduction

**Table 4.2.1-1: Operations of the Nsmf_EventExposure Service**

| Service operation name | Description | Initiated by |
|---|---|---|
| Notify | Report UE PDU session related event(s) to recipient of notification(s) which the NF service consumer has subscribed to the event report service. | (H-)SMF, V-SMF, I-SMF |
| Subscribe | This service operation is used by an NF service consumer to subscribe for event notifications on a specified PDU session, or for all PDU Sessions of one UE, a group of UE(s) or any UE, or to modify a subscription. | NF service consumers (e.g. AMF, NEF, AF, UDM, NWDAF, DCCF) |
| UnSubscribe | This service operation is used by an NF service consumer to unsubscribe from event notifications. | NF service consumers (e.g. AMF, NEF, AF, UDM, NWDAF, DCCF) |
| AppRelocationInfo | This service operation is used by an NF service consumer to acknowledge the notification from the SMF regarding UE PDU Session related event(s) | NF service consumers (e.g. NEF, AF) |

NOTE: The Nsmf_TrafficCorrelation_Notify Service Operation defined in clause 5.2.8.5.2 of 3GPP TS 23.502 [3] is implemented as the "TRAFFIC_CORRELATION" event in the Nsmf_EventExposure_Notify Service Operation with "CommonEASDNAI" feature support.

## 4.2.2 Nsmf_EventExposure_Notify Service Operation

### 4.2.2.1 General

The Nsmf_EventExposure_Notify service operation enables the SMF (i.e. (H-)SMF, V-SMF and/or I-SMF) to send notifications to recipient of notification(s) subscribed by NF service consumers upon the occurrence of a previously subscribed event on the related PDU session.

The following procedure using the Nsmf_EventExposure_Notify service operation is supported:

- notification about subscribed events.

### 4.2.2.2 Notification about subscribed events

The present "notification about subscribed events" procedure is performed by the SMF when any of the subscribed events occur.

The following applies with respect to the detection of subscribed events:

- If:
  - the SMF supports the "DownlinkDataDeliveryStatus" feature,
  - the event "DDDS" is subscribed,
  - the traffic descriptors of the downlink data source have been provided for that subscription, and

- the SMF is informed that the UE corresponding to that subscription is unreachable,

  - if the data is buffered at the UPF, then the SMF shall interact with the UPF to notify that the UPF buffers the downlink packets. The SMF shall include the traffic descriptor of the subscriptions in the PDR with a higher priority if the PCC is not applied to the PDU session or derive the PDR from the PCC rule received from the PCF as defined in clause 4.2.4.27 of 3GPP TS 29.512 [14] if the PCC is applied to the PDU session and request the UPF to report when there are corresponding buffered downlink packets or discarded packets in the UPF as defined in clause 5.28.1 of 3GPP TS 29.244 [23]. When receiving the report from the UPF, the SMF shall determine whether that subscribed event with delivery status "DISCARDED" or "BUFFERED" occurred. The SMF shall determine that subscribed event with delivery status "TRANSMITTED" occurred by the fact that the related PDU session becomes ACTIVE.

  - if the data is buffered at the SMF, the SMF shall determine whether that subscribed event occurred by comparing the downlink packets with the traffic descriptors received in the corresponding event subscription. If the SMF decides to buffer the packets, the subscribed event with delivery status "BUFFERED" occurred. If the SMF decides to discard the packets, the subscribed event with delivery status "DISCARDED" occurred. The SMF shall determine that subscribed event with delivery status "TRANSMITTED" occurred by the fact that the related PDU session becomes ACTIVE.

Figure 4.2.2.2-1 illustrates the notification about subscribed events.

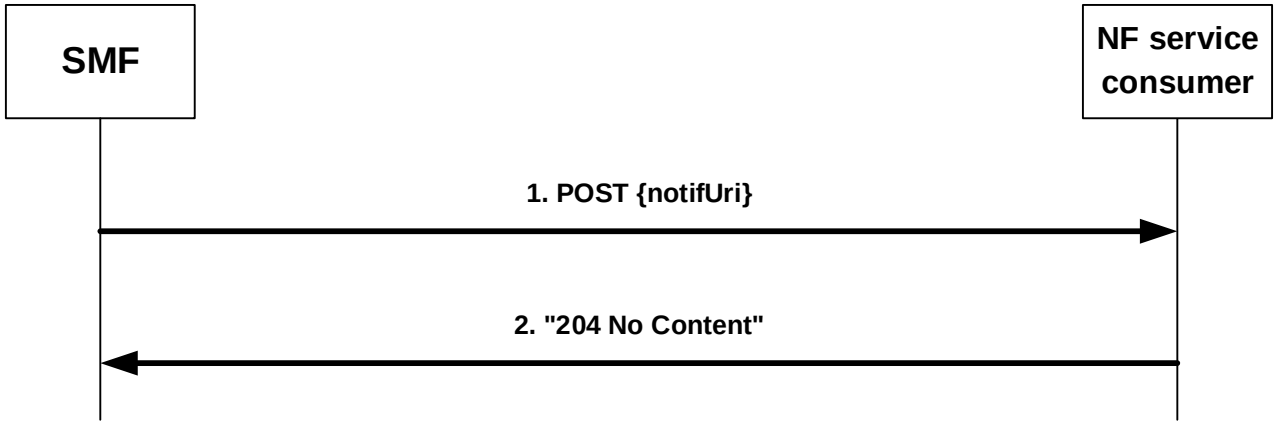


**Figure 4.2.2.2-1: Notification about subscribed events**

If the SMF observes PDU Session related event(s) for which an NF service consumer has subscribed, the SMF shall send an HTTP POST request with "{notifUri}", as previously provided by the NF service consumer within the corresponding subscription, as URI and NsmfEventExposureNotification data structure as request body that shall include:

- Notification correlation ID provided by the NF service consumer during the subscription, or as provided by the PCF for implicit subscription of UP path change and/or traffic correlation as defined in clause 4.2.6.2.6.2 of 3GPP TS 29.512 [14], or as provided by the PCF for implicit subscription of QoS Monitoring as defined in clause 4.2.3.25 of 3GPP TS 29.512 [14], as "notifId" attribute, or as provided by the V-NEF for implicit subscription of UP path change as defined in clause 4.4.2.4.2 of 3GPP TS 29.591 [28], as "upPathChgNotifCorreId" attribute within "eventNotifications" attribute; and

- information about the observed event(s) within the "eventNotifs" attribute that shall contain for each observed event an "EventNotification" data structure that shall include:

  1. the Event Trigger as "event" attribute;

  2. for a UP path change notification:

     a) type of notification ("EARLY" or "LATE") as "dnaiChgType" attribute;

     b) source DNAI and/or target DNAI as "sourceDnai" attribute and "targetDnai" attribute if DNAI is changed, respectively (NOTE 3); and

     c) if the PDU Session type is IP, for the source DNAI IP address/prefix of the UE as "sourceUeIpv4Addr" attribute or "sourceUeIpv6Prefix" attribute; and

d) if the PDU Session type is IP, for the target DNAI IP address/prefix of the UE as "targetUeIpv4Addr" attribute or "targetUeIpv6Prefix" attribute;

e) if available (NOTE 3), for the source DNAI, N6 traffic routing information related to the UE as "sourceTraRouting" attribute;

f) if available (NOTE 3), for the target DNAI, N6 traffic routing information related to the UE as "targetTraRouting" attribute;

g) if the PDU Session type is Ethernet, the MAC address of the UE in the "ueMac" attribute;

h) if the "CommonEASDNAI" feature is supported,

- the candidate DNAI(s) for the PDU Session in "candidateDnais" attribute, optionally together with the indication of their prioritization within the "candDnaisPrioInd" attribute, if the "candDnaiInd" attribute was set to "true" in the PCC rule(s); or

- the indication of EAS re-discovery in "easRediscoverInd" attribute if EAS re-discovery took place.

i) if both the SMF and the NF service consumer support "ULBuffering" and/or "EASIPreplacement" features, these supported features within the "supportedFeatures" attribute.

NOTE 1: The SMF gets the knowledge of the feature supported by the NF service consumer as described in clause 5.8.

j) if the "EasRelocationEnh" feature is supported and the SMF determines that the target DNAI is supported by an AF different to the one that shall receive this notification, the identifier of the target AF that supports this DNAI in the "targetAfId" attribute.

k) if the "HR-SBO" feature is supported and the SMF determines that the UE has moved to a serving PLMN in which local traffic offload is allowed, the identifier of this new serving PLMN within the "plmnId" attribute, as well as the DNN and S-SNSSAI of the HPLMN within the "dnn" and "snssai" attributes, respectively.

NOTE 2: The SMF can determine this by comparing the AF ID of the EAS Deployment Information entry that contains the old DNAI with the AF ID of the EAS Deployment Information entry that contains the target DNAI. These EAS Deployment Information entries are received via the Nnef_EASDeployment API defined in 3GPP TS 29.591 [25].

NOTE 3: UP path change notification, i.e. DNAI change notification and/or N6 traffic routing information change notification, can be the result of an implicit subscription of the PCF on behalf of the NEF/AF as part of setting PCC rule(s) via the Npcf_SMPolicyControl service (see clause 4.2.6.2.6.2 of 3GPP TS 29.512 [14]).

NOTE 4: If the DNAI is not changed while the N6 traffic routing information change, the source DNAI and target DNAI are not provided.

NOTE 5: The change from the UP path status where no DNAI applies to a status where a DNAI applies indicates the activation of the related AF request and therefore only the target DNAI and N6 traffic routing information is provided in the event notification; the change from the UP path status where a DNAI applies to a status where no DNAI applies indicates the de-activation of the related AF request and therefore only the source DNAI and N6 traffic routing information is provided in the event notification.

3. for a UE IP address change:

a) added new UE IP address or prefix as "adIpv4Addr" attribute or "adIpv6Prefix" attribute, respectively; and/or

b) released UE IP address or prefix as "reIpv4Addr" attribute or "reIpv6Prefix" attribute, respectively;

4. for an access type change:

a) new access type as "accType" attribute;

5. for a PLMN Change:

a) new PLMN as "plmnId" attribute;

6. for a PDU Session Release:

   a) ID of the released PDU session as "pduSeId" attribute;

   b) DNN of the released PDU session as "dnn" attribute, if the "PduSessionStatus" feature is supported;

   c) The type of the released PDU session as "pduSessType" attribute, if the "PduSessionStatus" feature is supported;

   d) UE IPv4 address as "ipv4Addr" attribute and/or IPv6 information (IPv6 prefix(es) or IPv6 address(es)) as "ipv6Prefixes" or "ipv6Addrs" attributes, if the released PDU session type is IP and the "PduSessionStatus" feature is supported; and

   e) S-NSSAI of the released PDU session as "snssai" attribute, if the "EneNA" feature is supported and "snssai" attribute is present in the subscribed "NsmfEventExposure" data type;

7. the time at which the event was observed encoded as "timeStamp" attribute;

8. the SUPI as the "supi" attribute if the subscription applies to a group of UE(s) or any UE. If the "WlanPerformanceExt_AIML " feature is supported, the "supi" attribute may also be included for a single UE when the subscription applies to the "WLAN_INFO" event;

9. if available, the GPSI as the "gpsi" attribute if the subscription applies to a group of UE(s) or any UE;

10. for a Downlink Data Delivery Status, if the "DownlinkDataDeliveryStatus" feature is supported:

    a) the downlink data delivery status as "dddStatus" attribute;

    b) the downlink data descriptors impacted by the downlink data delivery status change within the "dddTraDescriptor" attribute; and

    c) for downlink data delivery status "BUFFERED". the estimated maximum waiting time as "maxWaitTime" attribute;

11. for a Communication Failure, if the "CommunicationFailure" feature is supported:

    a) the detailed communication failure information (e.g. 5G SM cause) as "commFailure" attribute; and

12. for QoS Monitoring event, if the "QoSMonitoring" feature is supported:

    a) the uplink packet delays within the "ulDelays" attribute; and/or

    b) the downlink packet delays within the "dlDelays" attribute; and/or

    c) the round trip packet delays within the "rtDelays" attribute; or

NOTE 6: The UPF reports one UL, DL and/or round-trip packet delay measurement for each periodic and/or event-triggered report as described in 3GPP TS 29.244 [23]. i.e, the SMF can include only one element within the "ulDelays", "dlDelays", and/or "rtDelays" array(s), each one with the received report from the UPF for the UL, DL and/or round trip delay(s).

    d) if the feature "PacketDelayFailureReport" is supported, the packet delay measurement failure indicator within the "pdmf" attribute; and/or

    e) if the feature "EnQoSMon" is supported, UL and/or DL congestion information within the "ulCongInfo" attribute and "dlCongInfo" attribute; and/or

    f) if the feature "EnQoSMon" is supported, UL and/or DL data rate measurement within the "ulDataRate" attribute and/or "dlDataRate" attribute.

NOTE 7: The SMF gets the knowledge of the NF service consumer support of "QoSMonitoring", "PacketDelayFailureReport" and "EnQoSMon" features as described in 3GPP TS 29.512 [14].

NOTE 8: QoS Monitoring notification can be the result of an implicit subscription of the PCF on behalf of the NEF/AF as part of setting PCC rule(s) via the Npcf_SMPolicyControl service (see clause 4.2.3.25 of 3GPP TS 29.512 [14]).

13. for a PDU Session Establishment, if the "PduSessionStatus" feature is supported:

    a) ID of the established PDU session as "pduSeId" attribute;

    b) DNN of the established PDU session as "dnn" attribute;

    c) The type of the established PDU session as "pduSessType" attribute;

    d) UE IPv4 address as "ipv4Addr" attribute and/or IPv6 information (IPv6 prefix(es) or IPv6 address(es)) as "ipv6Prefixes" or "ipv6Addrs" attributes if available at PDU session establishment; and

    e) S-NSSAI of the established PDU session as "snssai" attribute, if the "EneNA" feature is supported and "snssai" attribute is present in the subscribed "NsmfEventExposure" data type;

14. for a QFI allocation, if the "QfiAllocation" or feature is supported:

    a) QFI of the allocated QoS Flow ID for the application as "qfi" attribute or, if the "EnQfiAllocation" feature is also supported, the 5QI of the allocated QoS Flow ID for the application as "5qi" attribute;

    b) DNN of the allocated PDU session as "dnn" attribute;

    c) Slice of the allocated PDU session as "snssai" attribute;

    d) The description of the application traffic as "appId", "fDescs" or "ethfDescs" attribute; and

    e) ID of the allocated PDU session as "pduSeId" attribute if the subscription was for a UE, a group of UEs, or any UE, and not for a specific PDU Session;

    f) To obtain the PDU Session information, if the "PduSessionInfo" feature is supported:

        i) the information about the UE access type provided as "accessType" attribute;

        ii) the information about the PDU Session Type in the "pduSessType" attribute and/or the SSC mode in the "sscMode" attribute associated with the application provided as "appId" attribute; and/or

        iii) the information about the PDU Session associated list of access types as "pduAccTypes" attribute, if the "MultipleAccessTypes" feature is also supported.

15. for an RAT type change event, if the "EneNA" feature is supported:

    a) new RAT type as "ratType" attribute;

16. for a SM congestion control experience for PDU Session, if the "SMCCE" feature is supported:

    a) DNN of the PDU session as "dnn" attribute if DNN based SMCC is applied

    or Slice of the allocated PDU session as "snssai" attribute if S-NSSAI based SMCC is applied;

    b) Time window representing a start time and a stop time of the data collection period as "timeWindow" attribute;

    c) The information of the SM NAS requests from UE as "smNasFromUe" attribute; and

    d) The information of the SM NAS messages from SMF with backoff timer as "smNasFromSmf" attribute;

17. for transactions dispersion collection, if the Dispersion feature is supported:

    a) The transactions dispersion information collected as "transacInfos" attribute; and

    b) The UE IP address as "ueIpAddr" attribute if it is available and requested in the subscription;

18. for redundant transmission experience of PDU Session, if the "RedundantTransmissionExp" feature is supported:

a) DNN associated with URLLC service for the PDU session as "dnn" attribute; and

b) UP with redundant transmission setup as "upRedTrans" attribute;

19. for WLAN information on PDU Session, if the "WlanPerformance" feature is supported:

a) SSID or BSSID that the PDU session is related to as "ssId" or "bssId" attribute; and

b) start time or end time of the PDU Session for WLAN as "startWlan" or "endWlan" attribute;

20. for obtaining the UPF information, if the "ServiceExperience" and/or "DnPerformance" feature is supported:

a) the information of the UPF serving the UE provided as "upfInfo" attribute.

21. for obtaining the User Plane status information, if the "UeCommunication" feature is supported:

a) the information about the User Plane status provided as "pduSessInfos" attribute.

22. for a satellite backhaul category change, if the "EnSatBackhaulCategoryChg" feature is supported:

a) satellite backhaul category as "satBackhaulCat" attribute.

23. for traffic correlation, if the "CommonEASDNAI" feature is supported:

a) the traffic correlation information in the "trafCorreInfo" attribute, if the "notifUri" attribute, "notifCorrId" attribute and "tfcCorrId" attribute are provided in the PCC rule, and the common EAS is not provided in the PCC rule or the SMF decides to trigger EAS discovery for the set of UE(s).

NOTE 9: Traffic correlation notification can be the result of an implicit subscription of the PCF on behalf of the NEF as part of setting PCC rule(s) via the Npcf_SMPolicyControl service (see clause 4.2.6.2.6.2 of 3GPP TS 29.512 [14]).

- an URI for further AF acknowledgement in the "ackUri" attribute if the SMF determines to wait for the AF acknowledgement before activating the new UP path associated with the new DNAI.

NOTE 10: Based on the indication of AF acknowledgment to be expected in the PCC rules received from the PCF and local configuration, the SMF may determine to wait for the AF acknowledgement before activating the new UP path associated with the new DNAI.

Upon the reception of an HTTP POST request with "{notifUri}" as URI and an NsmfEventExposureNotification data structure as request body, the notified NF shall send an HTTP "204 No Content" response for a successful processing.

If errors occur when processing the HTTP POST request, the notified NF shall send the HTTP error response as specified in clause 5.7.

If the feature "ES3XX" is not supported and,

- if the notified NF is not able to handle the Notification but another unknown NF could possibly handle the notification, it shall reply with an HTTP "404 Not found" error response.

NOTE 11: An AMF as NF service consumer and/or notified NF can change.

- if the SMF becomes aware that a new NF service consumer is requiring notifications (e.g. via the "404 Not found" response, or via Namf_Communication service AMFStatusChange Notifications, see 3GPP TS 29.518 [13], or via link level failures or via the Nnrf_NFDiscovery Service (using the service name and GUAMI obtained during the creation of the subscription) to discover the other AMFs within the AMF set) specified in 3GPP TS 29.510 [12]), and the SMF knows alternate or backup IPv4 Address(es), IPv6 Address(es) or FQDN(s) where to send Notifications (e.g. via "altNotifIpv4Addrs", "altNotifIpv6Addrs" or "altNotifFqdns" attributes received when the subscription was created), the SMF shall exchange the authority part of the Notification URI with one of those addresses and shall use that URI in any subsequent communication. If the SMF received a "404 Not found" response, the SMF should resend the failed notification to that URI.

If the feature "ES3XX" is supported, and the notified NF determines the received HTTP POST request needs to be redirected, the NF service consumer shall send an HTTP redirect response as specified in clause 6.10.9 of 3GPP TS 29.500 [4] and,

- if the SMF receives a "307 Temporary Redirect" response, the SMF shall resend the failed event notification request using the received URI in the Location header field as Notification URI. Subsequent event notifications, triggered after the failed one, shall be sent to the Notification URI provided by the NF service consumer during the corresponding subscription creation/update; or
- if the SMF receives a "308 Permanent Redirect" response, the SMF shall resend the failed event notification request and send the subsequent event notification using the received URI in the Location header field as Notification URI.

If the SMF in the VPLMN needs to send an event notification to the NEF in the HPLMN, it may normalize the event based on roaming agreements when required before provisioning the event report to the NEF of the HPLMN.

## 4.2.3 Nsmf_EventExposure_Subscribe Service Operation

### 4.2.3.1 General

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

The following procedures using the Nsmf_EventExposure_Subscribe service operation are supported:

- creating a new subscription;
- modifying an existing subscription.

### 4.2.3.2 Creating a new subscription

Figure 4.2.3.2-1 illustrates the creation of a subscription.

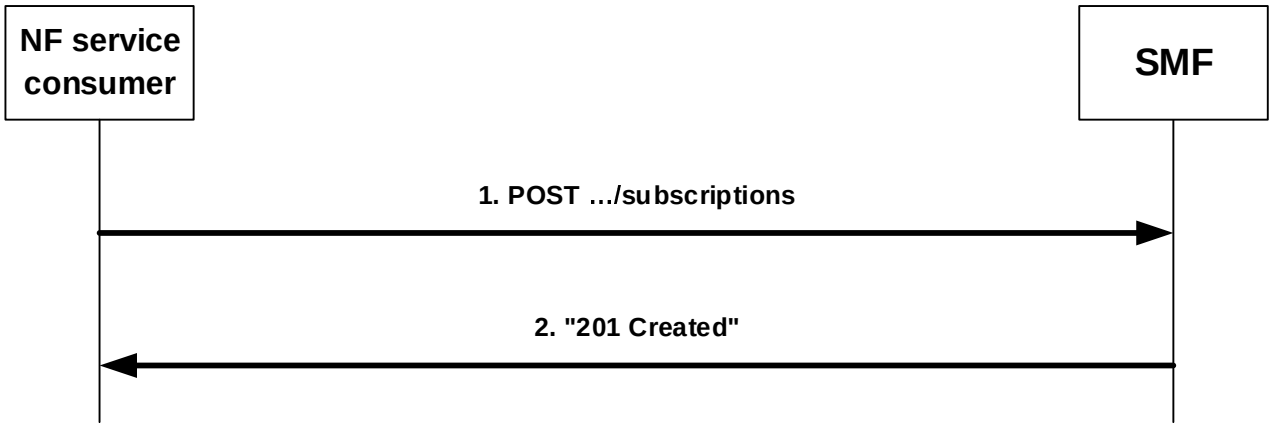


**Figure 4.2.3.2-1: Creation of a subscription**

To subscribe to event notifications, the NF service consumer shall send an HTTP POST request with: "{apiRoot}/nsmf-event-exposure/v1/subscriptions" as Resource URI and the NsmfEventExposure data structure as request body that shall include:

- if the subscription applies to events related to a single PDU session for a UE, the PDU Session ID of that PDU session as "pduSeId" attribute and the UE identification as "supi" or "gpsi" attribute;
- if the subscription applies to events not related to a single PDU session, the Network Function instance identity if "UPEAS" feature is supported and the "eventSubs" attribute contains an entry with the "event" set to the value "UPF_EVENT", and identification of UEs to which the subscription applies via:
  a) identification of a single UE by SUPI as "supi" attribute or GPSI as "gpsi" attribute;
  b) identification of a group of UE(s) via a "groupId" attribute; or
  c) identification of any UE via the "anyUeInd" attribute set to true;

NOTE 1: The identification of any UE does not apply for local breakout roaming scenarios where the SMF is located in the VPLMN and the NF service consumer is located in the HPLMN.

- an URI where to receive the requested notifications as "notifUri" attribute;
- a Notification Correlation Identifier provided by the NF service consumer for the requested notifications as "notifId" attribute; and
- if the NF service consumer is an AMF, the GUAMI encoded as "guami" attribute:
- a description of the subscribed events as "eventSubs" attribute that for each event shall include:

  a) an event identifier as "event" attribute; and

  b) for event "UP_PATH_CH", whether the subscription is for early, late, or early and late notifications of UP path reconfiguration in the "dnaiChgType" attribute;

  c) for event "DDDS", the traffic descriptor(s) of the downlink data source in the "dddTraDescriptors" attribute;

  and that may include:

  a) for event "DDDS", the subscribed delivery statuses in the "dddStati" attribute;

  b) for event "QFI_ALLOC" or "DISPERSION", the application identifiers in the "appIds" attribute;

  c) for event "SMCC_EXP", the data collection target period in the "targetPeriod" attribute;

  d) for event "DISPERSION", the UE IP Address in the "ueIpAddr" attribute, the indication of transaction dispersion collection in the "transacDispInd" attribute and the requested transaction metrics in the "transacMetrics" attribute;

  e) for event "WLAN_INFO", the data collection target period in the "targetPeriod" attribute;

  f) for event "RED_TRANS_EXP", the data collection target period in the "targetPeriod" attribute;

  g) for event "UPF_EVENT", the UPF event exposure information in the "upfEvents" attribute; and/or

  h) for event "QOS_MON", the Application Identifier in the "appIds" of the application for which the QoS flows are to be monitored and an indication within the "defQosSupp" attribute to inform whether the NF service consumer supports to receive QoS Flow performance information for the QoS Flow associated with the default QoS rule if there are no measurements available for the provided Application Identifier included within the "appIds" attribute.

NOTE 2: Explicit subscription to "UPF_EVENT" and "QOS_MON" events as described in this clause implies the direct notification from the UPF as specified in 3GPP TS 29.564 [26].

The NsmfEventExposure data structure as request body may also include:

- if the NF service consumer is an AMF:

  a) the name of a service produced by the AMF that expects to receive the notifications about subscribed events encoded as "serviceName" attribute;

  b) Alternate or backup IPv4 Address(es) where to send Notifications encoded as "altNotifIpv4Addrs" attribute;

  c) Alternate or backup IPv6 Address(es) where to send Notifications encoded as "altNotifIpv6Addrs" attribute;

  d) Alternate or backup FQDN(s) where to send Notifications encoded as "altNotifFqdns" attribute;

- a Data Network Name as "dnn" attribute;
- a single Network Slice Selection Assistance Information as "snssai" attribute;
- an identification of network area by "networkArea" attribute, if the feature AreaFilter or the feature UPEAS is supported and the "anyUeInd" attribute is provided and set to true;

NOTE 3: Care needs to be taken with regards to load and major signalling caused when requesting Any UE. This could be achieved via utilization of some event filters (e.g. Area of Interest), a specific DNN, S-NSSAI or sampling ratio as part of Event Reporting Information.

- a Data Network Identifier as "dnai" attribute, if the feature UPEAS is supported;
- the SSID that the PDU session is related to as "ssid" attribute, if the feature UPEAS is supported;
- the BSSID that the PDU session is related to as "bssid" attribute, if the feature UPEAS is supported;
- the UPF identifier as "upfId" attribute, if the feature UPEAS is supported;
- immediate reporting flag as "ImmeRep" attribute;
- event notification method (periodic, one time, on event detection) as "notifMethod" attribute;
- maximum Number of Reports as "maxReportNbr" attribute;
- monitoring Duration as "expiry" attribute;
- repetition Period for periodic reporting as "repPeriod" attribute;
- sampling ratio as "sampRatio" attribute;
- partitioning criteria for partitioning the UEs before performing sampling as "partitionCriteria" attribute if the EneNA feature is supported; and/or
- group reporting guard time as "grpRepTime" attribute;
- a notification flag as "notifFlag" attribute if the EneNA feature is supported; and/or
- notification muting exception instructions within the "notifFlagInstruct" attribute, if the EnhDataMgmt feature is supported and the "notifFlag" attribute is provided and set to "DEACTIVATE".

NOTE 4: For the "PDU_SES_EST" event subscription, the "ImmeRep" attribute needs to be included to enable the SMF to report the current available "PDU_SES_EST" event information for the subscribed PDU Session which is already established.

Upon the reception of an HTTP POST request with: "{apiRoot}/nsmf-event-exposure/v1/subscriptions" as Resource URI and NsmfEventExposure data structure as request body, the SMF shall:

- create a new subscription;
- assign a subscription correlation ID;
- select an expiry time that is equal to or less than the expiry time potentially received in the request;
- store the subscription;
- if the feature "UPEAS" is supported, and if the NF service consumer subscribed to "QOS_MON" event, the SMF shall check if there is an active PCC rule that includes a Data Collection Application Identifier as described in 3GPP TS 29.512 [14] that matches the Application Identifier received within "appIds" attribute. If there is an active PCC rule, the SMF shall allow the NF service consumer to receive QoS monitoring reports enabled by that PCC rule. If no PCC rule is identified and the "defQosSupp" attribute was received and set to true, the SMF may instruct the UPF to perform QoS monitoring for the QoS Flow associated to the default QoS rule as described in 3GPP TS 29.244 [23]. If no PCC rule is identified and the "defQosSupp" attribute was received and set to false or not received, the SMF may, based on local configuration, reject the request by sending the NO_ACTIVE_PCC_RULE error described in clause 5.7 or include the "qosMonPending" indication set to true in the response to inform the NF service consumer that the reporting will be activated when the measurements are enabled by a PCC rule;
- if the feature "UPEAS" is supported and the "upfEvents" attribute is provided together with the "networkArea" attribute in the EventSubscription data type, the SMF shall subscribe to the UPF for the respective UPF events as described in 3GPP TS 29.564 [26] only when the UE is located in the indicated area. When the UE leaves the indicated area, the SMF shall unsubscribe those events from the UPF as described in 3GPP TS 29.564 [26].

NOTE 5: To know when a UE enters or leaves the indicated area, the SMF can subscribe to the respective AMF Event Exposure event.

NOTE 6: The reporting can be activated when a new PCC rule is installed or an existing one is modified with QoS monitoring information that includes the Data Collection Application Identifier related to the subscription. In this case the SMF will act as if the new subscription is received from the NF service consumer.

- send an HTTP "201 Created" response with NsmfEventExposure data structure as response body and a Location header field containing the URI of the created individual subscription resource, i.e. "{apiRoot}/nsmf-event-exposure/v1/subscriptions/{subId}";

- if the feature "ERIR" is not supported, and if the "ImmeRep" attribute is included and set to true in the request, the SMF shall immediately notify the recipient of notification(s) subscribed in the "notifUri" attribute of the current available value(s) using the Nsmf_EventExposure_Notify service operation, as defined in clause 4.2.2.1;

- if the feature "ERIR" is supported, and if the "ImmeRep" attribute is included and set to true, the SMF may immediately notify the NF service consumer with the current available value(s) for the subscribed event(s) within the HTTP "201 Created" response as shown in figure 4.2.3.2-1, step 2. The "NsmfEventExposure" data type in the response may include the corresponding event(s) notification within the "eventNotifs" attribute.

- if the sampling ratio attribute, as "sampRatio", is included in the subscription without a "partitionCriteria" attribute, the SMF shall select a random subset of UEs among the target UEs according to the sampling ratio and only report the event(s) related to the selected subset of UEs. If the "partitionCriteria" attribute is additionally included, then the SMF shall first partition the UEs according to the value of the "partitionCriteria" attribute and then select a random subset of UEs from each partition according to the sampling ratio and only report the event(s) related to the selected subsets of UEs;

- when the group reporting guard time attribute, as "grpRepTime", is included in the subscription, the SMF shall accumulate all the event reports for the target UEs until the group reporting guard time expires. Then the SMF shall notify the NF service consumer using the Nsmf_EventExposure_Notify service operation, as described in clause 4.2.2.2; and

- if the "notifFlag" attribute is included and set to "DEACTIVATE" in the request, the SMF shall mute the event notification and store the available events until the NF service consumer requests to retrieve them by setting the "notifFlag" attribute to "RETRIEVAL" or until a muting exception occurs (e.g. full buffer). When a muting exception occurs, the SMF may consider the contents of the "notifFlagInstruct" attribute (if provided) and/or local configuration to determine its actions. If the EnhDataMgmt feature is supported and the SMF accepts the muting instructions provided in the "notifFlag" and/or the "notifFlagInstruct" attributes, it may indicate the applied muting notification settings within the "mutingSetting" attribute in the response. If the SMF does not accept the muting instructions provided in the "notifFlag" and/or the "notifFlagInstruct" attributes, it shall send an HTTP "403 Forbidden" error response including the "cause" attribute set to "MUTING_INSTR_NOT_ACCEPTED".

If the SMF received an GUAMI, the SMF may subscribe to GUAMI changes using the AMFStatusChange service operation of the Namf_Communication service specified in 3GPP TS 29.518 [13], and it may use the Nnrf_NFDiscovery Service specified in 3GPP TS 29.510 [12] (using the obtained GUAMI and possibly service name) to query the other AMFs within the AMF set.

If errors occur when processing the HTTP POST request, the SMF shall send an HTTP error response as specified in clause 5.7.

### 4.2.3.3 Modifying an existing subscription

Figure 4.2.3.3-1 illustrates the modification of an existing subscription.

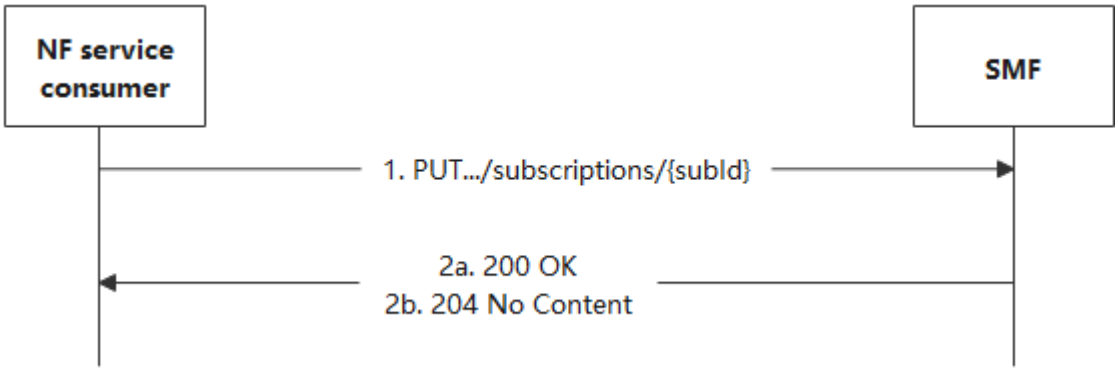


**Figure 4.2.3.3-1: Modification of an existing subscription**

To modify an existing subscription to event notifications, the NF service consumer shall send an HTTP PUT request with: "{apiRoot}/nsmf-event-exposure/v1/subscriptions/{subId}" as Resource URI, where "{subId}" is the subscription correlation ID of the existing subscription, and NsmfEventExposure data structure as request body as described in clause 4.2.3.2.

NOTE 1: An alternate NF service consumer than the one that requested the generation of the subscription resource can send the PUT. For instance, an AMF as NF service consumer can change.

NOTE 2: The "notifUri" attribute within the NsmfEventExposure data structure can be modified to request that subsequent notifications are sent to a new NF service consumer.

When the "notifFlag" attribute is included and set to "DEACTIVATE" in the request, the SMF shall mute the event notification and store the available events until the NF service consumer requests to retrieve them by setting the "notifFlag" attribute to "RETRIEVAL" or until a muting exception occurs (e.g. full buffer). When a muting exception occurs, the SMF may consider the contents of the "notifFlagInstruct" attribute (if provided) and/or local configuration to determine its actions; if the "notifFlag" attribute is set to "RETRIEVAL" in the request, the SMF shall send the stored events to the NF service consumer, mute the event notification again and store available events; if the "notifFlag" attribute is set to "ACTIVATE" and the event notifications are muted (due to a previously received "DECATIVATE" value), the SMF shall unmute the event notification, i.e. start sending again notifications for available events. If the EnhDataMgmt feature is supported and the SMF accepts the muting instructions provided in the "notifFlag" and/or the "notifFlagInstruct" attributes, it may indicate the applied muting notification settings within the "mutingSetting" attribute in the response. If the SMF does not accept the muting instructions provided in the "notifFlag" and/or the "notifFlagInstruct" attributes, it shall send an HTTP "403 Forbidden" error response including the "cause" attribute set to "MUTING_INSTR_NOT_ACCEPTED".

When the "ImmeRep" attribute set to true is included in the subscription and the subscribed event(s) are available:

- if the feature "ERIR" is not supported, the SMF shall immediately notify the in the "notifUri" attribute in the "notifUri" attribute with the current available value(s) for the subscribed event(s) using the Nsmf_EventExposure_Notify service operation, as described in clause 4.2.2.1.

- if the feature "ERIR" is supported, the SMF may immediately notify the NF service consumer with the current available value(s) for the subscribed event(s) within the HTTP "200 OK" response as shown in figure 4.2.3.3-1, step 2a. The "NsmfEventExposure" data type may include the corresponding event(s) notification within the "eventNotifs" attribute.

NOTE 3: Only the newly added event(s) needs to be reported during the subscription update.

NOTE 4: For the "PDU_SES_EST" event subscription, the "ImmeRep" attribute needs to be included to enable the SMF to report the current available "PDU_SES_EST" event information for the subscribed PDU Session which is already established.

If the "sampRatio" attribute is included in the request without a "partitionCriteria" attribute, the SMF shall select a random subset of UEs among the target UEs according to the sampling ratio and only report the event(s) related to the selected subset of UEs. If the "partitionCriteria" attribute is additionally included, then the SMF shall first partition the UEs according to the value of the "partitionCriteria" attribute and then select a random subset of UEs from each partition according to the sampling ratio and only report the event(s) related to the selected subsets of UEs.

When the "grpRepTime" attribute is included in the request, the SMF shall accumulate all the event reports for the target UEs until the group reporting guard time expires. Then the SMF shall notify the NF service consumer using the Nsmf_EventExposure_Notify service operation, as described in clause 4.2.2.2.

When the "expiry" attribute is included in the request, the SMF shall select an expiry time that is equal to or less than the expiry time received in the request.

Upon the reception of an HTTP PUT request with: "{apiRoot}/nsmf-event-exposure/v1/subscriptions/{subId}" as Resource URI and NsmfEventExposure data structure as request body, if the received HTTP request is successfully processed and accepted, the SMF shall:

- update the concerned subscription; and
- send an HTTP "200 OK" response with a response body containing a representation of the updated subscription in the NsmfEventExposure data structure or send a HTTP "204 No Content".

If errors occur when processing the HTTP PUT request, the SMF shall send an HTTP error response as specified in clause 5.7.

If the feature "ES3XX" is supported, and the SMF determines the received HTTP PUT request needs to be redirected, the SMF shall send an HTTP redirect response as specified in clause 6.10.9 of 3GPP TS 29.500 [4].

## 4.2.4 Nsmf_EventExposure_UnSubscribe Service Operation

### 4.2.4.1 General

This service operation is used by an NF service consumer to unsubscribe from event notifications.

The following procedure using the Nsmf_EventExposure_UnSubscribe service operation is supported:

- unsubscription from event notifications.

### 4.2.4.2 Unsubscription from event notifications

Figure 4.2.4.2-1 illustrates the unsubscription from event notifications.

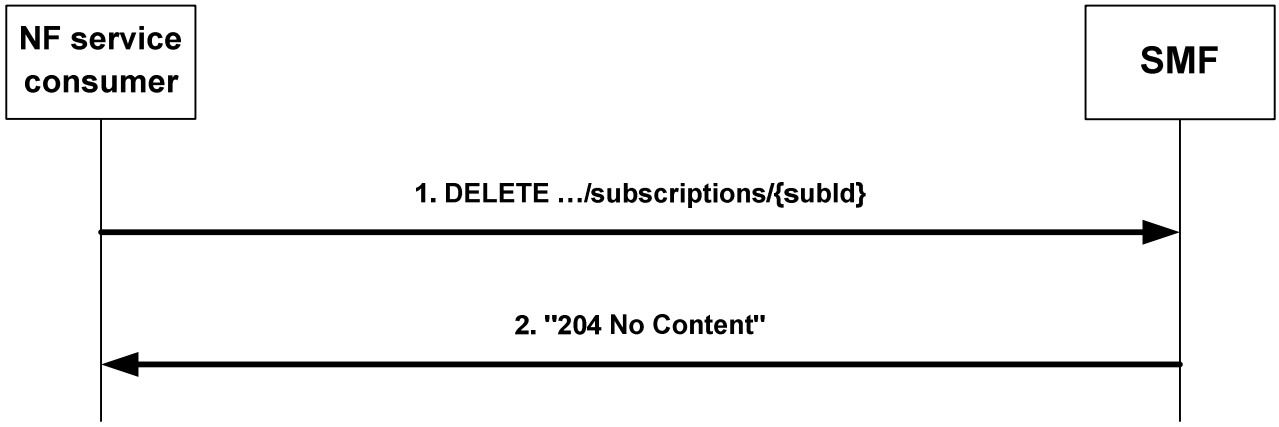


**Figure 4.2.4.2-1: Unsubscription from event notifications**

To unsubscribe from event notifications, the NF service consumer shall send an HTTP DELETE request with: "{apiRoot}/nsmf-event-exposure/v1/subscriptions/{subId}" as Resource URI, where "{subId}" is the subscription correlation ID of the existing subscription that is to be deleted.

Upon the reception of the HTTP DELETE request with: "{apiRoot}/nsmf-event-exposure/v1/subscriptions/{subId}" as Resource URI, if the received HTTP request is successfully processed and accepted, the SMF shall:

- remove the corresponding subscription; and
- send an HTTP "204 No Content" response.

If errors occur when processing the HTTP DELETE request, the SMF shall send an HTTP error response as specified in clause 5.7.

If the feature "ES3XX" is supported, and the SMF determines the received HTTP DELETE request needs to be redirected, the SMF shall send an HTTP redirect response as specified in clause 6.10.9 of 3GPP TS 29.500 [4].

## 4.2.5 Nsmf_EventExposure_AppRelocationInfo Service Operation

### 4.2.5.1 General

The Nsmf_EventExposure_AppRelocationInfo service operation enables the NF service consumer to acknowledge the notification of subscribed events on the related PDU session from the SMF.

The following procedure using the Nsmf_EventExposure_AppRelocationInfo service operation is supported:

- acknowledgement of notification about subscribed events.

### 4.2.5.2 Acknowledgement of Notification about subscribed events

Figure 4.2.5.2-1 illustrates the acknowledgement of notification about subscribed events.

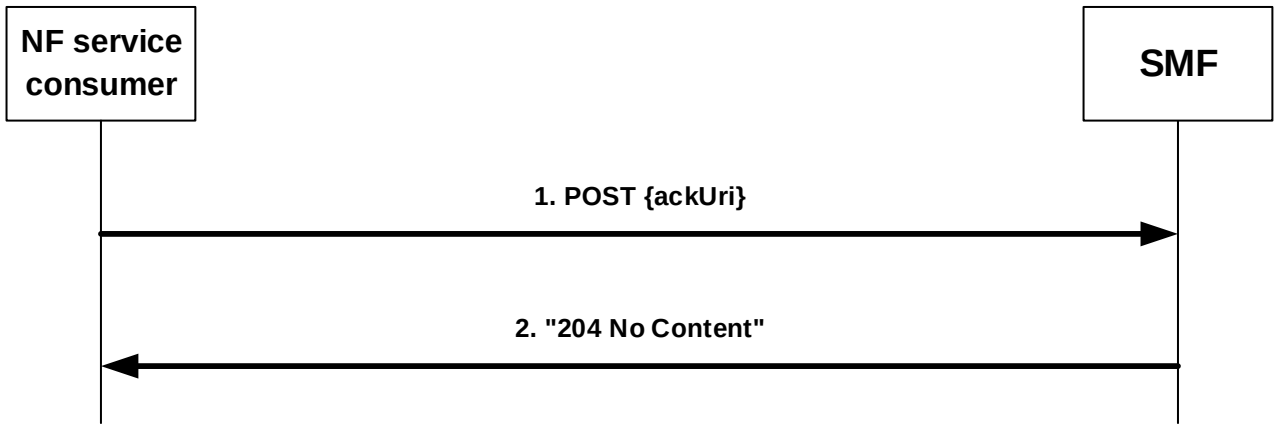


**Figure 4.2.5.2-1: Acknowledgement of Notification about subscribed events**

In order to acknowledge the SMF of the application relocation information after the handling of a notification about UP path change event, an NF service consumer shall send an HTTP POST request to the callback URI "{ackUri}" as previously provided by the SMF in an attribute within the NsmfEventExposureNotification data during UP path change notification procedure as defined in clause 4.2.2.2.

The request body contains the AckOfNotify data structure that shall include:

- Notification correlation ID provided by the SMF during UP path change notification, as "notifId" attribute;
- an identifier of UE (i.e. SUPI or GPSI), if available and the subscription does not applies to a group of UE(s) or any UE; and
- information about the AF acknowledgement within the "ackResult" attribute that shall contain result status of the application relocation as "afStatus" attribute. If the "afStatus" attribute sets to "SUCCESS", the N6 traffic routing information associated to the target DNAI may be included as "trafficRoute" attribute and, if the "ULBuffering" feature is supported, an indication that buffering of uplink traffic to the target DNAI is needed may be included as "upBuffInd" attribute and, if the feature "EASIPreplacement" is supported, EAS IP replacement information may be included as "easIpReplaceInfos" attribute. If the application relocation is not completed on time, the "afStatus" attribute shall set to the corresponding failure cause.

NOTE The NF service consumer gets the knowledge of the support of "ULBuffering" and/or "EASIPreplacement" negotiated features as part of the notification of the subscribed events as described in clause 4.2.2.2.

Upon the reception of an HTTP POST request with AckOfNotify data structure as request body, the SMF shall send an HTTP "204 No Content" response for a succesfull processing.

If errors occur when processing the HTTP POST request, the SMF shall send an HTTP error response as specified in clause 5.7.

If the feature "ES3XX" is supported, and the SMF determines the received HTTP POST request needs to be redirected, the SMF shall send an HTTP redirect response as specified in clause 6.10.9 of 3GPP TS 29.500 [4].

# 5 Nsmf_EventExposure API

## 5.1 Introduction

The Session Management Event Exposure Service shall use the Nsmf_EventExposure API.

The API URI of the Nsmf_EventExposure API shall be:

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

The request URIs used in HTTP requests from the NF service consumer towards the SMF 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-event-exposure".
- The <apiVersion> shall be "v1".
- The <apiSpecificResourceUriPart> shall be set as described in clause 5.3.

## 5.2 Usage of HTTP

### 5.2.1 General

HTTP/2, IETF RFC 9113 [8], 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].

The OpenAPI [10] specification of HTTP messages and content bodies for the Nsmf_EventExposure is contained in Annex A.

### 5.2.2 HTTP standard headers

#### 5.2.2.1 General

See clause 5.2.2 of 3GPP TS 29.500 [4] for the usage of HTTP standard headers.

#### 5.2.2.2 Content type

JSON, IETF RFC 8259 [9], shall be used as content type of the HTTP bodies specified in the present specification as specified in clause 5.4 of 3GPP TS 29.500 [4]. The use of the JSON format shall be signalled by the content type "application/json".

"Problem Details" JSON object shall be used to indicate additional details of the error in a HTTP response body and shall be signalled by the content type "application/problem+json", as defined in IETF RFC 9457 [18].

### 5.2.3 HTTP custom headers

The Nsmf_EventExposure API shall support HTTP custom header fields specified in clause 5.2.3.2 of 3GPP TS 29.500 [4] and may support HTTP custom header fields specified in clause 5.2.3.3 of 3GPP TS 29.500 [4].

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

## 5.3 Resources

### 5.3.1 Resource Structure

This clause describes the structure for the Resource URIs and the resources and methods used for the service.

Figure 5.3.1-1 depicts the resource URIs structure for the Nsmf_EventExposure API.

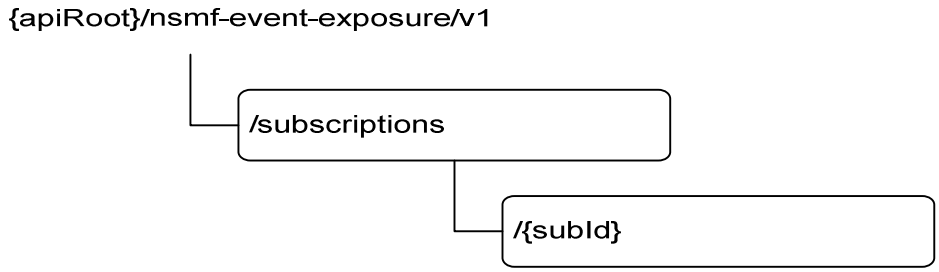


**Figure 5.3.1-1: Resource URI structure of the Nsmf_EventExposure API**

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

**Table 5.3.1-1: Resources and methods overview**

| Resource name | Resource URI | HTTP method or custom operation | Description |
|---|---|---|---|
| SMF Notification Subscriptions | /subscriptions | POST | Create a new Individual SMF Notification Subscription resource. |
| Individual SMF Notification Subscription | /subscriptions/{subId} | GET | Read an Individual SMF Notification Subscription resource. |
| | | PUT | Modify an existing Individual SMF Notification Subscription resource. |
| | | DELETE | Delete an Individual SMF Notification Subscription resource and cancel the related subscription. |

### 5.3.2 Resource: SMF Notification Subscriptions

#### 5.3.2.1 Description

The SMF Notification Subscriptions resource represents the collection of subscriptions to the SMF event exposure service at a given SMF.

#### 5.3.2.2 Resource definition

Resource URI: {apiRoot}/nsmf-event-exposure/v1/subscriptions

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

**Table 5.3.2.2-1: Resource URI variables for this resource**

| Name | Data type | Definition |
|---|---|---|
| apiRoot | string | See clause 5.1 |

### 5.3.2.3 Resource Standard Methods

#### 5.3.2.3.1 POST

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

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

| Name | Data type | P | Cardinality | Description |
|---|---|---|---|---|
| n/a | | | | |

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

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

| Data type | P | Cardinality | Description |
|---|---|---|---|
| NsmfEventExposure | M | 1 | Create a new Individual SMF Notification Subscription resource. |

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

| Data type | P | Cardinality | Response codes | Description |
|---|---|---|---|---|
| NsmfEventExposure | M | 1 | 201 Created | The creation of an Individual SMF Notification Subscription resource is confirmed and a representation of that resource is returned. |
| ProblemDetails | O | 0..1 | 403 Forbidden | (NOTE 2) |
| NOTE 1: The mandatory HTTP error status codes for the POST method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [4] also apply.<br>NOTE 2: Failure cases are described in clause 5.7. | | | | |

**Table 5.3.2.3.1-4: Headers supported by the 201 Response Code on this resource**

| Name | Data type | P | Cardinality | Description |
|---|---|---|---|---|
| Location | string | M | 1 | Contains the URI of the newly created resource, according to the structure: {apiRoot}/nsmf-event-exposure/v1/subscriptions/{subId} |

### 5.3.2.4 Resource Custom Operations

None.

## 5.3.3 Resource: Individual SMF Notification Subscription

### 5.3.3.1 Description

The SMF Notification Subscriptions resource represents a single subscription to the SMF event exposure service.

### 5.3.3.2 Resource definition

Resource URI: {apiRoot}/nsmf-event-exposure/v1/subscriptions/{subId}

This resource shall support the resource URI variables defined in table 5.3.3.2-1.

**Table 5.3.3.2-1: Resource URI variables for this resource**

| Name | Data type | Definition |
|---|---|---|
| apiRoot | string | See clause 5.1 |
| subId | string | Identifies a subscription to the SMF event exposure service formatted as defined for the SubId type in table 5.6.3.2-1. |

### 5.3.3.3 Resource Standard Methods

#### 5.3.3.3.1 GET

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

**Table 5.3.3.3.1-1: URI query parameters supported by the GET method on this resource**

| Name | Data type | P | Cardinality | Description |
|---|---|---|---|---|
| n/a | | | | |

This method shall support the request data structures specified in table 5.3.3.3.1-2 and the response data structures and response codes specified in table 5.3.3.3.1-3.

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

| Data type | P | Cardinality | Description |
|---|---|---|---|
| n/a | | | |

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

| Data type | P | Cardinality | Response codes | Description |
|---|---|---|---|---|
| NsmfEventExposure | M | 1 | 200 OK | A representation of the SMF Notification Subscription matching the subId is returned. |
| RedirectResponse | O | 0..1 | 307 Temporary Redirect | Temporary redirection, during Individual SMF Notification Subscription retrieval.<br><br>Applicable if the feature "ES3XX" is supported.<br><br>(NOTE 2) |
| RedirectResponse | O | 0..1 | 308 Permanent Redirect | Permanent redirection, during Individual SMF Notification Subscription retrieval.<br><br>Applicable if the feature "ES3XX" is supported.<br><br>(NOTE 2) |
| NOTE 1: The mandatory HTTP error status codes for the GET method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [4] also apply.<br>NOTE 2: The RedirectResponse data structure may be provided by an SCP (refer to clause 6.10.9.1 of 3GPP TS 29.500 [4]). | | | | |

**Table 5.3.3.3.1-4: Headers supported by the 307 Response Code on this resource**

| Name | Data type | P | Cardinality | Description |
|---|---|---|---|---|
| Location | string | M | 1 | Contains an alternative URI of the resource located in an alternative SMF (service) instance towards which the request is redirected.<br><br>For the case where the request is redirected to the same target via a different SCP, refer to clause 6.10.9.1 of 3GPP TS 29.500 [4]. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target SMF (service) instance towards which the request is redirected |

**Table 5.3.3.3.1-5: Headers supported by the 308 Response Code on this resource**

| Name | Data type | P | Cardinality | Description |
|---|---|---|---|---|
| Location | string | M | 1 | Contains an alternative URI of the resource located in an alternative SMF (service) instance towards which the request is redirected.<br><br>For the case where the request is redirected to the same target via a different SCP, refer to clause 6.10.9.1 of 3GPP TS 29.500 [4]. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target SMF (service) instance towards which the request is redirected |

### 5.3.3.3.2 PUT

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

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

| Name | Data type | P | Cardinality | Description |
|---|---|---|---|---|
| n/a | | | | |

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

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

| Data type | P | Cardinality | Description |
|---|---|---|---|
| NsmfEventExposure | M | 1 | Modify the existing Individual SMF Notification Subscription resource matching the subId according to the representation in the NsmfEventExposure |

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

| Data type | P | Cardinality | Response codes | Description |
|---|---|---|---|---|
| NsmfEventExposure | M | 1 | 200 OK | Successful case: The Individual SMF Notification Subscription resource matching the subId was modified and a representation is returned. |
| n/a | | | 204 No Content | Successful case: The Individual SMF Notification Subscription resource matching the subId was modified. |
| RedirectResponse | O | 0..1 | 307 Temporary Redirect | Temporary redirection, during Individual SMF Notification Subscription modification.<br><br>Applicable if the feature "ES3XX" is supported.<br><br>(NOTE 3) |
| RedirectResponse | O | 0..1 | 308 Permanent Redirect | Permanent redirection, during Individual SMF Notification Subscription modification.<br><br>Applicable if the feature "ES3XX" is supported.<br><br>(NOTE 3) |
| ProblemDetails | O | 0..1 | 403 Forbidden | (NOTE 2) |

NOTE 1: The mandatory HTTP error status codes for the PUT method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [4] also apply.
NOTE 2: Failure cases are described in clause 5.7.
NOTE 3: The RedirectResponse data structure may be provided by an SCP (refer to clause 6.10.9.1 of 3GPP TS 29.500 [4]).

**Table 5.3.3.3.2-4: Headers supported by the 307 Response Code on this resource**

| Name | Data type | P | Cardinality | Description |
|---|---|---|---|---|
| Location | string | M | 1 | Contains an alternative URI of the resource located in an alternative SMF (service) instance towards which the request is redirected.<br><br>For the case where the request is redirected to the same target via a different SCP, refer to clause 6.10.9.1 of 3GPP TS 29.500 [4]. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target SMF (service) instance towards which the request is redirected |

**Table 5.3.3.3.2-5: Headers supported by the 308 Response Code on this resource**

| Name | Data type | P | Cardinality | Description |
|---|---|---|---|---|
| Location | string | M | 1 | Contains an alternative URI of the resource located in an alternative SMF (service) instance towards which the request is redirected.<br><br>For the case where the request is redirected to the same target via a different SCP, refer to clause 6.10.9.1 of 3GPP TS 29.500 [4]. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target SMF (service) instance towards which the request is redirected |

### 5.3.3.3.3 DELETE

This method shall support the URI query parameters specified in table 5.3.3.3.3-1.

**Table 5.3.3.3.3-1: URI query parameters supported by the DELETE method on this resource**

| Name | Data type | P | Cardinality | Description |
|---|---|---|---|---|
| n/a | | | | |

This method shall support the request data structures specified in table 5.3.3.3.3-2 and the response data structures and response codes specified in table 5.3.3.3.3-3.

**Table 5.3.3.3.3-2: Data structures supported by the DELETE Request Body on this resource**

| Data type | P | Cardinality | Description |
|---|---|---|---|
| n/a | | | |

**Table 5.3.3.3.3-3: Data structures supported by the DELETE Response Body on this resource**

| Data type | P | Cardinality | Response codes | Description |
|---|---|---|---|---|
| n/a | | | 204 No Content | Successful case: The Individual SMF Notification Subscription resource matching the subId was deleted. |
| RedirectResponse | O | 0..1 | 307 Temporary Redirect | Temporary redirection, during Individual SMF Notification Subscription deletion.<br><br>Applicable if the feature "ES3XX" is supported.<br><br>(NOTE 2) |
| RedirectResponse | O | 0..1 | 308 Permanent Redirect | Permanent redirection, during Individual SMF Notification Subscription deletion.<br><br>Applicable if the feature "ES3XX" is supported.<br><br>(NOTE 2) |
| NOTE 1: The manadatory HTTP error status code for the DELETE method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [4] also apply.<br>NOTE 2: The RedirectResponse data structure may be provided by an SCP (refer to clause 6.10.9.1 of 3GPP TS 29.500 [4]). | | | | |

**Table 5.3.3.3.3-4: Headers supported by the 307 Response Code on this resource**

| Name | Data type | P | Cardinality | Description |
|---|---|---|---|---|
| Location | string | M | 1 | Contains an alternative URI of the resource located in an alternative SMF (service) instance towards which the request is redirected.<br><br>For the case where the request is redirected to the same target via a different SCP, refer to clause 6.10.9.1 of 3GPP TS 29.500 [4]. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target SMF (service) instance towards which the request is redirected |

**Table 5.3.3.3.3-5: Headers supported by the 308 Response Code on this resource**

| Name | Data type | P | Cardinality | Description |
|---|---|---|---|---|
| Location | string | M | 1 | Contains an alternative URI of the resource located in an alternative SMF (service) instance towards which the request is redirected.<br><br>For the case where the request is redirected to the same target via a different SCP, refer to clause 6.10.9.1 of 3GPP TS 29.500 [4]. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target SMF (service) instance towards which the request is redirected |

#### 5.3.3.4 Resource Custom Operations

None.

## 5.4 Custom Operations without associated resources

None.

## 5.5 Notifications

### 5.5.1 General

Notifications shall comply to clause 6.2 of 3GPP TS 29.500 [4] and clause 4.6.2.3 of 3GPP TS 29.501 [5].

**Table 5.5.1-1: Notifications overview**

| Notification | Callback URI | HTTP method or custom operation | Description (service operation) |
|---|---|---|---|
| Event Notification | {notifUri} | POST | Provides information about observed events. |
| Acknowledgement of event notification | {ackUri} | POST | Provides acknowledgement of event notification |

### 5.5.2 Event Notification

#### 5.5.2.1 Description

The Event Notification is used by the SMF to report one or several observed Events to a recipient of notification(s) that a NF service consumer has subscribed to such Notifications.

NOTE 1: The definition of "callbacks" in the OpenAPI specification found in clause A.2 associated to the POST method of the "SMF Notification Subscriptions" resource is used as the notification request for both explicit and implicit subscriptions.

NOTE 2: For implicit subscriptions, the PCF can have previously stored in the SMF the notification URI to be used in the notifications initiated by the SMF. See 3GPP TS 29.512 [14] for the details.

#### 5.5.2.2 Target URI

The Callback URI **"{notifUri}"** shall be used with the callback URI variables defined in table 5.5.2.2-1.

**Table 5.5.2.2-1: Callback URI variables**

| Name | Data type | Definition |
|---|---|---|
| notifUri | Uri | The Notification Uri as assigned either within the Individual SMF Notification Subscription Resource during the explicit subscription service operation and described within the NsmfEventExposure type (see table 5.6.2.2-1) or assigned during the implicit subscription via the provisioning of the subscription information within the PCC Rule from the PCF (see 3GPP TS 29.512 [14] or within the Traffic Influence Data from the V-NEF (see 3GPP TS 29.591 [25]. |

#### 5.5.2.3 Standard Methods

##### 5.5.2.3.1 POST

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

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

| Name | Data type | P | Cardinality | Description |
|---|---|---|---|---|
| n/a | | | | |

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

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

| Data type | P | Cardinality | Description |
|---|---|---|---|
| NsmfEventExposureNotification | M | 1 | Provides Information about observed events |

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

| Data type | P | Cardinality | Response codes | Description |
|---|---|---|---|---|
| n/a | | | 204 No Content | The receipt of the Notification is acknowledged. |
| RedirectResponse | O | 0..1 | 307 Temporary Redirect | Temporary redirection, during the event notification.<br><br>Applicable if the feature "ES3XX" is supported.<br><br>(NOTE 2) |
| RedirectResponse | O | 0..1 | 308 Permanent Redirect | Permanent redirection, during the event notification.<br><br>Applicable if the feature "ES3XX" is supported.<br><br>(NOTE 2) |
| ProblemDetails | O | 0..1 | 404 Not Found | The NF service consumer can use this response when the notification can be sent to another host. |
| 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] also apply.<br>NOTE 2: The RedirectResponse data structure may be provided by an SCP (refer to clause 6.10.9.1 of 3GPP TS 29.500 [4]). | | | | |

**Table 5.5.2.3.1-4: Headers supported by the 307 Response Code on this resource**

| Name | Data type | P | Cardinality | Description |
|---|---|---|---|---|
| Location | string | M | 1 | Contains an alternative URI representing the end point of an alternative NF consumer (service) instance towards which the notification should be redirected.<br><br>For the case where the request is redirected to the same target via a different SCP, refer to clause 6.10.9.1 of 3GPP TS 29.500 [4]. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target NF (service) instance towards which the notification request is redirected. May be included if the feature "ES3XX" is supported. |

**Table 5.5.2.3.1-5: Headers supported by the 308 Response Code on this resource**

| Name | Data type | P | Cardinality | Description |
|---|---|---|---|---|
| Location | string | M | 1 | Contains an alternative URI representing the end point of an alternative NF consumer (service) instance towards which the notification should be redirected.<br><br>For the case where the request is redirected to the same target via a different SCP, refer to clause 6.10.9.1 of 3GPP TS 29.500 [4]. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target NF (service) instance towards which the notification request is redirected |

## 5.5.3 Acknowledgement of event notification

### 5.5.3.1 Description

The Acknowledgement of Event Notification is used by the NF service consumer to acknowledge the SMF about handling result of the event notification (e.g. UP path change).

### 5.5.3.2 Target URI

The Callback URI **"{ackUri}"** shall be used with the callback URI variables defined in table 5.5.3.2-1.

**Table 5.5.3.2-1: Callback URI variables**

| Name | Data type | Definition |
|---|---|---|
| ackUri | Uri | Acknowledgement Uri as assigned during the procedure of notification about subscribed events and described within the NsmfEventExposureNotification data type (see table 5.6.2.3-1). |

### 5.5.3.3 Standard Methods

#### 5.5.3.3.1 POST

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

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

| Name | Data type | P | Cardinality | Description |
|---|---|---|---|---|
| n/a | | | | |

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

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

| Data type | P | Cardinality | Description |
|---|---|---|---|
| AckOfNotify | M | 1 | Acknowledgement information of event notification |

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

| Data type | P | Cardinality | Response codes | Description |
|---|---|---|---|---|
| n/a | | | 204 No Content | The receipt of the acknowledgement is successful. |
| RedirectResponse | O | 0..1 | 307 Temporary Redirect | Temporary redirection, during acknowledgement of notification.<br><br>Applicable if the feature "ES3XX" is supported.<br><br>(NOTE 2) |
| RedirectResponse | O | 0..1 | 308 Permanent Redirect | Permanent redirection, during acknowledgement of notification.<br><br>Applicable if the feature "ES3XX" is supported.<br><br>(NOTE 2) |
| 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] also apply.<br>NOTE 2: The RedirectResponse data structure may be provided by an SCP (refer to clause 6.10.9.1 of 3GPP TS 29.500 [4]). | | | | |

**Table 5.5.3.3.1-4: Headers supported by the 307 Response Code on this resource**

| Name | Data type | P | Cardinality | Description |
|---|---|---|---|---|
| Location | string | M | 1 | Contains an alternative URI representing the end point of an alternative SMF (service) instance towards which the acknowledgement should be redirected.<br><br>For the case where the request is redirected to the same target via a different SCP, refer to clause 6.10.9.1 of 3GPP TS 29.500 [4]. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target SMF (service) instance towards which the acknowledgement request is redirected |

**Table 5.5.3.3.1-5: Headers supported by the 308 Response Code on this resource**

| Name | Data type | P | Cardinality | Description |
|---|---|---|---|---|
| Location | string | M | 1 | Contains an alternative URI representing the end point of an alternative SMF (service) instance towards which the acknowledgement should be redirected.<br><br>For the case where the request is redirected to the same target via a different SCP, refer to clause 6.10.9.1 of 3GPP TS 29.500 [4]. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target SMF (service) instance towards which the acknowledgement request is redirected |

# 5.6 Data Model

## 5.6.1 General

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

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

**Table 5.6.1-1: Nsmf_EventExposure specific Data Types**

| Data type | Section defined | Description | Applicability |
|---|---|---|---|
| AckOfNotify | 5.6.2.7 | Acknowledgement information of event notification | |
| AppliedSmccType | 5.6.3.6 | The type of applied SM congestion control. | SMCCE |
| EventNotification | 5.6.2.5 | Describes notifications about a single event that occurred. | |
| EventSubscription | 5.6.2.4 | Represents the subscription to a single event | |
| NotificationMethod | 5.6.3.4 | Represents the notification methods that can be subscribed | |
| NsmfEventExposure | 5.6.2.2 | Represents an Individual SMF Notification Subscription resource | |
| NsmfEventExposureNotification | 5.6.2.3 | Describes Notifications about events that occurred. | |
| PduSessionInfo | 5.6.2.12 | Represents session information. | UeCommunication |
| PduSessionInformation | 5.6.2.11 | Represents the PDU session related information. | UeCommunication |
| PduSessionStatus | 5.6.3.8 | Status of the PDU Session. | UeCommunication |
| SmfEvent | 5.6.3.3 | Represents the types of events that can be subscribed | |
| SubId | 5.6.3.2 | Identifies an Individual SMF Notification Subscription. | |
| SmNasFromSmf | 5.6.2.9 | Describes the information of the SM NAS messages from SMF with backoff timer | SMCCE |
| SmNasFromUe | 5.6.2.8 | Describes the information of the SM NAS requests from UE | SMCCE |
| TrafficCorrelationNotification | 5.6.2.14 | Represents the traffic correlation Information for Notification. | CommonEASDNAI |
| TransactionInfo | 5.6.2.10 | UE Session Management transaction information. | Dispersion |
| TransactionMetric | 5.6.3.7 | Metric on UE Session Management transactions. | Dispersion |
| UpfInformation | 5.6.2.13 | The information of the UPF serving the UE. | ServiceExperience DnPerformance |

Table 5.6.1-2 specifies data types re-used by the Nsmf_EventExposure 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_EventExposure service based interface.

**Table 5.6.1-2: Nsmf_EventExposure re-used Data Types**

| Data type | Reference | Comments | Applicability |
|---|---|---|---|
| 5Qi | 3GPP TS 29.571 [11] | The 5G QoS Identifier. | EnQfiAllocation |
| AccessType | 3GPP TS 29.571 [11] | | |
| AfResultInfo | 3GPP TS 29.522 [20] | Represents application handling information. | |
| ApplicationId | 3GPP TS 29.571 [11] | The application identifier. | QfiAllocation PduSessionInfo |
| BitRate | 3GPP TS 29.571 [11] | Represents the bit rate. | EnQoSMon |
| CommunicationFailure | 3GPP TS 29.518 [13] | Represents the communication failure information. | Communication Failure |
| DateTime | 3GPP TS 29.571 [11] | | |
| DlDataDeliveryStatus | 3GPP TS 29.571 [11] | Status of downlink data delivery | DownlinkDataDeliveryStatus |
| DddTrafficDescriptor | 3GPP TS 29.571 [11] | Traffic descriptor of source of downlink data | DownlinkDataDeliveryStatus |
| Dnai | 3GPP TS 29.571 [11] | | |
| DnaiChangeType | 3GPP TS 29.571 [11] | Describes the types of DNAI change. | |
| Dnn | 3GPP TS 29.571 [11] | | QfiAllocation, PduSessionStatus |
| DurationSec | 3GPP TS 29.571 [11] | | |
| EthFlowDescription | 3GPP TS 29.514 [22] | Ethernet flow description | QfiAllocation |
| FlowDescription | 3GPP TS 29.514 [22] | IP flow description | QfiAllocation |
| Fqdn | 3GPP TS 29.571 [11] | FQDN | |
| Gpsi | 3GPP TS 29.571 [11] | | |
| GroupId | 3GPP TS 29.571 [11] | | |
| Guami | 3GPP TS 29.571 [11] | Globally Unique AMF Identifier | |
| IpAddr | 3GPP TS 29.571 [11] | UE IP address. | Dispersion CommonEASDNAI |
| Ipv4Addr | 3GPP TS 29.571 [11] | | |
| Ipv6Addr | 3GPP TS 29.571 [11] | | |
| Ipv6Prefix | 3GPP TS 29.571 [11] | | |
| MacAddr48 | 3GPP TS 29.571 [11] | MAC Address. | |
| MutingExceptionInstructions | 3GPP TS 29.571 [11] | Contains instructions to be executed upon the occurrence of an event muting exception (e.g. full buffer). | EnhDataMgmt |
| MutingNotificationsSettings | 3GPP TS 29.571 [11] | Contains setting related to the muting of notifications. | EnhDataMgmt |
| NetworkAreaInfo | 3GPP TS 29.554 [27] | Identifies the network area. | AreaFilter UPEAS |
| NfInstanceId | 3GPP TS 29.571 [11] | Instance identity of the Network Function | UPEAS CommonEASDNAI |
| NotificationFlag | 3GPP TS 29.571 [11] | Notification flag. | EneNA |
| PartitioningCriteria | 3GPP TS 29.571 [11] | Used to partition UEs before applying sampling. | EneNA |
| PduSessionId | 3GPP TS 29.571 [11] | | |
| PduSessionType | 3GPP TS 29.571 [11] | PDU session type. | PduSessionStatus PduSessionInfo |
| PlmnIdNid | 3GPP TS 29.571 [11] | Identification of a network: the PLMN Identifier or the SNPN Identifier (the PLMN Identifier and the NID). | |
| ProblemDetails | 3GPP TS 29.571 [11] | | |
| Qfi | 3GPP TS 29.571 [11] | QoS flow identifier. | QfiAllocation |
| RatType | 3GPP TS 29.571 [11] | RAT type. | EneNA |
| RedirectResponse | 3GPP TS 29.571 [11] | Contains redirection related information. | ES3XX |
| RouteToLocation | 3GPP TS 29.571 [11] | A traffic route to/from an DNAI | |
| SamplingRatio | 3GPP TS 29.571 [11] | Sampling Ratio. | |
| SatelliteBackhaulCategory | 3GPP TS 29.571 [11] | Indicates the satellite backhaul category or non-satellite backhaul. | EnSatBackhaulCategoryChg |
| ServiceName | 3GPP TS 29.510 [12] | Name of the service instance. | |
| Snssai | 3GPP TS 29.571 [11] | S-NSSAI | QfiAllocation |
| SscMode | 3GPP TS 29.571 [11] | SSC Mode selected for the PDU Session. | PduSessionInfo |
| Supi | 3GPP TS 29.571 [11] | | |

| | | | |
|---|---|---|---|
| SupportedFeatures | 3GPP TS 29.571 [11] | Used to negotiate the applicability of the optional features defined in table 5.8-1. | |
| TimeWindow | 3GPP TS 29.122 [24] | A start time and a stop time of a time window. | SMCCE |
| Uinteger | 3GPP TS 29.571 [11] | | |
| UpfEvent | 3GPP TS 29.564 [26] | Contains UPF event information. | UPEAS |
| Uri | 3GPP TS 29.571 [11] | | |

## 5.6.2 Structured data types

### 5.6.2.1 Introduction

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

### 5.6.2.2 Type NsmfEventExposure

**Table 5.6.2.2-1: Definition of type NsmfEventExposure**

| Attribute name | Data type | P | Cardinality | Description | Applicability |
|---|---|---|---|---|---|
| supi | Supi | C | 0..1 | Subscription Permanent Identifier (NOTE 1) | |
| gpsi | Gpsi | C | 0..1 | Generic Public Subscription Identifier (NOTE 1)<br>This IE is not applicable to "SMCC_EXP" event. | |
| anyUeInd | boolean | C | 0..1 | This IE shall be present if the event subscription is applicable to any UE. It indicates whether the event subscription is applicable to any UE:<br>- "true": the event subscription is applicable to any UE;<br>- "false"(default): the event subscription is not applicable to any UE.<br>(NOTE 1) (NOTE 4) | |
| groupId | GroupId | C | 0..1 | Identifies a group of UEs. (NOTE 1) | |
| pduSeId | PduSessionId | C | 0..1 | PDU session ID (NOTE 1) | |
| dnn | Dnn | O | 0..1 | Data Network Name. | |
| snssai | Snssai | O | 0..1 | A single Network Slice Selection Assistance Information. (NOTE 4) | |
| dnai | Dnai | O | 0..1 | Data network access identifier. | UPEAS |
| ssId | string | O | 0..1 | SSID that the PDU session is related to. | UPEAS |
| bssId | string | O | 0..1 | BSSID that the PDU session is related to. | UPEAS |
| upfId | string | O | 0..1 | Identifies the UPF. | UPEAS |
| nfId | NfInstanceId | C | 0..1 | Indicates the instance identity of the NF creating the subscription. It shall be provided if the "eventSubs" attribute contains an entry with the "event" set to the value "UPF_EVENT". | UPEAS |
| subId | SubId | C | 0..1 | Subscription ID.<br>This parameter shall be supplied by the SMF in HTTP responses that include an object of NsmfEventExposure type. | |
| notifId | string | M | 1 | Notification Correlation ID provided by the NF service consumer. (NOTE 2) | |
| notifUri | Uri | M | 1 | Identifies the recipient of Notifications sent by the SMF. | |
| altNotifIpv4Addrs | array(Ipv4Addr) | O | 1..N | Alternate or backup IPv4 Address(es) where to send Notifications. | |
| altNotifIpv6Addrs | array(Ipv6Addr) | O | 1..N | Alternate or backup IPv6 Address(es) where to send Notifications. | |
| altNotifFqdns | array(Fqdn) | O | 1..N | Alternate or backup FQDN(s) where to send Notifications. | |
| eventSubs | array(EventSubscription) | M | 1..N | Subscribed events. (NOTE 4) | |
| eventNotifs | array(EventNotification) | O | 1..N | Represents the SMF Events to be reported in the Nsmf_EvenExposure_Subscribe response.<br>May be present when the "ERIR" feature is supported and the "ImmeRep" attribute set to true is included in the subscription request. | ERIR |

| | | | | | |
|---|---|---|---|---|---|
| ImmeRep | boolean | O | 0..1 | It is included and set to true if the immediate reporting of the current status of the subscribed event, if available is required.<br><br>(NOTE 6) | |
| notifMethod | NotificationMethod | O | 0..1 | If "notifMethod" is not supplied, the default value "ON_EVENT_DETECTION" applies. (NOTE 4) (NOTE 5) | |
| maxReportNbr | Uinteger | O | 0..1 | If omitted, there is no limit. (NOTE 4) (NOTE 5) | |
| expiry | DateTime | C | 0..1 | This attribute indicates the expiry time of the subscription, after which the SMF shall not send any event notifications and the subscription becomes invalid. It may be included in an event subscription request and may be included in an event subscription response based on operator policies. If an expiry time was included in the request, then the expiry time returned in the response should be less than or equal to that value. If the expiry time is not included in the response, the NF service consumer shall not associate an expiry time for the subscription. (NOTE 4) | |
| repPeriod | DurationSec | C | 0..1 | This attribute indicates the reporting period. Shall be provided if the notification method is set to "PERIODIC". | |
| guami | Guami | C | 0..1 | The Globally Unique AMF Identifier (GUAMI) shall be provided by an AMF as NF service consumer. | |
| serviceName | ServiceName | O | 0..1 | If the NF service consumer is an AMF, it should provide the name of a service produced by the AMF that makes use of the notification about subscribed events. | |
| supportedFeatures | SupportedFeatures | C | 0..1 | List of Supported features used as described in clause 5.8.<br>This parameter shall be supplied by NF service consumer and SMF in the POST request that request the creation of an SMF Notification Subscriptions resource and the related reply, respectively. | |
| sampRatio | SamplingRatio | O | 0..1 | Indicates the ratio of the random subset to target UEs, event reports only relates to the subset. | |
| partitionCriteria | array(PartitioningCriteria) | O | 1..N | Defines criteria for partitioning the UEs in order to apply the sampling ratio for each partition. It may only be included in event subscription requests when the "sampRatio" attribute is also provided. (NOTE 3) | EneNA |
| grpRepTime | DurationSec | O | 0..1 | Indicates the time for which the SMF aggregates the event reports detected by the UEs in a group and report them together to the NF service consumer. | |
| notifFlag | NotificationFlag | O | 0..1 | Indicates the notification flag, which is used to mute/unmute notifications and to retrieve events stored during a period of muted notifications. Default: "ACTIVATE" | EneNA |

| | | | | | |
|---|---|---|---|---|---|
| notifFlagInstruct | MutingExceptionInstructions | O | 0..1 | Contains instructions to be executed upon the occurrence of an event muting exception (e.g. full buffer). It may only be provided if the "notifFlag" is provided and set to "DEACTIVATE". | EnhDataMgmt |
| mutingSetting | MutingNotificationsSettings | O | 0..1 | Contains settings related to the muting of notifications. It may only be provided in the NF service producer response and only if the muting instructions provided in the "notifFlag" and/or the "notifFlagInstruct" attributes are accepted. | EnhDataMgmt |
| defQosSupp | boolean | O | 0..1 | Indicates whether the NF service consumer requests to receive QoS Flow performance information for the QoS Flow associated with the default QoS rule if there are no measurements available for the provided Application Identifier included within the "appIds" attribute.<br>True: NF service consumer requests to receive QoS Flow performance information for the QoS Flow associated with the default QoS rule.<br>False (default): NF service consumer does not request to receive QoS Flow performance information for the QoS Flow associated with the default QoS rule. | UPEAS |
| qosMonPending | boolean | O | 0..1 | Indicates that the reporting will be activated when the measurements are enabled by a PCC rule. It shall be always set to true when present. It may only be provided in the response.<br>Default value is false. | UPEAS |

NOTE 1: If the event subscription applies for a specific PDU session, the PDU session of a single UE (pduSeId, and gpsi/supi) shall be included; otherwise one and only one of a single UE (gpsi/supi), a group of UEs (groupId), or anyUeInd set to true shall be included.
NOTE 2: If the UDM as NF service consumer subscribes to event (e.g. downlink data delivery status, PDU Session Establishment, PDU Session Release) on behalf of AF/NEF, "notifId" shall be set the same as "referenceId" received from the AF/NEF as defined in clause 6.4.6.2.4 of 3GPP TS 29.503 [14].
NOTE 3: For a given type of partitioning criteria, the UE shall belong to only one single partition as long as it is served by the NF service producer.
NOTE 4: If EneNA feature is supported, when the "snssai" attribute is presented together with "anyUeInd" attribute and the "eventSubs" attribute contains "PDU_SES_EST" and "PDU_SES_REL", then only the "ON_EVENT_DETECTION" value is applicable in the "notifMethod" attribute together with "maxReportNbr" attribute and/or "expiry"attribute presence.
NOTE 5: The attribute "maxReportNbr" is not applicable when the value of "notifMethod" is set to "ONE_TIME".
NOTE 6: The attribute does not follow the related naming convention (i.e. "lowerCamel") defined in clause 5.1.4 of 3GPP TS 29.501 [7]. This attribute is however kept as currently defined in this specification for backward compatibility considerations.

### 5.6.2.3 Type NsmfEventExposureNotification

**Table 5.6.2.3-1: Definition of type NsmfEventExposureNotification**

| Attribute name | Data type | P | Cardinality | Description | Applicability |
|---|---|---|---|---|---|
| notifId | string | M | 1 | Notification correlation ID used to identify the subscription which the notification is corresponding to. It shall be set to the same value as the "notifId" attribute of NsmfEventExposure data type or the value of "notifCorreId" within the UpPathChgEvent data type defined in 3GPP TS 29.512 [14], the value of "notifCorrId" in the "tfcCorreInfo" attribute within the TrafficControlData data type defined in 3GPP TS 29.512 [14], or the value of "notifCorreId" within the QosMonitoringData data type defined in 3GPP TS 29.512 [14], or the value of "upPathChgNotifCorreId" within the TrafficInfluDataNotify data type defined in 3GPP TS 29.591 [28]. | |
| eventNotifs | array(EventNotification) | M | 1..N | Notifications about Individual Events | |
| ackUri | Uri | O | 0..1 | The URI provided by the SMF for the AF acknowledgement.<br>If present, it only applies to the "UP_PATH_CH" event indicated in the "eventNotifs" attribute. | |

### 5.6.2.4 Type EventSubscription

**Table 5.6.2.4-1: Definition of type EventSubscription**

| Attribute name | Data type | P | Cardinality | Description | Applicability |
|---|---|---|---|---|---|
| event | SmfEvent | M | 1 | Subscribed events | |
| dnaiChgType | DnaiChangeType | C | 0..1 | For event UP path change, this attribute indicates whether the subscription is for early, late, or early and late DNAI change notification shall be supplied if the subscribed event is set to "UP_PATH_CH". | |
| dddTraDescriptors | array(DddTrafficDescriptor) | C | 1..N | The traffic descriptor(s) of the downlink data source. Shall be included for event "DDDS". | DownlinkDataDeliveryStatus |
| dddStati | array(DlDataDeliveryStatus) | O | 1..N | May be included for event "DDDS". The subscribed statuses (discarded, transmitted, buffered) for the event. If omitted all statuses are subscribed. | DownlinkDataDeliveryStatus |
| appIds | array(ApplicationId) | O | 1..N | May be included for event "QFI_ALLOC", "DISPERSION" or "QOS_MON".<br>(NOTE 1) | QfiAllocation<br>Dispersion<br>PduSessionInfo<br>UPEAS |
| networkArea | NetworkAreaInfo | O | 0..1 | Identification of network area to which the subscription applies. | AreaFilter<br>UPEAS |
| targetPeriod | TimeWindow | O | 0..1 | Indicates the data collection target period.<br>May be included for event "SMCC_EXP", "RED_TRANS_EXP" or "WLAN_INFO". | SMCCE<br>RedundantTransmissionExp<br>WlanPerformance |
| transacDispInd | boolean | O | 0..1 | Indicates the subscription for UE transaction dispersion collection, if it is included and set to "true". Default value is "false".<br>May be included for event "DISPERSION". | Dispersion |
| transacMetrics | array(TransactionMetric) | O | 1..N | Requested transaction metrics.<br>May be included for event "DISPERSION". | Dispersion |
| ueIpAddr | IpAddr | O | 0..1 | Indicates the UE IP address. May be included for event "DISPERSION". | Dispersion |
| upfEvents | array(UpfEvent) | O | 1..N | Indicates the exposure information related to UPF events.<br>May be included for event "UPF_EVENT".<br>(NOTE 2) | UPEAS |
| NOTE 1: Only one instance of "ApplicationId" shall be provided when the event is "QOS_MON".<br>NOTE 2: If the UPEAS feature is supported and the "immediateFlag" attribute within the "upfEvents" attribute is provided, the "ImmeRep" attribute within the NsmfEventExposure data type is not applicable. | | | | | |

### 5.6.2.5 Type EventNotification

**Table 5.6.2.5-1: Definition of type EventNotification**

| Attribute name | Data type | P | Cardinality | Description | Applicability |
|---|---|---|---|---|---|
| event | SmfEvent | M | 1 | Event that is notified. | |
| timeStamp | DateTime | M | 1 | Time at which the event is observed. | |
| supi | Supi | C | 0..1 | Subscription Permanent Identifier. It is included when the subscription applies to a group of UE(s) or any UE. (NOTE 9) | |
| gpsi | Gpsi | C | 0..1 | Identifies a GPSI. It shall contain an MSISDN. It is included when it is available and the subscription applies to a group of UE(s) or any UE.<br>This IE is not applicable to "SMCC_EXP" event. | |
| ueIpAddr | IpAddr | C | 0..1 | Indicates the UE IP address, It is included for event "DISPERSION" when it is available and requested in the subscription. | Dispersion |
| transacInfos | array(TransactionInfo) | C | 1..N | Transaction Information. Shall be included for event "DISPERSION". | Dispersion |
| sourceDnai | Dnai | C | 0..1 | Source DN Access Identifier. Shall be included for event "UP_PATH_CH" if the DNAI changed (NOTE 1, NOTE 2). | |
| targetDnai | Dnai | C | 0..1 | Target DN Access Identifier. Shall be included for event "UP_PATH_CH" if the DNAI changed (NOTE 1, NOTE 2). | |
| dnaiChgType | DnaiChangeType | C | 0..1 | DNAI Change Type. Shall be included for event "UP_PATH_CH". | |
| candidateDnais | array(Dnai) | O | 1..N | The candidate DNAI(s) for the PDU Session. May be included for event "UP_PATH_CH". | CommonEAS DNAI |
| easRediscoverInd | boolean | O | 0..1 | Indication of EAS re-discovery. If present and set to "true", it indicates the EAS re-discovery is performed, e.g. due to change of common EAS. Default value is "false" if omitted. | CommonEAS DNAI |
| candDnaisPrioInd | boolean | O | 0..1 | If provided and set to "true", it indicates that the candidate DNAIs provided in the "candidateDnais" attribute are in descending priority order, i.e. the lower the array index the higher the priority of the respective DNAI. If omitted, the default value is "false". It may only be provided if the "candidateDnais" attribute is provided and the "dnaiChgType" attribute is set to the value "EARLY". | CommonEAS DNAI |
| trafCorreInfo | TrafficCorrelationNotification | O | 0..1 | Contains traffic correlation information for notification.<br>It shall be provided if the event attribute has the value "TRAFFIC_CORRELATION". | CommonEAS DNAI |
| sourceUeIpv4Addr | Ipv4Addr | O | 0..1 | The IPv4 Address of the served UE for the source DNAI. May be included for event "UP_PATH_CH". | |
| sourceUeIpv6Prefix | Ipv6Prefix | O | 0..1 | The Ipv6 Address Prefix of the served UE for the source DNAI. May be included for event "UP_PATH_CH". | |
| targetUeIpv4Addr | Ipv4Addr | O | 0..1 | The IPv4 Address of the served UE for the target DNAI. May be included for event "UP_PATH_CH". | |

| | | | | | |
|---|---|---|---|---|---|
| targetUeIpv6Prefix | Ipv6Prefix | O | 0..1 | The Ipv6 Address Prefix of the served UE for the target DNAI. May be included for event "UP_PATH_CH". | |
| sourceTraRouting | RouteToLocation | C | 0..1 | N6 traffic routing information for the source DNAI. Shall be included for event "UP_PATH_CH" if available (NOTE 2). | |
| targetTraRouting | RouteToLocation | C | 0..1 | N6 traffic routing information for the target DNAI. Shall be included for event "UP_PATH_CH" if available (NOTE 2). | |
| ueMac | MacAddr48 | O | 0..1 | UE MAC address. May be included for event "UP_PATH_CH". | |
| adIpv4Addr | Ipv4Addr | O | 0..1 | Added IPv4 Address(es). May be included for event "UE_IP_CH". | |
| adIpv6Prefix | Ipv6Prefix | O | 0..1 | Added Ipv6 Address Prefix(es). May be included for event "UE_IP_CH". | |
| reIpv4Addr | Ipv4Addr | O | 0..1 | Removed IPv4 Address(es). May be included for event "UE_IP_CH". | |
| reIpv6Prefix | Ipv6Prefix | O | 0..1 | Removed Ipv6 Address Prefix(es). May be included for event "UE_IP_CH". | |
| plmnId | PlmnIdNid | C | 0..1 | New PLMN Identifier or the SNPN Identifier. Shall be included for event "PLMN_CH".<br>It shall be included for event "UP_PATH_CH" to contain the new serving PLMN identifier, if the "HR-SBO" feature is supported and the UE has moved to a serving PLMN where local traffic offloading is allowed.<br>(NOTE 7) | |
| accType | AccessType | C | 0..1 | New Access Type. Shall be included for event "AC_TY_CH" and may be included for event "QFI_ALLOC". | |
| pduAccTypes | array(AccessType) | O | 1..N | The list of Access Types used for the PDU session. May be included for event "QFI_ALLOC".<br>(NOTE 10) | MultipleAccessTypes |
| pduSeId | PduSessionId | C | 0..1 | PDU session ID. Shall be included for event "PDU_SES_REL" and "PDU_SES_EST". It shall also be included for event "QFI_ALLOC" if the subscription was for a UE, a group of UEs, or any UE, and not for a specific PDU Session. | |
| ratType | RatType | C | 0..1 | New RAT Type. Shall be included for event 'RAT_TY_CH'. | EneNA |
| dddStatus | DlDataDeliveryStatus | C | 0..1 | Downlink data delivery status (discarded, transmitted, buffered). Shall be included for event "DDDS", | DownlinkDataDeliveryStatus |
| maxWaitTime | DateTime | C | 0..1 | The estimated maximum waiting time for downlink data delivery, Shall be included for event "DDDS" with status "BUFFERED". | DownlinkDataDeliveryStatus |
| dddTraDescriptor | DddTrafficDescriptor | C | 0..1 | The downlink data descriptor impacted by downlink data delivery status change. Shall be included for event "DDDS" | DownlinkDataDeliveryStatus |
| commFailure | CommunicationFailure | C | 0..1 | Describes the communication failure cause for the UE. Shall be included for event "COMM_FAIL". | CommunicationFailure |

| | | | | | |
|---|---|---|---|---|---|
| ipv4Addr | Ipv4Addr | O | 0..1 | IPv4 address. May be included for event "PDU_SES_REL" or "PDU_SES_EST". | PduSessionStatus |
| ipv6Prefixes | array(Ipv6Prefix) | O | 1..N | IPv6 prefixes. May be included for event "PDU_SES_REL" or "PDU_SES_EST". (NOTE 3) | PduSessionStatus |
| ipv6Addrs | array(Ipv6Addr) | O | 1..N | IPv6 addresses. May be included for event "PDU_SES_REL" or "PDU_SES_EST". (NOTE 3) | PduSessionStatus |
| pduSessType | PduSessionType | C | 0..1 | PDU session type. Shall be included if the PduSessionStatus or PduSessionInfo feature is supported. (NOTE 8) | PduSessionStatus<br>PduSessionInfo |
| sscMode | SscMode | O | 0..1 | Represents the SSC mode of the PDU Session. It may be included for event "QFI_ALLOC". (NOTE 8) | PduSessionInfo |
| qfi | Qfi | C | 0..1 | QoS flow identifier. May be included for event "QFI_ALLOC". (NOTE 12) | QfiAllocation |
| appId | ApplicationId | O | 0..1 | Contains the application identifier. May be included for event "QFI_ALLOC". (NOTE 4) (NOTE 8) | QfiAllocation<br>PduSessionInfo |
| ethFlowDescs | array(EthFlowDescription) | O | 1..N | Descriptor(s) for non-IP traffic in which only ethernet flow description is defined. It allows the encoding of multiple UL and/or DL flows. Each entry of the array describes a single Ethernet flow. May be included for event "QFI_ALLOC", when the description of the Ethernet traffic requires multiple UL and/or DL flows. (NOTE 4) | MultipleFlowDescriptions |
| ethfDescs | array(EthFlowDescription) | O | 1..2 | Contains the flow description for the Uplink and/or Downlink Ethernet flows. May be included for event "QFI_ALLOC". (NOTE 4) | QfiAllocation |
| flowDescs | array(FlowDescription) | O | 1..N | Descriptor(s) of IP traffic. It allows the encoding of multiple UL and/or DL flows. Each entry of the array describes a single IP flow. May be included for event "QFI_ALLOC", when the description of the IP traffic requires multiple UL and/or DL flows. (NOTE 4) | MultipleFlowDescriptions |
| fDescs | array(FlowDescription) | O | 1..2 | Contains the flow description for the Uplink and/or Downlink IP flows. May be included for event "QFI_ALLOC". (NOTE 4) | QfiAllocation |
| dnn | Dnn | C | 0..1 | Data network name, Shall be included for event "QFI_ALLOC". May be included for event "PDU_SES_REL" or "PDU_SES_EST". Shall be included to indiate the DNN associated with URLLC service for event "RED_TRANS_EXP". Shall be included if DNN based SMCC is applied. It shall be included for event "UP_PATH_CH" to contain the HPLMN DNN, if the "HR-SBO" feature is supported and the UE has moved to a serving PLMN where local traffic offloading is allowed. | QfiAllocation,<br>PduSessionStatus<br>RedundantTransmissionExp<br>SMCCE<br>HR-SBO |

| | | | | | |
|---|---|---|---|---|---|
| snssai | Snssai | C | 0..1 | Identifies the slice information. Shall be included for event "QFI_ALLOC". Shall be included if S-NSSAI based SMCC is applied. It shall be included for event "UP_PATH_CH" to contain the HPLMN S-NSSAI, if the "HR-SBO" feature is supported and the UE has moved to a serving PLMN where local traffic offloading is allowed. | QfiAllocation EneNA SMCCE HR-SBO |
| ulDelays | array(Uinteger) | O | 1..N | Uplink packet delay in units of milliseconds. May be included for event "QOS_MON". (NOTE 5) | QoSMonitoring |
| dlDelays | array(Uinteger) | O | 1..N | Downlink packet delay in units of milliseconds. May be included for event "QOS_MON". (NOTE 5) | QoSMonitoring |
| ulCongInfo | Uinteger | O | 0..1 | Uplink congestion information. Percentage of packets that UPF uses for ECN marking for L4S (without "%" sign). May be included for event "QOS_MON". | EnQoSMon |
| dlCongInfo | Uinteger | O | 0..1 | Downlink congestion information. Percentage of packets that UPF uses for ECN marking for L4S (without "%" sign). May be included for event "QOS_MON". | EnQoSMon |
| rtDelays | array(Uinteger) | O | 1..N | Round trip delay in units of milliseconds. May be included for event "QOS_MON". (NOTE 5) | QoSMonitoring |
| ulDataRate | BitRate | O | 0..1 | Uplink data rate. May be included for event "QOS_MON". | EnQoSMon |
| dlDataRate | BitRate | O | 0..1 | Downlink data rate. May be included for event "QOS_MON". | EnQoSMon |
| timeWindow | TimeWindow | C | 0..1 | Time window representing a start time and a stop time of the data collection period. Shall be included for event "SMCC_EXP". | SMCCE |
| smNasFromUe | array(SmNasFromUe) | C | 1..N | Information on the SM NAS messages that SMF receives from UE for PDU Session. Shall be included for event "SMCC_EXP". | SMCCE |
| smNasFromSmf | array(SmNasFromSmf) | C | 1..N | Information on the SM congestion control applied SM NAS messages that SMF sends to UE for PDU Session. Shall be included for event "SMCC_EXP". | SMCCE |
| upRedTrans | boolean | C | 0..1 | Indicates whether the redundant transmission is setup or terminated. Set to "true" if the redundant transmission is setup, otherwise set to "false" if the redundant transmission is terminated. Default value is set to "false". Shall be included for event "RED_TRANS_EXP". | RedundantTransmissionExp |
| ssId | string | C | 0..1 | SSID that the PDU session is related to. (NOTE 6) | WlanPerformance |
| bssId | string | C | 0..1 | BSSID that the PDU session is related to. (NOTE 6) | WlanPerformance |
| startWlan | DateTime | C | 0..1 | The time stamp that indicates when the existing PDU Session's access type changes to WLAN or when the new PDU Session for WLAN is established. (NOTE 6) | WlanPerformance |

| | | | | | |
|---|---|---|---|---|---|
| endWlan | DateTime | C | 0..1 | The time stamp that indicates when the existing WLAN based PDU Session's access type is not WLAN any more or when the PDU Session for WLAN is released. (NOTE 6) | WlanPerformance |
| pduSessInfos | array(PduSessionInformation) | C | 1..N | The PDU session related information. It shall be included for event "UP_STATUS_INFO". | UeCommunication |
| upfInfo | UpfInformation | C | 0..1 | The information of the UPF serving the UE.<br>Shall be included for event "UPF_INFO". | ServiceExperience DnPerformance |
| pdmf | boolean | O | 0..1 | Packet delay measurement failure indicator. When set to true, it indicates that a packet delay failure has occurred, i.e. no measurement result is available during the reporting period.<br>Default value is false if omitted.<br>May be included for event "QOS_MON". | PacketDelayFailureReport |
| satBackhaulCat | SatelliteBackhaulCategory | C | 0..1 | The satellite backhaul category or non-satellite backhaul used for the PDU session shall be included for event "SATB_CH". | EnSatBackhaulCategoryChg |
| supportedFeatures | SupportedFeatures | C | 0..1 | List of negotiated features supported by the SMF and NF service consumer as described in clause 5.8.<br>This parameter shall be supplied by the SMF when the SMF detects that at least one feature related to an implicit subscription is supported by both the SMF and the NF service consumer. | |
| targetAfId | string | O | 0..1 | Identifier of the Application Function responsible for the target DNAI. May be included for event "UP_PATH_CH" if the target DNAI is not known to the source AF. | EasRelocationEnh |
| 5qi | 5Qi | O | 0..1 | The 5G QoS Identifier. May be included for event "QFI_ALLOC". | EnQfiAllocation |

NOTE 1: If the DNAI is not changed while the N6 traffic routing information is changed, the "sourceDnai" attribute and "targetDnai" attribute shall not be provided.
NOTE 2: The change from the UP path status where no DNAI applies to a status where a DNAI applies indicates the activation of the related AF request and therefore only the target DNAI and N6 traffic routing information is provided in the event notification; the change from the UP path status where a DNAI applies to a status where no DNAI applies indicates the de-activation of the related AF request and therefore only the source DNAI and N6 traffic routing information is provided in the event notification.
NOTE 3: If provided, either ipv6Prefixes or ipv6Addrs shall be present.
NOTE 4: Only one of the appId, ethfDescs, ethFlowDescs, flowDescs or fDescs attributes shall be provided.
NOTE 5: In this release of the specification one element may be included in the array as specified in clause 4.2.2.2.
NOTE 6: If notified event is "WLAN_INFO", then one of the "ssId" or "bssId" attribute and one of the "startWlan" or "endWlan" attribute shall be present.
NOTE 7: The SNPN Identifier consists of the PLMN Identifier and the NID.
NOTE 8: When the subscribed event is "QFI_ALLOC" and the PduSessionInfo feature is supported, if the "pduSessType" attribute and/or "sscMode" attribute is included, the associated "appId" attribute shall be provided.
NOTE 9: If the "WlanPerformanceExt_AIML" feature is supported, the "supi" attribute may also be included for a single UE when the subscription applies to the "WLAN_INFO" event.
NOTE 10: If multiple Access Types are used for the PDU Session and the "MultipleAccessTypes" feature is supported, the SMF shall include each PDU Session Access Type in the "pduAccTypes" attribute.
NOTE 11: Void.
NOTE 12: The "qfi" attribute and "5qi" attribute are mutually exclusive, either "qfi" attribute or "5qi" attribute shall be included for event "QFI_ALLOC".

### 5.6.2.6 void.

### 5.6.2.7 Type AckOfNotify

**Table 5.6.2.7-1: Definition of type AckOfNotify**

| Attribute name | Data type | P | Cardinality | Description | Applicability |
|---|---|---|---|---|---|
| notifId | string | M | 1 | Notification correlation ID provided by the SMF during UP path change notification. | |
| ackResult | AfResultInfo | M | 1 | Identifies the result of application layer handling. | |
| supi | Supi | O | 0..1 | Subscription Permanent Identifier. | |
| gpsi | Gpsi | O | 0..1 | Identifies a GPSI. | |

### 5.6.2.8 Type SmNasFromUe

**Table 5.6.2.8-1: Definition of type SmNasFromUe**

| Attribute name | Data type | P | Cardinality | Description | Applicability |
|---|---|---|---|---|---|
| smNasType | string | M | 1 | The type of SM NAS message transmitted by UE (e.g. PDU Session Establishment Request, PDU Session Modification Request, etc.). | |
| timeStamp | DateTime | M | 1 | Indicates the time stamp when SMF receives SM NAS message from UE. | |

### 5.6.2.9 Type SmNasFromSmf

**Table 5.6.2.9-1: Definition of type SmNasFromSmf**

| Attribute name | Data type | P | Cardinality | Description | Applicability |
|---|---|---|---|---|---|
| smNasType | string | M | 1 | The type of SM NAS message with backoff timer provided to UE (e.g. PDU Session Establishment Reject, PDU Session Modification Reject, PDU Session Release Command, etc.). | |
| timeStamp | DateTime | M | 1 | Indicates the time stamp when SMF sends SM NAS message to UE. | |
| backOffTimer | DurationSec | M | 1 | Indicates the value of backoff timer provided to UE in terms of time units of seconds. | |
| appliedSmccType | AppliedSmccType | M | 1 | The type of applied SM congestion control, i.e. DNN based congestion control or S-NSSAI based congestion control. | |

### 5.6.2.10 Type TransactionInfo

**Table 5.6.2.10-1: Definition of type TransactionInfo**

| Attribute name | Data type | P | Cardinality | Description | Applicability |
|---|---|---|---|---|---|
| transaction | Uinteger | M | 1 | Number of transactions. | |
| snssai | Snssai | C | 0..1 | Identifier of the network slice. | |
| appIds | array(ApplicationId) | O | 1..N | Application Identifiers. | |
| transMetrics | array(TransactionMetric) | O | 1..N | Indicates Session Management Transaction metrics. | |

### 5.6.2.11 Type PduSessionInformation

**Table 5.6.2.11-1: Definition of type PduSessionInformation**

| Attribute name | Data type | P | Cardinality | Description | Applicability |
|---|---|---|---|---|---|
| pduSessId | PduSessionId | O | 0..1 | Identification of PDU Session. It shall be provided if available. | |
| sessInfo | PduSessionInfo | C | 0..1 | Represents session information. It shall be provided if available. | |

### 5.6.2.12 Type PduSessionInfo

**Table 5.6.2.12-1: Definition of type PduSessionInfo**

| Attribute name | Data type | P | Cardinality | Description | Applicability |
|---|---|---|---|---|---|
| n4SessId | string | C | 0..1 | Identification of N4 Session. It shall be provided if available. | |
| sessInactiveTimer | DurationSec | C | 0..1 | The value of the session inactivity timer. It shall be provided if available. | |
| pduSessStatus | PduSessionStatus | C | 0..1 | Status of the PDU Session. It shall be provided if available. | |

### 5.6.2.13 Type UpfInformation

**Table 5.6.2.13-1: Definition of type UpfInformation**

| Attribute name | Data type | P | Cardinality | Description | Applicability |
|---|---|---|---|---|---|
| upfId | string | C | 0..1 | Identifies the UPF.<br>(NOTE 1) (NOTE 2) | |
| upfAddr | AddrFqdn | C | 0..1 | Represents the IP address/FQDN of the UPF.<br>(NOTE 1) (NOTE 2) | |
| NOTE 1: At least one of the "upfId" attribute and "upfAddr" attribute shall be included.<br>NOTE 2: The "upfId" attribute and "upfAddr" attribute may indicate an anchor UPF of the PDU session containing the QoS flow. | | | | | |

#### 5.6.2.14 Type: TrafficCorrelationNotification

**Table 5.6.2.14-1: Definition of type TrafficCorrelationNotification**

| Attribute name | Data type | P | Cardinality | Description | Applicability |
|---|---|---|---|---|---|
| smfId | NfInstanceId | M | 1 | Identifies the SMF Id sending the notification. | |
| tfcCorrId | string | M | 1 | Identification of traffic correlation. | |
| dnais | array(Dnai) | C | 1..N | Identification(s) of user plane access to DN(s) which the subscription applies. (NOTE 2) | |
| easFqdn | Fqdn | C | 0..1 | The Fqdn of the EAS. (NOTE 1) (NOTE 2) | |
| easIpAddr | IpAddr | C | 0..1 | Indicates the EAS IP address based on EASDF procedure. (NOTE 1) (NOTE 2) | |
| pduSessionNbr | Uinteger | M | 1 | Indicates the number of PDU sessions that the SMF is serving for the UE(s). | |
| NOTE 1: The "easFqdn" attribute and the "easIpAddr" attribute are mutually exclusive.<br>NOTE 2: At least one of the "dnais" attribute and the EAS ID ("easFqdn" attribute or "easIpAddr" attribute) shall be provided. | | | | | |

### 5.6.3 Simple data types and enumerations

#### 5.6.3.1 Introduction

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

#### 5.6.3.2 Simple data types

The simple data types defined in table 5.6.3.2-1 shall be supported.

**Table 5.6.3.2-1: Simple data types**

| Type Name | Type Definition | Description | Applicability |
|---|---|---|---|
| SubId | string | Identifies an Individual SMF Notification Subscription. To enable that the value is used as part of a URI, the string shall only contain characters allowed according to the "lower-with-hyphen" naming convention defined in 3GPP TS 29.501 [5]. In an OpenAPI [10] schema, the format shall be designated as "SubId". | |

### 5.6.3.3 Enumeration: SmfEvent

**Table 5.6.3.3-1: Enumeration SmfEvent**

| Enumeration value | Description | Applicability |
|---|---|---|
| AC_TY_CH | Access Type Change | |
| UP_PATH_CH | UP Path Change | |
| PDU_SES_REL | PDU Session Release | |
| PLMN_CH | PLMN Change | |
| UE_IP_CH | UE IP address change | |
| RAT_TY_CH | RAT Type Change | EneNA |
| DDDS | Downlink data delivery status | DownlinkDataDeliveryStatus |
| COMM_FAIL | Communication failure | CommunicationFailure |
| PDU_SES_EST | PDU Session Establishment | PduSessionStatus |
| QFI_ALLOC | QFI allocation | QfiAllocation |
| QOS_MON | QoS Monitoring | QoSMonitoring |
| SMCC_EXP | SM congestion control experience for PDU Session | SMCCE |
| DISPERSION | Session Management transaction dispersion | Dispersion |
| RED_TRANS_EXP | Redundant transmission experience for PDU Session | RedundantTransmissionExp |
| WLAN_INFO | WLAN information on PDU session for which Access Type is NON_3GPP_ACCESS and RAT Type is TRUSTED_WLAN | WlanPerformance |
| UPF_INFO | The UPF information, including the UPF ID/address/FQDN information. | ServiceExperience DnPerformance |
| UP_STATUS_INFO | User Plane status information | UeCommunication |
| UPF_EVENT | UPF event subscribed via SMF. (NOTE) | UPEAS |
| SATB_CH | Indicates that the SMF has detected a change between different satellite category, or non-satellite backhaul | EnSatBackhaulCategoryChg |
| TRAFFIC_CORRELATION | Indicates that the SMF provides 5GC determined traffic correlation information for a set of UEs identified by Traffic Correlation ID. | CommonEASDNAI |
| NOTE: UPF_EVENT shall only be used for "USER_DATA_USAGE_MEASURES" and "USER_DATA_USAGE_TRENDS" event types in 3GPP TS 29.564 [26]. | | |

### 5.6.3.4 Enumeration: NotificationMethod

The enumeration NotificationMethod represents the notification methods that can be subscribed. It shall comply with the provisions defined in table 5.6.3.4-1.

**Table 5.6.3.4-1: Enumeration NotificationMethod**

| Enumeration value | Description | Applicability |
|---|---|---|
| PERIODIC | The notification is periodically sent. | |
| ONE_TIME | The notification is only sent one time. | |
| ON_EVENT_DETECTION | The notification is sent each time the event is detected. | |

#### 5.6.3.5 void.

#### 5.6.3.6 Enumeration: AppliedSmccType

**Table 5.6.3.6-1: Enumeration AppliedSmccType**

| Enumeration value | Description | Applicability |
|---|---|---|
| DNN_CC | Indicates the DNN based congestion control. | |
| SNSSAI_CC | Indicates the S-NSSAI based congestion control. | |

#### 5.6.3.7 Enumeration: TransactionMetric

**Table 5.6.3.7-1: Enumeration TransactionMetric**

| Enumeration value | Description | Applicability |
|---|---|---|
| PDU_SES_EST | PDU Session Establishment | |
| PDU_SES_AUTH | PDU Session Authenication | |
| PDU_SES_MODIF | PDU Session Modification | |
| PDU_SES_REL | PDU Session Release | |

#### 5.6.3.8 Enumeration: PduSessionStatus

**Table 5.6.3.8-1: Enumeration PduSessionStatus**

| Enumeration value | Description | Applicability |
|---|---|---|
| ACTIVATED | Indicates the pdu session status is activated. | |
| DEACTIVATED | Indicates the pdu session status is deactivated. | |

## 5.7 Error handling

### 5.7.1 General

For the Nsmf_EventExposure API, HTTP error responses shall be supported as specified in clause 4.8 of 3GPP TS 29.501 [5].

Protocol errors and application errors specified in table 5.2.7.2-1 of 3GPP TS 29.500 [4] shall be supported for an HTTP method if the corresponding HTTP status codes are specified as mandatory for that HTTP method in table 5.2.7.1-1 of 3GPP TS 29.500 [4].

In addition, the requirements in the following clauses are applicable for the Nsmf_EventExposure API.

### 5.7.2 Protocol Errors

No specific procedures for the Nsmf_EventExposure service are specified.

### 5.7.3 Application Errors

The application errors defined for the Nsmf_EventExposure service are listed in Table 5.7.3-1.

**Table 5.7.3-1: Application errors**

| Application Error | HTTP status code | Description |
|---|---|---|
| MUTING_INSTR_NOT_ACCEPTED | 403 Forbidden | Indicates that the muting instructions received by the NF service consumer cannot be accepted. |
| NO_ACTIVE_PCC_RULE | 403 Forbidden | Indicates that QoS monitoring cannot be performed because there is no PCC rule active for the application. |

## 5.8 Feature negotiation

The optional features in table 5.8-1 are defined for the Nsmf_EventExposure API. They shall be negotiated using the extensibility mechanism defined in clause 6.6 of 3GPP TS 29.500 [4].

**Table 5.8-1: Supported Features**

| Feature number | Feature Name | Description |
|---|---|---|
| 1 | DownlinkDataDeliveryStatus | This feature indicates support for the "Downlink data delivery status" event. |
| 2 | CommunicationFailure | This feature indicates support for the "communication failure" event. |
| 3 | PduSessionStatus | This feature indicates support for the PDU session establishment event and enhancement (PDU session type, IP address) for the PDU session release event. |
| 4 | QfiAllocation | This feature indicates support for the "QFI allocation" event. |
| 5 | QoSMonitoring | This feature indicates support for the "QoS Monitoring" event. (NOTE 1) (NOTE 3) |
| 6 | ES3XX | Extended Support for 3xx redirections. This feature indicates the support of redirection for any service operation, according to Stateless NF procedures as specified in clauses 6.5.3.2 and 6.5.3.3 of 3GPP TS 29.500 [4] and according to HTTP redirection principles for indirect communication, as specified in clause 6.10.9 of 3GPP TS 29.500 [4]. |
| 7 | EneNA | This feature indicates support for exposing information required the enhancements of network data analytics requirements. |
| 8 | ULBuffering | This feature indicates support for Uplink buffering indication. (See NOTE 2) |
| 9 | SMCCE | This feature indicates support for Session Management Congestion Control Experience for PDU Session. |
| 10 | Dispersion | This feature indicates support for Session Management transactions dispersion. |
| 11 | ERIR | Indicates the support of immediate report of the available subscribed event(s) within the subscription response to the NF service consumer. |
| 12 | RedundantTransmissionExp | This feature indicates support for Redundant Transmission Experience. |
| 13 | WlanPerformance | This feature indicates support for WLAN information on PDU Session for which Access Type is NON_3GPP_ACCESS and RAT Type is TRUSTED_WLAN, to support WLAN performance analytics. |
| 14 | EASIPreplacement | This feature indicates the support of provisioning of EAS IP replacement info (See NOTE 2). |
| 15 | BIUMR | This feature bit indicates whether the NF Service Consumer (e.g. SMF) and PCF supports Binding Indication Update for multiple resource contexts specified in clauses 6.12.1 and 5.2.3.2.6 of 3GPP TS 29.500 [4]. |
| 16 | UeCommunication | This feature indicates the support exposing information required by UE communication analytics, i.e. User Plane status information. |
| 17 | ServiceExperience | This feature indicates the support for exposing UPF information required e.g. by QoS Sustainability analytics. (NOTE 4) |
| 18 | DnPerformance | This feature indicates the support for exposing UPF information required e.g. by QoS Sustainability analytics. (NOTE 4) |
| 19 | MultipleFlowDescriptions | This feature indicates the support of the report of multiple UL and/or DL flows. |
| 20 | PacketDelayFailureReport | This feature indicates the support of packet delay failure report as part of QoS Monitoring procedures. This feature requires that QosMonitoring feature is supported. (NOTE 1) |
| 21 | CommonEASDNAI | This feature indicates support of enhancements of UP path change event notification. (NOTE 1) |
| 22 | PduSessionInfo | This feature indicates support for PDU Session parameters information. |
| 23 | EnhDataMgmt | Indicates the support of enhanced data management mechanisms. Supporting this feature also requires the support of feature EneNA. |
| 24 | WlanPerformanceExt_AIML | This feature indicates support for the enhancements of WLAN performance supporting AIML, including support of analytics per UE granularity. Supporting this feature also requires the support of feature WlanPerformance. |
| 25 | EasRelocationEnh | This feature indicates enhanced support of EAS relocation procedures via additional information about the AFs that are responsible for certain EAS. |

| | | |
|---|---|---|
| 26 | UPEAS | This feature indicates the support of UPF enhancements for exposure. |
| 27 | EnSatBackhaulCategoryChg | This feature indicates the support of notification of a change between different satellite backhaul categories, or dynamic satellite backhaul categories, or between satellite backhaul and non-satellite backhaul. |
| 28 | Void | |
| 29 | AreaFilter | This feature indicates support for using an area as a subscription filter. |
| 30 | MultipleAccessTypes | This feature indicates the support of providing list of Access Type(s) used for the PDU Session. This is used for MA PDU sessions as well. |
| 31 | EnQfiAllocation | Indicates the enhancement on "QFI allocation" event including support of 5QI. Supporting this feature also requires the support of feature QfiAllocation. |
| 32 | EnQoSMon | This feature indicates the support of enhanced QoS monitoring functionality, i.e. the report of the congestion information, and/or, the data rate information monitoring. (NOTE 1) (NOTE 3)<br>This feature requires that QosMonitoring feature is supported. |
| 33 | HR-SBO | This feature indicates the support of extensions to User Plane Path Change event notifications to support Home Routed sessions with Session Breakout. (NOTE 2) |
| NOTE 1: SMF determines the support of this feature by the NF service consumer as part of the implicit subscription information provided by the PCF as described in 3GPP TS 29.512 [14] for the "UP_PATH_CH" event and "TRAFFIC_CORRELATION" event and "QOS_MON" event.<br>NOTE 2: NF service consumers determine the support of this feature as part of the notification of the implicitly subscribed events as described in clause 4.2.2.2.<br>NOTE 3: The negotiation of this feature may be explicit (via Nsmf_EventExposure_Subscribe service operation) or implicit as described in NOTE 1.<br>NOTE 4: The features "ServiceExperience" and "DnPerformance" indicate the support of exactly the same functionality of exposing UPF information, but they are both kept for backwards compatibility purposes. An NF service consumer may use these features for any purpose that requires UPF Information and not only for the calculation of QoS Sustainability analytics. | | |

## 5.9 Security

As indicated in 3GPP TS 33.501 [15] and 3GPP TS 29.500 [4], the access to the Nsmf_EventExposure API may be authorized by means of the OAuth2 protocol (see IETF RFC 6749 [16]), based on local configuration, using the "Client Credentials" authorization grant, where the NRF (see 3GPP TS 29.510 [12]) plays the role of the authorization server.

If OAuth2 is used, an NF service consumer, prior to consuming services offered by the Nsmf_EventExposure API, shall obtain a "token" from the authorization server, by invoking the Access Token Request service, as described in 3GPP TS 29.510 [12], clause 5.4.2.2.

NOTE: When multiple NRFs are deployed in a network, the NRF used as authorization server is the same NRF that the NF service consumer used for discovering the Nsmf_EventExposure service.

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

# Annex A (normative): OpenAPI specification

## A.1 General

The present Annex contains an OpenAPI [10] specification of HTTP messages and content bodies used by the Nsmf_EventExposure API.

This Annex shall take precedence when being discrepant to other parts of the specification with respect to the encoding of information elements and methods within the API.

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

Informative copies of the OpenAPI specification file contained in this 3GPP Technical Specification are available on a Git-based repository that uses the GitLab software version control system (see clause 5B of the 3GPP TR 21.900 [19] and clause 5.3.1 of the 3GPP TS 29.501 [5] for further information).

## A.2 Nsmf_EventExposure API

```
openapi: 3.0.0

info:
  version: 1.3.2
  title: Nsmf_EventExposure
  description: |
    Session Management Event Exposure Service.
    © 2025, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: 3GPP TS 29.508 V18.9.0; 5G System; Session Management Event Exposure Service.
  url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.508/

servers:
  - url: '{apiRoot}/nsmf-event-exposure/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in clause 4.4 of 3GPP TS 29.501

security:
  - {}
  - oAuth2ClientCredentials:
    - nsmf-event-exposure

paths:
  /subscriptions:
    post:
      operationId: CreateIndividualSubcription
      summary: Create an individual subscription for event notifications from the SMF
      tags:
        - Subscriptions (Collection)
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/NsmfEventExposure'
      responses:
        '201':
          description: Created.
          headers:
            Location:
              description: >
                Contains the URI of the newly created resource, according to the structure
```

```
            {apiRoot}/nsmf-event-exposure/v1/subscriptions/{subId}
          required: true
          schema:
            type: string
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/NsmfEventExposure'
    '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'
    '502':
      $ref: 'TS29571_CommonData.yaml#/components/responses/502'
    '503':
      $ref: 'TS29571_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29571_CommonData.yaml#/components/responses/default'
  callbacks:
    myNotification:
      '{$request.body#/notifUri}':
        post:
          requestBody:
            required: true
            content:
              application/json:
                schema:
                  $ref: '#/components/schemas/NsmfEventExposureNotification'
          responses:
            '204':
              description: No Content, Notification was successful.
            '307':
              $ref: 'TS29571_CommonData.yaml#/components/responses/307'
            '308':
              $ref: 'TS29571_CommonData.yaml#/components/responses/308'
            '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'
            '502':
              $ref: 'TS29571_CommonData.yaml#/components/responses/502'
            '503':
              $ref: 'TS29571_CommonData.yaml#/components/responses/503'
            default:
              $ref: 'TS29571_CommonData.yaml#/components/responses/default'
          callbacks:
            afAcknowledgement:
              '{$request.body#/ackUri}':
                post:
                  requestBody:  # contents of the callback message
```

```
                      required: true
                      content:
                        application/json:
                          schema:
                            $ref: '#/components/schemas/AckOfNotify'
                    responses:
                      '204':
                        description: No Content (successful acknowledgement)
                      '307':
                        $ref: 'TS29571_CommonData.yaml#/components/responses/307'
                      '308':
                        $ref: 'TS29571_CommonData.yaml#/components/responses/308'
                      '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'
                      '502':
                        $ref: 'TS29571_CommonData.yaml#/components/responses/502'
                      '503':
                        $ref: 'TS29571_CommonData.yaml#/components/responses/503'
                      default:
                        $ref: 'TS29571_CommonData.yaml#/components/responses/default'

  /subscriptions/{subId}:
    get:
      operationId: GetIndividualSubcription
      summary: Read an individual subscription for event notifications from the SMF
      tags:
        - IndividualSubscription (Document)
      parameters:
        - name: subId
          in: path
          description: Event Subscription ID
          required: true
          schema:
            type: string
      responses:
        '200':
          description: OK. Resource representation is returned
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/NsmfEventExposure'
        '307':
          $ref: 'TS29571_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29571_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29571_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29571_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29571_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29571_CommonData.yaml#/components/responses/404'
        '406':
          $ref: 'TS29571_CommonData.yaml#/components/responses/406'
        '429':
          $ref: 'TS29571_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29571_CommonData.yaml#/components/responses/500'
        '502':
          $ref: 'TS29571_CommonData.yaml#/components/responses/502'
        '503':
```

```
        $ref: 'TS29571_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29571_CommonData.yaml#/components/responses/default'
  put:
    operationId: ReplaceIndividualSubcription
    summary: Replace an individual subscription for event notifications from the SMF
    tags:
      - IndividualSubscription (Document)
    requestBody:
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/NsmfEventExposure'
    parameters:
      - name: subId
        in: path
        description: Event Subscription ID
        required: true
        schema:
          type: string
    responses:
      '200':
        description: OK. Resource was successfully modified and representation is returned
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/NsmfEventExposure'
      '204':
        description: No Content. Resource was successfully modified
      '307':
        $ref: 'TS29571_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29571_CommonData.yaml#/components/responses/308'
      '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'
      '502':
        $ref: 'TS29571_CommonData.yaml#/components/responses/502'
      '503':
        $ref: 'TS29571_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29571_CommonData.yaml#/components/responses/default'
  delete:
    operationId: DeleteIndividualSubcription
    summary: Delete an individual subscription for event notifications from the SMF
    tags:
      - IndividualSubscription (Document)
    parameters:
      - name: subId
        in: path
        description: Event Subscription ID
        required: true
        schema:
          type: string
    responses:
      '204':
        description: No Content. Resource was successfully deleted
      '307':
        $ref: 'TS29571_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29571_CommonData.yaml#/components/responses/308'
      '400':
```

```
          $ref: 'TS29571_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29571_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29571_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29571_CommonData.yaml#/components/responses/404'
        '429':
          $ref: 'TS29571_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29571_CommonData.yaml#/components/responses/500'
        '502':
          $ref: 'TS29571_CommonData.yaml#/components/responses/502'
        '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-event-exposure: Access to the Nsmf_EventExposure API

  schemas:

    NsmfEventExposure:
      description: >
        Represents an Individual SMF Notification Subscription resource. The serviveName property
        corresponds to the serviceName in the main body of the specification.
      type: object
      properties:
        supi:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Supi'
        gpsi:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
        anyUeInd:
          type: boolean
          description: >
            Any UE indication. This IE shall be present if the event subscription is applicable to
            any UE. Default value "false" is used, if not present.
        groupId:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/GroupId'
        pduSeId:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/PduSessionId'
        dnn:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
        snssai:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
        dnai:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnai'
        ssId:
          type: string
          description: SSID that the PDU session is related to.
        bssId:
          type: string
          description: BSSID that the PDU session is related to.
        upfId:
          type: string
          description: UPF identity.
        nfId:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'
        subId:
          $ref: '#/components/schemas/SubId'
        notifId:
          type: string
          description: Notification Correlation ID assigned by the NF service consumer.
        notifUri:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
        altNotifIpv4Addrs:
          type: array
          items:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv4Addr'
```

```
        description: Alternate or backup IPv4 address(es) where to send Notifications.
        minItems: 1
      altNotifIpv6Addrs:
        type: array
        items:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Addr'
        description: Alternate or backup IPv6 address(es) where to send Notifications.
        minItems: 1
      altNotifFqdns:
        type: array
        items:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Fqdn'
        minItems: 1
        description: Alternate or backup FQDN(s) where to send Notifications.
      eventSubs:
        type: array
        items:
          $ref: '#/components/schemas/EventSubscription'
        minItems: 1
        description: Subscribed events
      eventNotifs:
        type: array
        items:
          $ref: '#/components/schemas/EventNotification'
        minItems: 1
      ImmeRep:
        type: boolean
      notifMethod:
        $ref: '#/components/schemas/NotificationMethod'
      maxReportNbr:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
      expiry:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
      repPeriod:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
      guami:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Guami'
      serviveName:
        $ref: 'TS29510_Nnrf_NFManagement.yaml#/components/schemas/ServiceName'
      supportedFeatures:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      sampRatio:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/SamplingRatio'
      partitionCriteria:
        type: array
        items:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/PartitioningCriteria'
        minItems: 1
        description: Criteria for partitioning the UEs before applying the sampling ratio.
      grpRepTime:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
      notifFlag:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/NotificationFlag'
      notifFlagInstruct:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/MutingExceptionInstructions'
      mutingSetting:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/MutingNotificationsSettings'
      defQosSupp:
        type: boolean
        description: >
          Indicates whether the NF service consumer requests to receive QoS Flow performance
          information for the QoS Flow associated with the default QoS rule if there are no
          measurements available for the provided Application Identifier included in the appIds
          attribute.
      qosMonPending:
        type: boolean
        description: >
          Indicates that the reporting will be activated when the measurements are enabled by a
          PCC rule. It shall always be set to true when present. It may only be provided in the
          response.
    required:
      - notifId
      - notifUri
      - eventSubs

  NsmfEventExposureNotification:
    description: Represents notifications on events that occurred.
    type: object
```

```
    properties:
      notifId:
        type: string
        description: Notification correlation ID
      eventNotifs:
        type: array
        items:
          $ref: '#/components/schemas/EventNotification'
        minItems: 1
        description: Notifications about Individual Events
      ackUri:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
    required:
      - notifId
      - eventNotifs

  EventSubscription:
    description: Represents a subscription to a single event.
    type: object
    properties:
      event:
        $ref: '#/components/schemas/SmfEvent'
      dnaiChgType:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DnaiChangeType'
      dddTraDescriptors:
        type: array
        items:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/DddTrafficDescriptor'
        minItems: 1
      dddStati:
        type: array
        items:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/DlDataDeliveryStatus'
        minItems: 1
      appIds:
        type: array
        items:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/ApplicationId'
        minItems: 1
      networkArea:
        $ref: 'TS29554_Npcf_BDTPolicyControl.yaml#/components/schemas/NetworkAreaInfo'
      targetPeriod:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
      transacDispInd:
        type: boolean
        description: >
          Indicates the subscription for UE transaction dispersion collectionon, if it is included
          and set to "true". Default value is "false".
      transacMetrics:
        type: array
        items:
          $ref: '#/components/schemas/TransactionMetric'
        description: Indicates Session Management Transaction metrics.
        minItems: 1
      ueIpAddr:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/IpAddr'
      upfEvents:
        type: array
        items:
          $ref: 'TS29564_Nupf_EventExposure.yaml#/components/schemas/UpfEvent'
        description: Indicates UPF event exposure information.
        minItems: 1
    required:
      - event

  EventNotification:
    description: Represents a notification related to a single event that occurred.
    type: object
    properties:
      event:
        $ref: '#/components/schemas/SmfEvent'
      timeStamp:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
      supi:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Supi'
      gpsi:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
      ueIpAddr:
```

```
      $ref: 'TS29571_CommonData.yaml#/components/schemas/IpAddr'
    transacInfos:
      type: array
      items:
        $ref: '#/components/schemas/TransactionInfo'
      description: Transaction Information.
      minItems: 1
    sourceDnai:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnai'
    targetDnai:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnai'
    dnaiChgType:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/DnaiChangeType'
    candidateDnais:
      type: array
      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnai'
      minItems: 1
      description: The candidate DNAI(s) for the PDU Session.
    candDnaisPrioInd:
      type: boolean
      description: >
        If provided and set to true, it indicates that the candidate DNAIs provided
        in the candidateDnais attribute are in descending priority order, i.e.,
        the lower the array index the higher the priority of the respective DNAI.
        If omitted, the default value is false.
    easRediscoverInd:
      type: boolean
      description: >
        Indication of EAS re-discovery. If present and set to "true", it indicates the EAS
        re-discovery is performed, e.g. due to change of common EAS. Default value is "false" if
        omitted.
    trafCorreInfo:
      $ref: '#/components/schemas/TrafficCorrelationNotification'
    sourceUeIpv4Addr:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv4Addr'
    sourceUeIpv6Prefix:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Prefix'
    targetUeIpv4Addr:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv4Addr'
    targetUeIpv6Prefix:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Prefix'
    sourceTraRouting:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/RouteToLocation'
    targetTraRouting:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/RouteToLocation'
    ueMac:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/MacAddr48'
    adIpv4Addr:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv4Addr'
    adIpv6Prefix:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Prefix'
    reIpv4Addr:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv4Addr'
    reIpv6Prefix:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Prefix'
    plmnId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/PlmnIdNid'
    accType:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/AccessType'
    pduAccTypes:
      type: array
      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/AccessType'
      minItems: 1
    pduSeId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/PduSessionId'
    ratType:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/RatType'
    dddStatus:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/DlDataDeliveryStatus'
    dddTraDescriptor:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/DddTrafficDescriptor'
    maxWaitTime:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
    commFailure:
      $ref: 'TS29518_Namf_EventExposure.yaml#/components/schemas/CommunicationFailure'
    ipv4Addr:
```

```
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv4Addr'
    ipv6Prefixes:
      type: array
      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Prefix'
      minItems: 1
    ipv6Addrs:
      type: array
      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Addr'
      minItems: 1
    pduSessType:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/PduSessionType'
    sscMode:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SscMode'
    qfi:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Qfi'
    appId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/ApplicationId'
    ethFlowDescs:
      type: array
      items:
        $ref: 'TS29514_Npcf_PolicyAuthorization.yaml#/components/schemas/EthFlowDescription'
      minItems: 1
      description: >
        Descriptor(s) for non-IP traffic. It allows the encoding of multiple UL and/or DL flows.
        Each entry of the array describes a single Ethernet flow.
    ethfDescs:
      type: array
      items:
        $ref: 'TS29514_Npcf_PolicyAuthorization.yaml#/components/schemas/EthFlowDescription'
      minItems: 1
      maxItems: 2
      description: >
        Contains the UL and/or DL Ethernet flows. Each entry of the array describes a single
        Ethernet flow.
    flowDescs:
      type: array
      items:
        $ref: 'TS29514_Npcf_PolicyAuthorization.yaml#/components/schemas/FlowDescription'
      minItems: 1
      description: >
        Descriptor(s) for IP traffic. It allows the encoding of multiple UL and/or DL flows.
        Each entry of the array describes a single IP flow.
    fDescs:
      type: array
      items:
        $ref: 'TS29514_Npcf_PolicyAuthorization.yaml#/components/schemas/FlowDescription'
      minItems: 1
      maxItems: 2
      description: >
        Contains the UL and/or DL IP flows. Each entry of the array describes a single
        IP flow.
    dnn:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
    snssai:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
    ulDelays:
      type: array
      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
      minItems: 1
    dlDelays:
      type: array
      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
      minItems: 1
    rtDelays:
      type: array
      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
      minItems: 1
    ulCongInfo:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
    dlCongInfo:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
    ulDataRate:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRate'
```

```
      dlDataRate:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRate'
      timeWindow:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
      smNasFromUe:
        $ref: '#/components/schemas/SmNasFromUe'
      smNasFromSmf:
        $ref: '#/components/schemas/SmNasFromSmf'
      upRedTrans:
        type: boolean
        description: >
          Indicates whether the redundant transmission is setup or terminated. Set to "true" if
          the redundant transmission is setup, otherwise set to "false" if the redundant
          transmission is terminated. Default value is set to "false".
      ssId:
        type: string
      bssId:
        type: string
      startWlan:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
      endWlan:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
      pduSessInfos:
        type: array
        items:
          $ref: '#/components/schemas/PduSessionInformation'
        minItems: 1
      upfInfo:
        $ref: '#/components/schemas/UpfInformation'
      pdmf:
        type: boolean
        description: Represents the packet delay measurement failure indicator.
      satBackhaulCat:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/SatelliteBackhaulCategory'
      supportedFeatures:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      targetAfId:
        type: string
        description: Identifier of the Application Function responsible for the target DNAI.
      5qi:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/5Qi'
    required:
      - event
      - timeStamp
    not:
      required: [ipv6Prefixes,ipv6Addrs]

  SubId:
    type: string
    format: SubId
    description: >
      Identifies an Individual SMF Notification Subscription. To enable that the value is used as
      part of a URI, the string shall only contain characters allowed according to the
      "lower-with-hyphen" naming convention defined in 3GPP TS 29.501. In an OpenAPI schema, the
      format shall be designated as "SubId".

  AckOfNotify:
    description: Represents an acknowledgement information of an event notification.
    type: object
    properties:
      notifId:
        type: string
      ackResult:
        $ref: 'TS29522_TrafficInfluence.yaml#/components/schemas/AfResultInfo'
      supi:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Supi'
      gpsi:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
    required:
      - notifId
      - ackResult

  SmNasFromUe:
    description: >
      Represents information on the SM NAS messages that SMF receives from UE for PDU Session.
    type: object
    properties:
      smNasType:
```

```
        type: string
      timeStamp:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
    required:
      - smNasType
      - timeStamp

  SmNasFromSmf:
    description: >
      Represents information on the SM congestion control applied SM NAS messages that SMF sends
      to UE for PDU Session.
    type: object
    properties:
      smNasType:
        type: string
      timeStamp:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
      backoffTimer:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
      appliedSmccType:
        $ref: '#/components/schemas/AppliedSmccType'
    required:
      - smNasType
      - timeStamp
      - backoffTimer
      - appliedSmccType

  TransactionInfo:
    description: Represents SMF Transaction Information.
    type: object
    properties:
      transaction:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
      snssai:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
      appIds:
        type: array
        items:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/ApplicationId'
        minItems: 1
      transacMetrics:
        type: array
        items:
          $ref: '#/components/schemas/TransactionMetric'
        minItems: 1
    required:
      - transaction

  PduSessionInformation:
    description: Represents the PDU session related information.
    type: object
    properties:
      pduSessId:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/PduSessionId'
      sessInfo:
        $ref: '#/components/schemas/PduSessionInfo'

  PduSessionInfo:
    description: Represents session information.
    type: object
    properties:
      n4SessId:
        type: string
        description: The identifier of the N4 session for the reported PDU Session.
      sessInactiveTimer:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
      pduSessStatus:
        $ref: '#/components/schemas/PduSessionStatus'

  UpfInformation:
    description: Represents the ID/address/FQDN of the UPF.
    type: object
    properties:
      upfId:
        type: string
      upfAddr:
        $ref: 'TS29517_Naf_EventExposure.yaml#/components/schemas/AddrFqdn'
```

```
    TrafficCorrelationNotification:
      description: Represents notifications for 5GC determined Traffic Correlation Information.
      type: object
      properties:
        smfId:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'
        tfcCorrId:
          type: string
          description: >
            Identification of a set of UEs accessing the application identified by the
            Application Identifier or traffic filtering information.
        dnais:
          type: array
          items:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnai'
          minItems: 1
        easFqdn:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Fqdn'
        easIpAddr:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/IpAddr'
        pduSessionNbr:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
      required:
        - smfId
        - pduSessionNbr
        - tfcCorrId
      anyOf:
        - required: [dnais]
        - oneOf:
          - required: [easFqdn]
          - required: [easIpAddr]

    SmfEvent:
      anyOf:
      - type: string
        enum:
          - AC_TY_CH
          - UP_PATH_CH
          - PDU_SES_REL
          - PLMN_CH
          - UE_IP_CH
          - RAT_TY_CH
          - DDDS
          - COMM_FAIL
          - PDU_SES_EST
          - QFI_ALLOC
          - QOS_MON
          - SMCC_EXP
          - DISPERSION
          - RED_TRANS_EXP
          - WLAN_INFO
          - UPF_INFO
          - UP_STATUS_INFO
          - UPF_EVENT
          - SATB_CH
          - TRAFFIC_CORRELATION
      - type: string
        description: >
          This string provides forward-compatibility with future
          extensions to the enumeration and is not used to encode
          content defined in the present version of this API.
      description: |
        Represents the types of events that can be subscribed.
        Possible values are:
        - AC_TY_CH: Access Type Change.
        - UP_PATH_CH: UP Path Change.
        - PDU_SES_REL: PDU Session Release.
        - PLMN_CH: PLMN Change.
        - UE_IP_CH: UE IP address change.
        - RAT_TY_CH: RAT Type Change.
        - DDDS: Downlink data delivery status.
        - COMM_FAIL: Communication Failure.
        - PDU_SES_EST: PDU Session Establishment.
        - QFI_ALLOC: QFI allocation.
        - QOS_MON: QoS Monitoring.
        - SMCC_EXP: SM congestion control experience for PDU Session.
        - DISPERSION: Session Management transaction dispersion.
        - RED_TRANS_EXP: Redundant transmission experience for PDU Session.
```

```
      - WLAN_INFO: WLAN information on PDU session for which Access Type is NON_3GPP_ACCESS and
        RAT Type is TRUSTED_WLAN.
      - UPF_INFO: The UPF information, including the UPF ID/address/FQDN information.
      - UP_STATUS_INFO: The User Plane status information.
      - UPF_EVENT: UPF event subscribed via SMF.
      - SATB_CH: Satellite backhaul category change.
      - TRAFFIC_CORRELATION: Indicates that the SMF provides 5GC determined traffic correlation
        information for a set of UEs identified by Traffic Correlation ID.

    NotificationMethod:
      anyOf:
      - type: string
        enum:
          - PERIODIC
          - ONE_TIME
          - ON_EVENT_DETECTION
      - type: string
        description: >
          This string provides forward-compatibility with future
          extensions to the enumeration and is not used to encode
          content defined in the present version of this API.
      description: |
        Represents the notification methods that can be subscribed.
        Possible values are:
        - PERIODIC
        - ONE_TIME
        - ON_EVENT_DETECTION

    AppliedSmccType:
      anyOf:
      - type: string
        enum:
          - DNN_CC
          - SNSSAI_CC
        description: >
          This string indicates the type of applied SM congestion control.
      - type: string
        description: >
          This string provides forward-compatibility with future
          extensions to the enumeration and is not used to encode
          content defined in the present version of this API.
      description: |
        Represents the type of applied SM congestion control.
        Possible values are:
        - DNN_CC: Indicates the DNN based congestion control.
        - SNSSAI_CC: Indicates the S-NSSAI based congestion control.

    TransactionMetric:
      anyOf:
      - type: string
        enum:
          - PDU_SES_EST
          - PDU_SES_AUTH
          - PDU_SES_MODIF
          - PDU_SES_REL
      - type: string
        description: >
          This string provides forward-compatibility with future extensions to the enumeration
          and is not used to encode content defined in the present version of this API.

      description: |
        Represents the metric on UE Session Management transactions.
        Possible values are:
        - PDU_SES_EST: PDU Session Establishment
        - PDU_SES_AUTH: PDU Session Authentication
        - PDU_SES_MODIF: PDU Session Modification
        - PDU_SES_REL: PDU Session Release

    PduSessionStatus:
      anyOf:
      - type: string
        enum:
          - ACTIVATED
          - DEACTIVATED
      - type: string
        description: >
          This string provides forward-compatibility with future extensions to the enumeration
          and is not used to encode content defined in the present version of this API.
```

```
      description: |
        Represents the status of the PDU Session.
        Possible values are:
        - ACTIVATED: PDU Session status is activated.
        - DEACTIVATED: PDU Session status is deactivated.
```

# Annex B (informative): Change history

| Change history | | | | | | | |
|---|---|---|---|---|---|---|---|
| Date | Meeting | TDoc | CR | Rev | Cat | Subject/Comment | New version |
| 2017-10 | | | | | | TS skeleton of Session Management Event Exposure Service specification | 0.0.0 |
| 2017-10 | CT3#92 | | | | | C3-175326,C3-175327 and C3-175281 | 0.1.0 |
| 2017-12 | CT3#93 | | | | | C3-176071, C3-176240, C3-176316, C3-176242, C3-176243, C3-176244, C3-176317 and C3-176318 | 0.2.0 |
| 2018-01 | CT3#94 | | | | | C3-180034, C3-180196 and C3-180197 | 0.3.0 |
| 2018-03 | CT3#95 | C3-181366 | | | | Inclusion of P-CRs agreed in CT3#95: C3-181214, C3-181215, C3-181216, C3-181217, C3-181354, C3-181353. | 0.4.0 |
| 2018-04 | CT3#96 | | | | | C3-182315, C3-182316, C3-182144, C3-182317 | 0.5.0 |
| 2018-05 | CT3#97 | | | | | C3-183452, C3-183451, C3-183829, C3-183453, C3-183454, C3-183283 and C3-183455. | 0.6.0 |
| 2018-06 | CT#80 | CP-181039 | | | | TS sent to plenary for approval | 1.0.0 |
| 2018-06 | CT#80 | CP-181039 | | | | TS approved by plenary | 15.0.0 |
| 2018-09 | CT#81 | CP-182015 | 0001 | 2 | F | DNAI change notification type | 15.1.0 |
| 2018-09 | CT#81 | CP-182015 | 0002 | 4 | F | Completion of Error Codes in OpenAPI file | 15.1.0 |
| 2018-09 | CT#81 | CP-182015 | 0003 | | F | Definition of DNAI | 15.1.0 |
| 2018-09 | CT#81 | CP-182015 | 0004 | 2 | F | Stateless AMF support updates | 15.1.0 |
| 2018-09 | CT#81 | CP-182015 | 0007 | 1 | F | Encoding of the "N6 traffic routing information" | 15.1.0 |
| 2018-09 | CT#81 | CP-182033 | 0008 | 2 | F | Addition of Time Stamp | 15.1.0 |
| 2018-09 | CT#81 | CP-182015 | 0009 | 1 | F | Update of resource figure | 15.1.0 |
| 2018-09 | CT#81 | CP-182015 | 0010 | | F | Update of resource figure | 15.1.0 |
| 2018-12 | CT#82 | CP-183205 | 0011 | 6 | F | Correction to the event subscription | 15.2.0 |
| 2018-12 | CT#82 | CP-183205 | 0012 | 4 | F | Correction to the AF influence traffic steering control | 15.2.0 |
| 2018-12 | CT#82 | CP-183137 | 0013 | 5 | F | Immediate reporting flag | 15.2.0 |
| 2018-12 | CT#82 | CP-183205 | 0014 | 2 | F | UE ID in the notification | 15.2.0 |
| 2018-12 | CT#82 | CP-183205 | 0015 | 1 | F | Correction to the overview | 15.2.0 |
| 2018-12 | CT#82 | CP-183205 | 0016 | 2 | F | Correction to the NF consumer | 15.2.0 |
| 2018-12 | CT#82 | CP-183205 | 0017 | 1 | F | Location Header | 15.2.0 |
| 2018-12 | CT#82 | CP-183205 | 0018 | | F | Data for notification | 15.2.0 |
| 2018-12 | CT#82 | CP-183205 | 0019 | 1 | F | NotificationMethod | 15.2.0 |
| 2018-12 | CT#82 | CP-183205 | 0020 | 1 | F | Correction of apiName | 15.2.0 |
| 2018-12 | CT#82 | CP-183205 | 0021 | | F | Default value for apiRoot | 15.2.0 |
| 2018-12 | CT#82 | CP-183205 | 0023 | | F | API version | 15.2.0 |
| 2018-12 | CT#82 | CP-183205 | 0024 | 1 | F | ExternalDocs OpenAPI field | 15.2.0 |
| 2018-12 | CT#82 | CP-183205 | 0025 | | F | Location header field in OpenAPI | 15.2.0 |
| 2018-12 | CT#82 | CP-183205 | 0026 | 1 | F | Security | 15.2.0 |
| 2018-12 | CT#82 | CP-183205 | 0027 | | F | supported content types | 15.2.0 |
| 2018-12 | CT#82 | CP-183205 | 0028 | 2 | F | HTTP Error responses | 15.2.0 |
| 2018-12 | CT#82 | CP-183205 | 0029 | 1 | F | Monitoring identities | 15.2.0 |
| 2018-12 | CT#82 | CP-183205 | 0030 | | F | Correction to the names of data types | 15.2.0 |
| 2018-12 | CT#82 | CP-183205 | 0031 | | F | Report of Ethernet UE address | 15.2.0 |
| 2019-03 | CT#83 | CP-190117 | 0032 | 1 | F | Correction of name of security scope | 15.3.0 |
| 2019-03 | CT#83 | CP-190117 | 0033 | 2 | F | API version update for Rel-15 | 15.3.0 |
| 2019-03 | CT#83 | CP-190117 | 0034 | 1 | F | Correction of URIs in resource structure table and figure | 15.3.0 |
| 2019-06 | CT#84 | CP-191074 | 0037 | 3 | F | Correct condition for DNAI in UP path change | 15.4.0 |
| 2019-06 | CT#84 | CP-191074 | 0038 | 1 | F | Precedence of OpenAPI file | 15.4.0 |
| 2019-06 | CT#84 | CP-191074 | 0041 | 1 | F | Correction of Misplaced Location header in OpenAPI file | 15.4.0 |
| 2019-06 | CT#84 | CP-191074 | 0043 | 2 | F | API version Update | 15.4.0 |
| 2019-06 | CT#84 | CP-191074 | 0044 | 1 | F | Copyright Note in YAML file | 15.4.0 |
| 2019-06 | CT#84 | CP-191070 | 0039 | 3 | B | Downlink data delivery status event | 16.0.0 |
| 2019-06 | CT#84 | CP-191071 | 0040 | 3 | B | AF acknowledgement of UP path event notification | 16.0.0 |
| 2019-06 | CT#84 | CP-191101 | 0042 | 2 | F | API version Update | 16.0.0 |
| 2019-09 | CT#85 | CP-192169 | 0045 | | B | Add communication failure event | 16.1.0 |
| 2019-09 | CT#85 | CP-192141 | 0046 | 1 | A | Correct SMF event exposure service name | 16.1.0 |
| 2019-09 | CT#85 | CP-192157 | 0047 | 1 | B | Enhancement of event reporting information | 16.1.0 |
| 2019-09 | CT#85 | CP-192157 | 0048 | 2 | B | Support for Service Experience | 16.1.0 |
| 2019-09 | CT#85 | CP-192159 | 0049 | 1 | B | I-SMF notification to SMF | 16.1.0 |
| 2019-09 | CT#85 | CP-192220 | 0050 | 3 | B | Notification of downlink data delivery status | 16.1.0 |
| 2019-09 | CT#85 | CP-192138 | 0051 | 2 | B | AF acknowledgement of UP path event notification | 16.1.0 |
| 2019-09 | CT#85 | CP-192173 | 0054 | | F | OpenAPI version update for TS 29.508 Rel-16 | 16.1.0 |
| 2019-12 | CT#86 | CP-193183 | 0056 | | A | Usage of the "serviveName" attribute | 16.2.0 |
| 2019-12 | CT#86 | CP-193197 | 0057 | | F | Data type of the "serviceName" attribute | 16.2.0 |
| 2019-12 | CT#86 | CP-193181 | 0058 | 1 | B | OpenAPI file update to support AF acknowledgement | 16.2.0 |
| 2019-12 | CT#86 | CP-193181 | 0059 | 3 | F | Update of AFRelocationAck feature | 16.2.0 |
| 2019-12 | CT#86 | CP-193201 | 0060 | 1 | B | I-SMF applicable event | 16.2.0 |
| 2019-12 | CT#86 | CP-193183 | 0062 | 1 | A | Correction on 307 error, 29.508 | 16.2.0 |
| 2019-12 | CT#86 | CP-193212 | 0064 | | F | Update of API version and TS version in OpenAPI file | 16.2.0 |
| 2020-03 | CT#87e | CP-200220 | 0065 | 1 | B | Update of the Availability after DDN Failure event | 16.3.0 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2020-03 | CT#87e | CP-200230 | 0066 | 1 | B | Update of the DDD status event | 16.3.0 |
| 2020-03 | CT#87e | CP-200202 | 0067 | 1 | B | QoS Monitoring Report | 16.3.0 |
| 2020-03 | CT#87e | CP-200198 | 0068 | | B | Support PDU session establishment event | 16.3.0 |
| 2020-03 | CT#87e | CP-200198 | 0070 | | F | V-SMF applicable event | 16.3.0 |
| 2020-03 | CT#87e | CP-200241 | 0071 | 2 | B | QFI allocation event | 16.3.0 |
| 2020-03 | CT#87e | CP-200211 | 0072 | | F | DDD status for I-SMF | 16.3.0 |
| 2020-03 | CT#87e | CP-200216 | 0073 | | F | Update of OpenAPI version and TS version in externalDocs field | 16.3.0 |
| 2020-06 | CT#88e | CP-201210 | 0075 | 1 | F | Correction to the DDD status event | 16.4.0 |
| 2020-06 | CT#88e | CP-201246 | 0077 | 1 | F | Correct presence condition in event subscription | 16.4.0 |
| 2020-06 | CT#88e | CP-201244 | 0078 | 1 | F | Storage of YAML files in ETSI Forge | 16.4.0 |
| 2020-06 | CT#88e | CP-201210 | 0079 | | F | Monitoring event normalization in roaming case | 16.4.0 |
| 2020-06 | CT#88e | CP-201256 | 0080 | 1 | F | URI of the Nsmf_EventExposure service | 16.4.0 |
| 2020-06 | CT#88e | CP-201213 | 0081 | 1 | F | Correction to QoS Monitoring report | 16.4.0 |
| 2020-06 | CT#88e | CP-201216 | 0083 | | A | Notification Uri and subId resource URI | 16.4.0 |
| 2020-06 | CT#88e | CP-201216 | 0085 | 1 | A | OpenAPI: adding Location header field in 307 response | 16.4.0 |
| 2020-06 | CT#88e | CP-201233 | 0086 | 1 | B | FQDN of alternate or backup AMF | 16.4.0 |
| 2020-06 | CT#88e | CP-201210 | 0087 | | B | Add DNN and Slice filter | 16.4.0 |
| 2020-06 | CT#88e | CP-201210 | 0088 | | F | Correct presence condition for snssai | 16.4.0 |
| 2020-06 | CT#88e | CP-201213 | 0089 | 1 | F | Add missing event | 16.4.0 |
| 2020-06 | CT#88e | CP-201244 | 0092 | | F | Optionality of ProblemDetails | 16.4.0 |
| 2020-06 | CT#88e | CP-201244 | 0093 | 1 | F | Supported headers, Resource Data type, Operation Name | 16.4.0 |
| 2020-06 | CT#88e | CP-201255 | 0095 | | F | Update of OpenAPI version and TS version in externalDocs field | 16.4.0 |
| 2020-09 | CT#89e | CP-202050 | 0096 | 1 | F | notifId used for QoS monitoring report | 16.5.0 |
| 2020-09 | CT#89e | CP-202048 | 0097 | | F | Correction to detection of downlink data delivery status change | 16.5.0 |
| 2020-09 | CT#89e | CP-202067 | 0100 | | F | Remove UP path change for I-SMF | 16.5.0 |
| 2020-09 | CT#89e | CP-202209 | 0101 | 1 | F | Subscribed delivery status | 16.5.0 |
| 2020-09 | CT#89e | CP-202073 | 0098 | | F | Successful status code | 17.0.0 |
| 2020-12 | CT#90e | CP-203139 | 0103 | 1 | A | Essential corrections and alignments | 17.1.0 |
| 2020-12 | CT#90e | CP-203139 | 0105 | 1 | A | Storage of YAML files in 3GPP Forge | 17.1.0 |
| 2020-12 | CT#90e | CP-203108 | 0107 | | A | Correction to ddd status when the SMF buffers the data | 17.1.0 |
| 2020-12 | CT#90e | CP-203113 | 0110 | 1 | A | Corrections on resourceURI | 17.1.0 |
| 2020-12 | CT#90e | CP-203108 | 0112 | 1 | A | notifId provided by the UDM for CIoT events | 17.1.0 |
| 2021-03 | CT#91e | CP-210191 | 0115 | 1 | A | Support of stateless NFs | 17.2.0 |
| 2021-03 | CT#91e | CP-210218 | 0118 | | F | OpenAPI reference | 17.2.0 |
| 2021-03 | CT#91e | CP-210219 | 0119 | | F | Clarification on optional HTTP custom headers | 17.2.0 |
| 2021-03 | CT#91e | CP-210189 | 0121 | 1 | A | Correction to DDD status event detection | 17.2.0 |
| 2021-03 | CT#91e | CP-210189 | 0123 | | A | Correction to DDD status event subscription | 17.2.0 |
| 2021-03 | CT#91e | CP-210221 | 0124 | 1 | F | Ambiguous concept of NF service consumer terminology | 17.2.0 |
| 2021-03 | CT#91e | CP-210219 | 0125 | 1 | F | Adding some missing description fields to data type definitions in OpenAPI specification files | 17.2.0 |
| 2021-03 | CT#91e | CP-210194 | 0128 | | A | alignment of dnaiChgType attribute | 17.2.0 |
| 2021-03 | CT#91e | CP-210240 | 0130 | | F | Update of OpenAPI version and TS version in externalDocs field | 17.2.0 |
| 2021-06 | CT#92e | CP-211221 | 0131 | 2 | B | Partitioning criteria for applying sampling in specific UE partitions in SMF exposure | 17.3.0 |
| 2021-06 | CT#92e | CP-211221 | 0132 | 1 | B | Support of Mute Reporting | 17.3.0 |
| 2021-06 | CT#92e | CP-211200 | 0134 | 1 | A | Temporary and Permanent Redirection | 17.3.0 |
| 2021-06 | CT#92e | CP-211243 | 0135 | 1 | F | Removal of resource URI in Notification Acknowledgement procedure | 17.3.0 |
| 2021-06 | CT#92e | CP-211221 | 0136 | 1 | B | Nsmf_EventExposure supports RAT Type Change Event | 17.3.0 |
| 2021-06 | CT#92e | CP-211265 | 0138 | | F | Update of OpenAPI version and TS version in externalDocs field | 17.3.0 |
| 2021-09 | CT#93e | CP-212220 | 0139 | 1 | F | Correction of URI structure | 17.4.0 |
| 2021-09 | CT#93e | CP-212221 | 0141 | 1 | A | Missing PDU Session ID from QFI allocation event notifications | 17.4.0 |
| 2021-09 | CT#93e | CP-212198 | 0142 | 2 | B | Adding uplink buffering indication for Application Relocation | 17.4.0 |
| 2021-09 | CT#93e | CP-212203 | 0143 | 1 | F | Corrections for RAT Type exposure | 17.4.0 |
| 2021-09 | CT#93e | CP-212223 | 0144 | | F | Update of OpenAPI version and TS version in externalDocs field | 17.4.0 |
| 2021-12 | CT#94e | CP-213227 | 0145 | 1 | B | Update input data collection for Slice load level information | 17.5.0 |
| 2021-12 | CT#94e | CP-213228 | 0146 | 2 | B | New event for SM congestion control experience | 17.5.0 |
| 2021-12 | CT#94e | CP-213238 | 0148 | | A | The <apiName> of the Nsmf_EventExposure API | 17.5.0 |
| 2021-12 | CT#94e | CP-213223 | 0149 | 1 | B | Adding EAS IP replacement information in AppRelocationInfo | 17.5.0 |
| 2021-12 | CT#94e | CP-213228 | 0150 | 1 | B | Adding DCCF as SMF event exposure NF service consumer | 17.5.0 |
| 2021-12 | CT#94e | CP-213239 | 0151 | | F | Adding missing conditions on features for notifications about subscribed events | 17.5.0 |
| 2021-12 | CT#94e | CP-213244 | 0152 | | F | Handling of implicit subscriptions | 17.5.0 |
| 2021-12 | CT#94e | CP-213215 | 0154 | 1 | A | Essential correction to immediate report | 17.5.0 |
| 2021-12 | CT#94e | CP-213228 | 0155 | 1 | B | Transactions dispersion information collected from serving SMF | 17.5.0 |
| 2021-12 | CT#94e | CP-213246 | 0156 | | F | Update of OpenAPI version and TS version in externalDocs field | 17.5.0 |

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|---|---|---|---|---|---|---|---|
| 2022-03 | CT#95e | CP-220195 | 0159 | 4 | B | Event report in the subscription response | 17.6.0 |
| 2022-03 | CT#95e | CP-220189 | 0161 | 1 | B | Support Redundant Transmission Experience | 17.6.0 |
| 2022-03 | CT#95e | CP-220189 | 0162 | 1 | B | Support new event on WLAN information | 17.6.0 |
| 2022-03 | CT#95e | CP-220190 | 0163 | 1 | F | Corrections related to SMCCE | 17.6.0 |
| 2022-03 | CT#95e | CP-220190 | 0164 | 1 | F | Corrections related to Dispersion | 17.6.0 |
| 2022-03 | CT#95e | CP-220192 | 0165 | 1 | D | Correction of SMCC and other abbreviations | 17.6.0 |
| 2022-03 | CT#95e | CP-220186 | 0166 | 1 | F | Handling of supported features for Edge Computing | 17.6.0 |
| 2022-03 | CT#95e | CP-220175 | 0168 | | A | Corrections related to URLLC | 17.6.0 |
| 2022-03 | CT#95e | CP-220201 | 0169 | | B | Updating Binding Indication for multiple resource contexts feature | 17.6.0 |
| 2022-03 | CT#95e | CP-220191 | 0170 | | B | Provide PDU session information for supporting the UE communication analytics | 17.6.0 |
| 2022-03 | CT#95e | CP-220192 | 0171 | 1 | B | Support UPF information for service experience and DN performance analytics | 17.6.0 |
| 2022-03 | CT#95e | CP-220194 | 0172 | | F | Update of info and externalDocs fields | 17.6.0 |
| 2022-06 | CT#96 | CP-221154 | 0173 | 1 | F | Formatting of description fields | 17.7.0 |
| 2022-06 | CT#96 | CP-221154 | 0174 | | F | Using the common data type for FQDN | 17.7.0 |
| 2022-06 | CT#96 | CP-221157 | 0175 | | F | Inaccurate condition for immediate reporting | 17.7.0 |
| 2022-06 | CT#96 | CP-221129 | 0176 | | F | Correction to the notifFlag attribute in subscription modification | 17.7.0 |
| 2022-06 | CT#96 | CP-221129 | 0177 | | F | Completion of subscription modification procedure | 17.7.0 |
| 2022-06 | CT#96 | CP-221129 | 0178 | | F | missing applicable RED_TRANS_EXP event for targetPeriod attribute | 17.7.0 |
| 2022-06 | CT#96 | CP-221130 | 0179 | 1 | B | Resolve editor's note on Redundant Transmission Experience event | 17.7.0 |
| 2022-06 | CT#96 | CP-221130 | 0180 | | F | Corrections to SMCCE | 17.7.0 |
| 2022-06 | CT#96 | CP-221133 | 0181 | | F | Muting notifications correction | 17.7.0 |
| 2022-06 | CT#96 | CP-221157 | 0182 | 1 | F | Correction to the reported flows | 17.7.0 |
| 2022-06 | CT#96 | CP-221151 | 0183 | | F | Update of info and externalDocs fields | 17.7.0 |
| 2022-09 | CT#97e | CP-222123 | 0184 | 1 | F | Alignment with the SBI template | 17.8.0 |
| 2022-12 | CT#98e | CP-223173 | 0186 | 1 | F | User Plane Status Information event handling | 17.9.0 |
| 2022-12 | CT#98e | CP-223177 | 0188 | | F | Adding support of SNPN | 17.9.0 |
| 2022-12 | CT#98e | CP-223188 | 0190 | | F | Update of info and externalDocs fields | 17.9.0 |
| 2022-12 | CT#98e | CP-223191 | 0187 | | F | Adding the mandatory error code 502 Bad Gateway | 18.0.0 |
| 2022-12 | CT#98e | CP-223192 | 0189 | 1 | F | Enumeration definitions in the OpenAPI file | 18.0.0 |
| 2022-12 | CT#98e | CP-223189 | 0191 | | F | Update of info and externalDocs fields | 18.0.0 |
| 2023-03 | CT#99 | CP-230166 | 0192 | | F | Adding missing presence condition for IPv6 addresses and prefixes | 18.1.0 |
| 2023-03 | CT#99 | CP-230175 | 0196 | 1 | F | Clarification regarding maxReportNbr | 18.1.0 |
| 2023-03 | CT#99 | CP-230176 | 0197 | 1 | F | Correct the event name for downlink data delivery status | 18.1.0 |
| 2023-03 | CT#99 | CP-230174 | 0198 | | F | Corrections on subscription notification | 18.1.0 |
| 2023-03 | CT#99 | CP-230174 | 0199 | | F | Corrections on PDU Session Establishment | 18.1.0 |
| 2023-03 | CT#99 | CP-230166 | 0200 | | F | Correction of the description fields in enumerations | 18.1.0 |
| 2023-03 | CT#99 | CP-230145 | 0202 | | A | Missing presence condition for transacInfos attribute | 18.1.0 |
| 2023-03 | CT#99 | CP-230174 | 0204 | | F | Alignment of packet delay report | 18.1.0 |
| 2023-03 | CT#99 | CP-230175 | 0209 | 1 | F | Support of indirect feature negotiation | 18.1.0 |
| 2023-03 | CT#99 | CP-230173 | 0211 | 1 | A | Correction on handling of Packet Delay Failure report Threshold | 18.1.0 |
| 2023-03 | CT#99 | CP-230166 | 0212 | | F | Corrections to attributes not respecting the naming convention | 18.1.0 |
| 2023-03 | CT#99 | CP-230137 | 0213 | 1 | B | Support of common DNAI selection by AF | 18.1.0 |
| 2023-03 | CT#99 | CP-230161 | 0217 | | F | Update of info and externalDocs fields | 18.1.0 |
| 2023-06 | CT#100 | CP-231124 | 0215 | 2 | B | Support NWDAF assisted URSPs in Service Experience | 18.2.0 |
| 2023-06 | CT#100 | CP-231135 | 0218 | 1 | B | Prioritization of candidate DNAIs | 18.2.0 |
| 2023-06 | CT#100 | CP-231136 | 0219 | 3 | B | Indicating target AF in UP path change events | 18.2.0 |
| 2023-06 | CT#100 | CP-231125 | 0220 | 1 | B | Event muting enhancements for SMF event exposure | 18.2.0 |
| 2023-06 | CT#100 | CP-231135 | 0222 | 1 | B | Support NWDAF assisted URSPs in Service Experience | 18.2.0 |
| 2023-06 | CT#100 | CP-231135 | 0225 | 1 | B | Complete common DNAI and EAS selection | 18.2.0 |
| 2023-06 | CT#100 | CP-231127 | 0226 | 1 | B | Enhancements to WLAN performance event | 18.2.0 |
| 2023-06 | CT#100 | CP-231157 | 0227 | 1 | B | Subscription to UPF notifications via SMF | 18.2.0 |
| 2023-06 | CT#100 | CP-231132 | 0228 | 1 | F | HTTP redirection clause correction | 18.2.0 |
| 2023-06 | CT#100 | CP-231183 | 0229 | 1 | B | Support of SMF event exposure related to dynamic satellite backhaul | 18.2.0 |
| 2023-06 | CT#100 | CP-231128 | 0230 | 1 | B | Input data support of End-to-end data volume transfer time analytics | 18.2.0 |
| 2023-06 | CT#100 | CP-231141 | 0231 | | F | Update of info and externalDocs fields | 18.2.0 |
| 2023-09 | CT#101 | CP-232250 | 0233 | 2 | B | Support of the Congestion Information Monitoring | 18.3.0 |
| 2023-09 | CT#101 | CP-232085 | 0234 | | F | Update of info and externalDocs fields | 18.3.0 |
| 2023-12 | CT#102 | CP-233225 | 0232 | 3 | B | Supporting data collection for PDU Session Traffic Analytics | 18.4.0 |
| 2023-12 | CT#102 | CP-233224 | 0235 | 1 | B | Collect list of Access Types used for the PDU session from SMF | 18.4.0 |
| 2023-12 | CT#102 | CP-233224 | 0236 | 1 | B | Support of 5QI collection from SMF | 18.4.0 |
| 2023-12 | CT#102 | CP-233233 | 0237 | 1 | F | Support of the new feature name EnQoSMon | 18.4.0 |
| 2023-12 | CT#102 | CP-233239 | 0238 | | B | Supporting SMF Traffic Correlation Notification | 18.4.0 |
| 2023-12 | CT#102 | CP-233228 | 0239 | | F | Update HTTP RFC 7540 obsoleted by IETF RFC 9113 | 18.4.0 |

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|---|---|---|---|---|---|---|---|
| 2023-12 | CT#102 | CP-233249 | 0240 | | F | Corrections to the inputs of subscription to UPF events | 18.4.0 |
| 2023-12 | CT#102 | CP-233228 | 0241 | 1 | F | Update HTTP RFC 7807 obsoleted by IETF RFC 9457 | 18.4.0 |
| 2023-12 | CT#102 | CP-233254 | 0242 | 1 | A | Correction of anyUeInd attribute | 18.4.0 |
| 2023-12 | CT#102 | CP-233249 | 0243 | 1 | B | Support of explicit QoS monitoring subscription | 18.4.0 |
| 2023-12 | CT#102 | CP-233237 | 0244 | | F | Update of info and externalDocs fields | 18.4.0 |
| 2024-03 | CT#103 | CP-240158 | 0248 | | F | Clarification of feature dependency on QoSMonitoring for EnQoSMon | 18.5.0 |
| 2024-03 | CT#103 | CP-240158 | 0249 | 1 | B | indirect feature negotiation for EnQoSMon | 18.5.0 |
| 2024-03 | CT#103 | CP-240158 | 0250 | 1 | F | Corrections for congestion monitoring | 18.5.0 |
| 2024-03 | CT#103 | CP-240184 | 0252 | 1 | F | Add reference to 29.564 for direct notification from the UPF | 18.5.0 |
| 2024-03 | CT#103 | CP-240170 | 0253 | 2 | A | Corrections on QoS monitoring reports | 18.5.0 |
| 2024-03 | CT#103 | CP-240172 | 0256 | 1 | F | EAS discovery and selection correction | 18.5.0 |
| 2024-03 | CT#103 | CP-240172 | 0257 | 1 | B | User Plane Path Change notifications for HR-SBO | 18.5.0 |
| 2024-03 | CT#103 | CP-240184 | 0258 | 1 | B | Updates to UPF event subscription | 18.5.0 |
| 2024-03 | CT#103 | CP-240166 | 0259 | | F | Update of info and externalDocs fields | 18.5.0 |
| 2024-06 | CT#104 | CP-241093 | 0260 | | F | Callback correction in the Nsmf_EventExposure API | 18.6.0 |
| 2024-06 | CT#104 | CP-241091 | 0261 | 1 | B | Access type change for MA PDU session update | 18.6.0 |
| 2024-06 | CT#104 | CP-241114 | 0263 | | F | AoI based search feature dependency | 18.6.0 |
| 2024-06 | CT#104 | CP-241101 | 0264 | 1 | F | Missing applicable feature | 18.6.0 |
| 2024-06 | CT#104 | CP-241087 | 0265 | | B | UP path change notification for HR-SBO | 18.6.0 |
| 2024-06 | CT#104 | CP-241087 | 0266 | | F | Corrections on traffic correlation notify | 18.6.0 |
| 2024-06 | CT#104 | CP-241093 | 0267 | 1 | F | Corrections on presence condition | 18.6.0 |
| 2024-06 | CT#104 | CP-241114 | 0268 | | F | Support of UPF event subscribe | 18.6.0 |
| 2024-06 | CT#104 | CP-241091 | 0270 | 2 | B | Updates to support E2E data volume transfer time analytics | 18.6.0 |
| 2024-06 | CT#104 | CP-241077 | 0271 | 1 | B | Support QoS Sustainability in a fine granularity area | 18.6.0 |
| 2024-06 | CT#104 | CP-241129 | 0274 | 1 | A | Wrong attribute name | 18.6.0 |
| 2024-06 | CT#104 | CP-241095 | 0275 | | F | Implicit subscription to PacketDelayFailureReport feature | 18.6.0 |
| 2024-06 | CT#104 | CP-241092 | 0276 | 1 | F | Unused feature removal | 18.6.0 |
| 2024-06 | CT#104 | CP-241088 | 0277 | 1 | F | Applicability of User Plane Path Change event | 18.6.0 |
| 2024-06 | CT#104 | CP-241085 | 0280 | | F | Update of info and externalDocs fields | 18.6.0 |
| 2024-09 | CT#105 | CP-242122 | 0282 | | F | Removal of incorrect NOTE for QoS Monitoring report | 18.7.0 |
| 2024-09 | CT#105 | CP-242119 | 0283 | | F | Corrections on collecting the UPF information from the SMF | 18.7.0 |
| 2024-12 | CT#106 | CP-243093 | 0287 | | F | Correction of wrong attribute | 18.8.0 |
| 2024-12 | CT#106 | CP-243122 | 0290 | 1 | A | Corrections on the support of SNPN | 18.8.0 |
| 2024-12 | CT#106 | CP-243132 | 0301 | 1 | F | User Plane event subscription with intermediate SMF | 18.8.0 |
| 2024-12 | CT#106 | CP-243146 | 0306 | | F | Update of info and externalDocs fields | 18.8.0 |
| 2025-03 | CT#107 | CP-250089 | 0316 | | A | Corrections on the WLAN information | 18.9.0 |
| 2025-03 | CT#107 | CP-250128 | 0320 | | F | Update of info and externalDocs fields | 18.9.0 |

# History

| Document history | | |
|---|---|---|
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