**3GPP TSG- Meeting #**

**E-Meeting, -**

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| --- |
| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  |  | **CR** |  | **rev** |  | **Current version:** |  |  |
|  |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **X** |

|  |
| --- |
|  |
| ***Title:***  | New event for SM congestion control experience |
|  |  |
| ***Source to WG:*** | LG Electronics, Ericsson |
| ***Source to TSG:*** | C3 |
|  |  |
| ***Work item code:*** |  |  | ***Date:*** |  |
|  |  |  |  |  |
| ***Category:*** |  |  | ***Release:*** |  |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
|  |  |
| ***Reason for change:*** | In clause 5.2.8.3.1 of TS 23.502, event "Session Management Congestion Control Experience for PDU Session" is defined for Nsmf\_EventExposure service to support SM congestion control experience analytics defined in clause 6.12 of TS 23.288. |
|  |  |
| ***Summary of change:*** | Enhance the Nsmf\_EventExposure service to define new feature and new event for SM congestion control experience for PDU Session based on clause 6.12.2 of TS 23.288. |
|  |  |
| ***Consequences if not approved:*** | Stage 2 requirements on SMF supporting data collection for Session Management Congestion Control Experience Analytics is not fulfilled. |
|  |  |
| ***Clauses affected:*** | 2, 3.2, 4.1.1, 4.2.2.2, 4.2.3.2, 5.6.1, 5.6.2.4, 5.6.2.5, 5.6.2.Y (new), 5.6.2.Z (new), 5.8, 5.6.3.3, 5.6.3.m (new) A.2 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** | This CR introduces backward compatible feature into the OpenAPI file for Nsmf\_EventExposure API. |
|  |  |
| ***This CR's revision history:*** |  |

\* \* \* \* Start of 1st Change \* \* \* \*

# 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 7540: "Hypertext Transfer Protocol Version 2 (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 7807: "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".

[TS29122] 3GPP TS 29.122: "T8 reference point for Northbound APIs".

\* \* \* \* Start of Next Change \* \* \* \*

## 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

DDD Downlink Data Delivery

DNAI DN Access Identifier

DNN Data Network Name

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

NRF Network Repository Function

NSSAI Network Slice Selection Assistance Information

NWDAF Network Data Analytics Function

SMCC Session Management Congestion Control

SMF Session Management Function

SUPI Subscription Permanent Identifier

S-NSSAI Single Network Slice Selection Assistance Information

PCF Policy Control Function

PRA Presence Reporting Area

QFI QoS Flow Identifier

UDM Unified Data Management

UPF User Plane Function

V-SMF Visited SMF

\* \* \* \* Start of Next Change \* \* \* \*

### 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 consumer NF service consumers to subscribe and unsubscribe for events on a PDU session; and

- notifies consumer NF service consumers with a corresponding subscription about observed events on the PDU session.

The types of observed events applicable for (H-)SMF 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 (for non-roaming);

- UE IP address/prefix change;

- QFI allocation;

- QoS monitoring; and/or

- SM congestion control experience for PDU Session.

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

- Downlink data delivery status.

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

- Downlink data delivery status.

\* \* \* \* Start of Next Change \* \* \* \*

#### 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 "downlink data delivery status" feature,

- the event "downlink data delivery status" 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 PDUsession or derive the PDR from the PCC rule received from the PCF as defined in subclause 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 subclause 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 as defined in subclause 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 subclause 4.2.3.25 of 3GPP TS 29.512 [14], as "notifId" 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; and

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

NOTE 1: 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 subclause 4.2.6.2.6.2 of 3GPP TS 29.512 [14]).

NOTE 2: If the DNAI is not changed while the N6 traffic routing information change, the source DNAI and target DNAI are not provided.

NOTE 3: 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 release PDU session as "dnn" attribute, if the "PduSessionStatus" feature is supported;

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

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;

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;

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:

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:

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

12. for QoS Monitoring:

a) one or two uplink packet delays within the "ulDelays" attribute; or

b) one or two downlink packet delays within the "dlDelays" attribute; or

c) one or two round trip packet delays within the "rtDelays" attribute.

NOTE 4: 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 subclause 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 release PDU session as "dnn" attribute;

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

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;

14. for a QFI allocation:

a) QFI of the allocated QoS Flow ID for the application as "qfi" 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;

15. for an RAT type change:

a) new RAT type as "ratType" attribute;

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

a) DNN of the release PDU session as "dnn" attribute;

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

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

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

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

- 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 5: 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 NF service consumer shall send an HTTP "204 No Content" response for a successful processing.

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

If the feature "ES3XX" is not supported and,

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

NOTE 6: An AMF as NF service consumer 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 NF service consumer determines the received HTTP POST request needs to be redirected, the NF service consumer shall send an HTTP redirect response as specified in subclause 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.

\* \* \* \* Start of Next Change \* \* \* \*

#### 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, 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 change, whether the subscription is for early, late, or early and late notifications of UP path reconfiguration in the "dnaiChgType" attribute;

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

and that may include:

a) for event "downlink data delivery status", the subscribed delivery statuses in the "dddStati" attribute;

b) for event "QFI allocation", the application identifiers in the "appIds" attribute; and

c) for event "SM congestion control experience for PDU Session", the data collection target period in the "targetPeriod" attribute.

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;

- 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; and/or

- a notification flag as "notifFlag" attribute if the EneNA feature is supported.

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;

- 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 "ImmeRep" attribute is included and set to true in the request, the SMF shall report the current available value(s) for the subscribed event(s) as defined in subclause 4.2.3.1;

- 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 subclause 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.

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.

\* \* \* \* Start of Next Change \* \* \* \*

### 5.6.1 General

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

Table 5.6.1-1 specifies the data types defined for the Nsmf\_EventExposure service based interface protocol.

Table 5.6.1-1: Nsmf\_EventExposure specific Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Section defined | Description | Applicability |
| 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. |  |
| 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. |  |
| AckOfNotify | 5.6.2.7 | Acknowledgement information of event notification |  |
| SmNasFromUe | 5.6.2.Y | Describes the information of the SM NAS requests from UE |  |
| SmNasFromSmf | 5.6.2.Z | Describes the information of the SM NAS messages from SMF with backoff timer |  |

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 |
| 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 |
| CommunicationFailure | 3GPP TS 29.518 [13] | Represents the communication failure information. | CommunicationFailure |
| 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 29.510 [12] | FQDN |  |
| Gpsi | 3GPP TS 29.571 [11] |  |  |
| GroupId | 3GPP TS 29.571 [11] |  |  |
| Guami | 3GPP TS 29.571 [11] | Globally Unique AMF Identifier |  |
| 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. |  |
| 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 |
| PlmnId | 3GPP TS 29.571 [11] |  |  |
| ProblemDetails | 3GPP TS 29.571 [11] |  |  |
| Qfi | 3GPP TS 29.571 [11] | QoS flow identifier. | QfiAllocation |
| RatType | 3GPP TS 29.571 [11] |  |  |
| 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. |  |
| ServiceName | 3GPP TS 29.510 [12] | Name of the service instance. |  |
| Snssai | 3GPP TS 29.571 [11] | S-NSSAI | QfiAllocation |
| 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 [TS29122] | A start time and a stop time of a time window. | SMCongestion |
| Uinteger | 3GPP TS 29.571 [11] |  |  |
| Uri | 3GPP TS 29.571 [11] |  |  |

\* \* \* \* Start of Next Change \* \* \* \*

#### 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. |  |
| dddTraDescriptors | array(DddTrafficDescriptor) | C | 1..N | The traffic descriptor(s) of the downlink data source. Shall be included for event "downlink data delivery status". | DownlinkDataDeliveryStatus |
| dddStati | array(DlDataDeliveryStatus) | O | 1..N | May be included for event "downlink data delivery status". 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 allocation". | QfiAllocation |
| targetPeriod | TimeWindow | O | 0..1 | Indicates the data collection target period.May be included for event "SM congestion control experience for PDU Session". | SMCongestion |

\* \* \* \* Start of Next Change \* \* \* \*

#### 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. |  |
| 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. |  |
| 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". |  |
| 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 | PlmnId | C | 0..1 | New PLMN ID. Shall be included for event "PLMN\_CH". |  |
| accType | AccessType | C | 0..1 | New Access Type. Shall be included for event "AC\_TY\_CH". |  |
| 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 "downlink data delivery status", | DownlinkDataDeliveryStatus |
| maxWaitTime | DateTime | C | 0..1 | The estimated maximum waiting time for downlink data delivery, Shall be included for event "downlink data delivery status" 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 "downlink data delivery status" | 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 feature is supported. | PduSessionStatus |
| qfi | Qfi | C | 0..1 | QoS flow identifier. Shall be included for event "QFI\_ALLOC". | QfiAllocation |
| appId | ApplicationId | O | 0..1 | Contains the application identifier. May be included for event "QFI\_ALLOC". (NOTE 4) | QfiAllocation |
| 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 |
| 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". | QfiAllocation, PduSessionStatus |
| snssai | Snssai | C | 0..1 | Identifies the slice information. Shall be included for event "QFI\_ALLOC". | QfiAllocation |
| ulDelays | array(Uinteger) | O | 1..N | Uplink packet delay in units of milliseconds. (NOTE 5) | QoSMonitoring |
| dlDelays | array(Uinteger) | O | 1..N | Downlink packet delay in units of milliseconds. (NOTE 5) | QoSMonitoring |
| rtDelays | array(Uinteger) | O | 1..N | Round trip delay in units of milliseconds. (NOTE 5) | QoSMonitoring |
| 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". | SMCongestion |
| 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". | SMCongestion |
| 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". | SMCongestion |
| 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 or fDescs shall be provided. NOTE 5: In this release of the specification the maximum number of elements in the array is 2. If more than one value is received at one given point of time for UL packet delay, DL packet delay or round trip packet delay respectively, the SMF reports the minimum and maximum packet delays to the NEF/AF. |

\* \* \* \* Start of Next Change \* \* \* \*

#### 5.6.2.Y Type SmNasFromUe

Table 5.6.2.Y-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. |  |

\* \* \* \* Start of Next Change \* \* \* \*

#### 5.6.2.Z Type SmNasFromSmf

Table 5.6.2.Z-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. |  |

\* \* \* \* Start of Next Change \* \* \* \*

#### 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 | SMCongestion |

\* \* \* \* Start of Next Change \* \* \* \*

#### 5.6.3.m Enumeration: AppliedSmccType

Table 5.6.3.m-1: Enumeration AppliedSmcctype

|  |  |  |
| --- | --- | --- |
| Enumeration value | Description | Applicability |
| DNN\_CC | Indicates the DNN based congestion control. |  |
| SNSSAI\_CC | Indicates the S-NSSAI based congestion control. |  |

\* \* \* \* Start of Next Change \* \* \* \*

## 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 subclause 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. |
| 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 subclauses 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 subclause 6.10.9 of 3GPP TS 29.500 [4].  |
| 7 | EneNA | This feature indicates support for the enhancements of network data analytics requirements. |
| 8 | EnEDGE | This feature indicates support for Enhancement of Edge Computing. |
| m | SMCongestion | This feature indicates support for Session Management Congestion Control Experience for PDU Session. |

\* \* \* \* Start of Next Change \* \* \* \*

# A.2 Nsmf\_EventExposure API

openapi: 3.0.0

info:

 version: 1.2.0-alpha.3

 title: Nsmf\_EventExposure

 description: |

 Session Management Event Exposure Service.

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externalDocs:

 description: 3GPP TS 29.508 V17.4.0; 5G System; Session Management Event Exposure Service.

 url: http://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 subclause 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'

 '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'

 '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'

 '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'

 '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'

 '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'

 '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'

 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: 'TS29510\_Nnrf\_NFManagement.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

 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'

 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

 targetPeriod:

 $ref: 'TS29122\_CommonData.yaml#/components/schemas/TimeWindow'

 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'

 sourceDnai:

 $ref: 'TS29571\_CommonData.yaml#/components/schemas/Dnai'

 targetDnai:

 $ref: 'TS29571\_CommonData.yaml#/components/schemas/Dnai'

 dnaiChgType:

 $ref: 'TS29571\_CommonData.yaml#/components/schemas/DnaiChangeType'

 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/PlmnId'

 accType:

 $ref: 'TS29571\_CommonData.yaml#/components/schemas/AccessType'

 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'

 qfi:

 $ref: 'TS29571\_CommonData.yaml#/components/schemas/Qfi'

 appId:

 $ref: 'TS29571\_CommonData.yaml#/components/schemas/ApplicationId'

 ethfDescs:

 type: array

 items:

 $ref: 'TS29514\_Npcf\_PolicyAuthorization.yaml#/components/schemas/EthFlowDescription'

 minItems: 1

 maxItems: 2

 fDescs:

 type: array

 items:

 $ref: 'TS29514\_Npcf\_PolicyAuthorization.yaml#/components/schemas/FlowDescription'

 minItems: 1

 maxItems: 2

 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

 timeWindow:

 $ref: 'TS29122\_CommonData.yaml#/components/schemas/TimeWindow'

 smNasFromUe:

 $ref: '#/components/schemas/SmNasFromUe'

 smNasFromSmf:

 $ref: '#/components/schemas/SmNasFromSmf'

 required:

 - event

 - timeStamp

 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

 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

 - type: string

 description: >

 This string provides forward-compatibility with future

 extensions to the enumeration but is not used to encode

 content defined in the present version of this API.

 description: >

 Possible values are

 - 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

 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 but is not used to encode

 content defined in the present version of this API.

 description: >

 Possible values are

 - PERIODIC

 - ONE\_TIME

 - ON\_EVENT\_DETECTION

 AppliedSmccType:

 - type: string

 enum:

 - DNN\_CC

 - SNSSAI\_CC

 description: >

 This string indicates the applied SM congestion control.

 description: >

 Possible values are

 - DNN\_CC: Indicates the DNN based congestion control.

 - SNSSAI\_CC: Indicates the S-NSSAI based congestion control.

\* \* \* \* End of Changes \* \* \* \*