**3GPP TSG-CT WG3 Meeting #142 *C3-253611***

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
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|  |  | **CR** |  | **rev** | **1** | **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** |

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| --- |
|  |
| ***Title:***  | SMF  |
|  |  |
| ***Source to WG:*** | Ericsson, Nokia |
| ***Source to TSG:*** | CT3 |
|  |  |
| ***Work item code:*** | , ReP\_UDR |  | ***Date:*** | 2025-08-27 |
|  |  |  |  |  |
| ***Category:*** |  |  | ***Release:*** | Rel-19 |
|  | *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-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19) Rel-20 (Release 20)* |
|  |  |
| ***Reason for change:*** | In release 17, Stage-2 introduced a new flag (udrRestartInd) sent by UDM consumers towards UDM which is used during the resynchronization phase to avoid the creation of already existing Event Exposure subscriptions. That was included in CR#0046 on TS 23.527. This Stage-2 requirement was translated into the introduction of a new flag in Nudm\_EventExposure service in TS 29.503.However, some UDM Event Exposure subscriptions may imply the creation of an Event Exposure subscription in SMF too. If Event Exposure subscriptions are not locally stored in UDR, no UDM Event Exposure subscription will exist, UDM subscription will be created triggering SMF Event Exposure subscription, but this subscription may already exist in SMF.So far, the restoration of SMF Event Exposure subscription context is not yet covered and duplicated subscriptions can be created in SMF.Furthermore, a similar change request (CR #1209) was recently approved in 29.518 by CR4 to cover the same scenario but in AMF.. |
|  |  |
| ***Summary of change:*** | In the subscription request it is added a new indication to inform about whether the request is sent as a consequence of a restoration procedure, so to allow the SMF to identify whether the required EE subs may already exist, in order to avoid the creation of a duplicated EE subscription. |
|  |  |
| ***Consequences if not approved:*** | SMF Event Exposure subscriptions may be duplicated, causing duplicated notification that may be wrongly interpreted. |
|  |  |
| ***Clauses affected:*** | 4.2.3.2, 5.6.2.2, 5.8, 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 to the following APIs:TS29508\_Nsmf\_EventExposure.yaml |
|  |  |
| ***This CR's revision history:*** |  |

\*\*\* 1st 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, 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;

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;

i) for event "ENERGY\_USAGE\_DATA", the UE Identity within "supi" attribute, and/or the S-NSSAI within the "snssai" attribute and the corresponding DNN information within the "dnn" attribute, and/or the Application Identifier in the "appIds" of the application or the service data flow information within the "flowDescs" for which the uplink/downlink data volume information is collected and notified;

j) for "SIGNALLING\_INFO" event, the time windows for which the NF service consumer is requesting to receive signalling information in the "tws" attribute if the "SignallingInfo" feature is supported; and/or

k) a reference identifier within the "referenceId" attribute, if the "EnhEventMgmt" feature is supported.

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].

NOTE 3: The user-plane energy consumption information reporting interval from the SMFs is the PLMN-wide configurable starting time and interval T.

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 4: 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;

NOTE 5: 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.

- 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;

- group reporting guard time as "grpRepTime" attribute;

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

- notification muting exception instructions within the "notifFlagInstruct" attribute, if the EnhDataMgmt feature is supported and the "notifFlag" attribute is provided and set to "DEACTIVATE"; and/or

- UDR Restart Indication as "udrRestartInd" attribute; if the "UDRRestProc" 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;

- 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;

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.

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

- if the feature "EnUPEAS" is supported, and the "remainingDataReports" attribute within the"upfEvents" attribute is provided, the SMF shall forward the remaining data reporting indication to the UPF for the respective UPF events as described in 3GPP TS 29.564 [26].

- 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"; and

- if the "UDRRestProc" feature is supported, the "udrRestartInd" attribute was provided and set to "true" in the corresponding request and the SMF determines that there is an existing identical "Individual SMF Notification Subscription" resource, then no new subscription is created and the SMF shall return within the response body of HTTP "201 Created" status code with NsmfEventExposure data structure as response body including the representation of this existing identical resource, and a Location header field containing the URI of this existing identical resource.

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.

\*\*\* 2 nd Change \*\*\*

#### 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) (NOTE 8) (NOTE 9) |  |
| gpsi | Gpsi | C | 0..1 | Generic Public Subscription Identifier (NOTE 1) (NOTE 8)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:- "true": the event subscription is applicable to any UE;- "false"(default): the event subscription is not applicable to any UE. (NOTE 1) (NOTE 4) (NOTE 7) |  |
| groupId | GroupId | C | 0..1 | Identifies a group of UEs. (NOTE 1) |  |
| pduSeId | PduSessionId | C | 0..1 | PDU session ID (NOTE 1) |  |
| dnn | Dnn | C | 0..1 | Data Network Name.(NOTE 9) |  |
| snssai | Snssai | C | 0..1 | A single Network Slice Selection Assistance Information.(NOTE 4) (NOTE 9) |  |
| 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.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.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 | Indicates whether immediate reporting of the current status of the subscribed event. Set to "true": it is requested that the current status of the subscribed event is immediately reported.- Set to "false": the current status of the subscribed event is not requested to be immediately reported.- Default value is "false" if omitted.(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.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.- Set to "true": NF service consumer requests to receive QoS Flow performance information for the QoS Flow associated with the default QoS rule.- Set to "false": NF service consumer does not request to receive QoS Flow performance information for the QoS Flow associated with the default QoS rule.- Default value is "false" if omitted. | UPEAS |
| qosMonPending | boolean | O | 0..1 | Indicates whether the reporting will be activated when the measurements are enabled by a PCC rule.- Set to "true": 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. | UPEAS |
| udrRestartInd | boolean | O | 0..1 | Indicates whether the Event Exposure subscription was initiated by the UDM due to a UDR restart.- "true" indicates that the subscription creation request message is sent by the UDM due to UDR data restoration. Therefore, the Event Exposure Subscription may already exist at the SMF.- "false" indicates that this subscription message is not motivated by a UDR data restoration procedure.- The default value is "false" if this attribute is omitted. | UDRRestProc |
| 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, the value of the "notifId" attribute shall be set to the same value as the value of the "notifyCorrelationId" attribute received from the AF/NEF as defined in subclause 6.4.6.2.2 of 3GPP TS 29.503 [30].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.NOTE 7: When the "anyUeInd" attribute is present and set to "true", the SMF does not consider the PDU Session(s) for which it is acting as I-SMF when it selects the PDU Session(s).NOTE 8: Void.NOTE 9: If the "Energy" feature is supported, the "supi" attribute or the "snssai" attribute and the corresponding "dnn" attribute shall be provided for the "ENERGY\_USAGE\_DATA" event. |

\*\*\* 3 rd 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 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)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) |
| 34 | EnUPEAS | This feature indicates the support of UPF enhancements for exposure during UPF relocation and PDU Session release.The following functionalities are supported:- provision the remaining data reporting indication for the UPF\_EVENT event type.This feature requires that UPEAS feature is supported. |
| 35 | TraffRouteReqOutcome | This feature indicates the support for reporting the installation outcome of the requested traffic routing requirements. (NOTE 1) |
| 36 | UeSatUeComm | This feature indicates the support of reporting about serving satellite identity for UE-Satellite-UE communication in IMS. |
| 37 | SimConnFailure | This feature indicates the support of Simultaneous Connectivity failure events. (NOTE 1) |
| 38 | QoSAssistance | This feature indicates the support of QFI deallocation and QoS flow change events.This feature requires the support of the EnQfiAllocation feature. |
| 39 | Energy | This feature indicates the support of provisioning the energy consumption information. |
| 40 | SignallingInfo | This feature indicates the support of signalling information events. |
| 41 | EnhEventMgmt | This feature indicates the support of enhanced event management.The following functionalities are supported:- supporting the reference Id per event. |
| 42 | UDRRestProc | This feature indicates the support of UDR Restoration Procedures.The following functionalities are supported:- Supporting the provisioning of the UDR Restart Indication. |
| 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].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.NOTE 3: The negotiation of this feature may be explicit (via Nsmf\_EventExposure\_Subscribe service operation) or implicit as described in NOTE 1.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. |

\*\*\* 4 th Change \*\*\*

# A.2 Nsmf\_EventExposure API

openapi: 3.0.0

info:

 version: 1.4.0-alpha.3

 title: Nsmf\_EventExposure

 description: |

 Session Management Event Exposure Service.

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externalDocs:

 description: 3GPP TS 29.508 V19.3.0; 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}:

 parameters:

 - name: subId

 in: path

 description: Event Subscription ID

 required: true

 schema:

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

 get:

 operationId: GetIndividualSubcription

 summary: Read an individual subscription for event notifications from the SMF

 tags:

 - IndividualSubscription (Document)

 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'

 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)

 responses:

 '200':

 description: OK. Resource was successfully deleted and representation is returned

 content:

 application/json:

 schema:

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

 '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. Set to "true" if NF service consumer requests to receive QoS Flow

 performance information for the QoS Flow associated with the default QoS rule, otherwise

 Set to "false" to indicate if NF service consumer does not request to receive QoS Flow

 Performance information for the QoS Flow associated with the default QoS rule. Default

 value is "false" if omitted.

 qosMonPending:

 type: boolean

 enum:

 - true

 description: >

 Indicates whether the reporting will be activated when the measurements are

 enabled by a PCC rule. Set to "true" indicates that the reporting will be activated.

 It may only be provided in the response.

 udrRestartInd:

 type: boolean

 default: false

 description: >

 Indicates whether the Event Exposure subscription was initiated by the UDM due to a UDR

 restart.

 true" indicates that the subscription creation request message is sent by the UDM due to

 UDR data restoration. Therefore, the Event Exposure Subscription may already exist at the

 SMF.

 false indicates that this subscription message is not motivated by a UDR data restoration

 procedure.

 The default value is "false" if this attribute is omitted

 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'

 referenceId:

 $ref: 'TS29503\_Nudm\_EE.yaml#/components/schemas/ReferenceId'

 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'

 tws:

 type: array

 items:

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

 minItems: 1

 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

 flowDescs:

 type: array

 items:

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

 description: Descriptor(s) of IP traffic.

 minItems: 1

 required:

 - event

 EventNotification:

 description: Represents a notification related to a single event that occurred.

 type: object

 properties:

 event:

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

 referenceId:

 $ref: 'TS29503\_Nudm\_EE.yaml#/components/schemas/ReferenceId'

 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'

 traffRouteReqOutcome:

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

 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 "false" if omitted.

 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. Default value is false

 if omitted.

 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'

 servSatId:

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

 qosPara:

 $ref: 'TS29520\_Nnwdaf\_EventsSubscription.yaml#/components/schemas/QosPara'

 dataVolInfos:

 type: array

 items:

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

 minItems: 1

 usageInfo:

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

 loadInfos:

 type: array

 items:

 $ref: 'TS29520\_Nnwdaf\_EventsSubscription.yaml#/components/schemas/NfLoadLevelInformation'

 minItems: 1

 numSessRep:

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

 stateTransitions:

 type: array

 items:

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

 minItems: 1

 nfSignalInfo:

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

 required:

 - event

 - timeStamp

 not:

 required: [ipv6Prefixes,ipv6Addrs]

 StateTransitionInfo:

 description: Represents session-related state transition information.

 type: object

 properties:

 supi:

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

 groupId:

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

 transType:

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

 numOfTran:

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

 pctUes:

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

 required:

 - transType

 allOf:

 - oneOf:

 - required: [supi]

 - required: [groupId]

 - anyOf:

 - required: [numOfTran]

 - required: [pctUes]

 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'

 remoteImsAddress:

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

 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]

 TraffRouteReqOutcome:

 description: >

 Represents the installation outcome of the requested traffic routing requirements.

 type: object

 properties:

 succTrafficFlows:

 type: array

 items:

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

 minItems: 1

 succEthTrafficFlows:

 type: array

 items:

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

 minItems: 1

 failedTrafficFlows:

 type: array

 items:

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

 minItems: 1

 failedEthTrafficFlows:

 type: array

 items:

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

 minItems: 1

 allOf:

 - not:

 required: [succTrafficFlows, succEthTrafficFlows]

 - not:

 required: [failedTrafficFlows, failedEthTrafficFlows]

 DataVolumeInformation:

 description: Represents the Data Volume information.

 type: object

 properties:

 dataVol:

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

 upfIds:

 type: array

 items:

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

 minItems: 1

 gNBId:

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

 required:

 - dataVol

 - upfIds

 - gNBId

 IpAddrUsageInfo:

 description: Indicates the usage information of UE IP address resources.

 type: object

 properties:

 ipv4AllocNum:

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

 Ipv6AllocNum:

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

 ipv4Usage:

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

 Ipv6Usage:

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

 UeIpNum:

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

 prohibitTimeWins:

 type: array

 items:

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

 minItems: 1

 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

 - TRAFF\_ROUTE\_REQ\_OUTCOME

 - SIM\_CONN\_FAIL

 - QFI\_DEALLOCATION

 - QOS\_FLOW\_CHANGE

 - ENERGY\_USAGE\_DATA

 - SIGNALLING\_INFO

 - 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.

 - TRAFF\_ROUTE\_REQ\_OUTCOME: Indicates the report of the installation outcome of the requested

 traffic routing requirements.

 - SIM\_CONN\_FAIL: Indicates that the simultaneous connectivity over the source and the target

 PDU Session Anchor failed to be established during a PDU Session Anchor change.

 - QFI\_DEALLOCATION: QFI deallocation.

 - QOS\_FLOW\_CHANGE: QoS flow change.

 - ENERGY\_USAGE\_DATA: Indicates that the SMF provides user-plane energy consumption

 information.

 - SIGNALLING\_INFO: Indicates the report of Service Signalling characteristics.

 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: 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.

 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.

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