**3GPP TSG-CT WG3 Meeting #137 *C3-245362r1***

**Hefei, CN, 14 - 18 October, 2024 (Revision of C3-245362)**

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **29.508** | **CR** | **1418** | **rev** | **1** | **Current version:** | **19.0.0** |  |
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| *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:*** | Updates for UPF event subscription via SMF | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Ericsson | | | | | | | | | |
| ***Source to TSG:*** | CT3 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | UPEAS\_Ph2 | | | | |  | ***Date:*** | | | 2024-09-16 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***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 can be 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:*** | | TS 23.501 clause 5.8.2.17 updated with An NF consumer may subscribe to the UPF Event Exposure service directly if target of data collection is a UE IP address and not including AoI, BSSID/SSID and DNAI, which in UPEAS needs to be subscribed via SMF:  5.8.2.17 Data exposure via Service Based interface  The UPF may expose information by means of UPF Event Exposure service as described in TS 23.502 [3] clause 5.2.26.2, via a service-based interface directly. The NF consumers, which may receive UPF event notifications, are AF/NEF, TSNAF/TSCTSF and NWDAF/DCCF/MFAF.  When the UPF supports the data exposure via the service based interface, it may register its NF profile to the NRF including the UPF Event Exposure services and the related Event ID(s).  For data collection from UPF (see clause 4.15.4.5 of TS 23.502 [3]), NF consumers can do the subscription to the UPF either directly or indirectly via SMF. An NF consumer may subscribe to the UPF Event Exposure service directly if target of data collection is "any UE", e.g. to collect user data usage information for NWDAF NF Load analytics (see clause 6.5 of TS 23.288 [86] or if target of data collection is a UE IP address,) and if the subscription is not including any of the following parameters: AoI, BSSID/SSID and DNAI. Otherwise the NF consumer shall subscribe indirectly via SMF.  also the UPF event subscription via SMF for any UE with AoI, BSSID/SSID and DNAI is not specified in the same procedure in clauses 4.2.3.2 and 5.6.2.2 in this TS, hence needs to updated the corresponding procedure and NsmfEventExposure condition note together in this TS. | | | | | | | | |
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| ***Summary of change:*** | | Clause 4.2.3.2, adding procedure on not targeting an UE IP address, and/or supporting any of "networkArea", "dnai", "ssid" and/or "bssid" attributes as condition for UPF event subscription via SMF.  Clause 5.6.2.2, update the condition aligned with updates in clause 4.2.3.2. | | | | | | | | |
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| ***Consequences if not approved:*** | | Not aligned with stage 2 conditional requirements on UPF event subscription via SMF with any UE together with AoI, BSSID/SSID and DNAI.  The table Note1 condition of "or anyUeInd set to true shall be included" is incorrect not aligned with stage 2 allowed direct UPF event subscription, will arouse implment/deployment issue and not effective signalling procedure. | | | | | | | | |
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| ***Clauses affected:*** | | 4.2.3.2, 5.6.2.2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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 does not impact the OpenAPI files. | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

**Additional discussion(if needed):**

**Proposed changes:**

\*\*\* 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 or not targeting an UE IP address, and/or supporting any of "networkArea", "dnai", "ssid" and/or "bssid" attributes, the Network Function instance identity if "UPEAS" feature is supported and the "eventSubs" attribute contains an entry with the "event" set to the value "UPF\_EVENT", and identification of UEs to which the subscription applies via:

a) identification of a single UE by SUPI as "supi" attribute or GPSI as "gpsi" attribute;

b) identification of a group of UE(s) via a "groupId" attribute; or

c) identification of any UE via the "anyUeInd" attribute set to true;

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

- an URI where to receive the requested notifications as "notifUri" attribute;

- a Notification Correlation Identifier provided by the NF service consumer for the requested notifications as "notifId" attribute; and

- if the NF service consumer is an AMF, the GUAMI encoded as "guami" attribute:

- a description of the subscribed events as "eventSubs" attribute that for each event shall include:

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

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

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

and that may include:

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

b) for event "QFI\_ALLOC" or "DISPERSION", the application identifiers in the "appIds" attribute;

c) for event "SMCC\_EXP", the data collection target period in the "targetPeriod" attribute;

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

e) for event "WLAN\_INFO", the data collection target period in the "targetPeriod" attribute;

f) for event "RED\_TRANS\_EXP", the data collection target period in the "targetPeriod" attribute;

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

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

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

The NsmfEventExposure data structure as request body may also include:

- if the NF service consumer is an AMF:

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

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

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

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

- a Data Network Name as "dnn" attribute;

- a single Network Slice Selection Assistance Information as "snssai" attribute;

- an identification of network area by "networkArea" attribute, if the feature AreaFilter or the feature UPEAS is supported and the "anyUeInd" attribute is provided and set to true;

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

- a Data Network Identifier as "dnai" attribute, if the feature UPEAS is supported;

- the SSID that the PDU session is related to as "ssid" attribute, if the feature UPEAS is supported;

- the BSSID that the PDU session is related to as "bssid" attribute, if the feature UPEAS is supported;

- the UPF identifier as "upfId" attribute, if the feature UPEAS is supported;

- immediate reporting flag as "ImmeRep" attribute;

- event notification method (periodic, one time, on event detection) as "notifMethod" attribute;

- maximum Number of Reports as "maxReportNbr" attribute;

- monitoring Duration as "expiry" attribute;

- repetition Period for periodic reporting as "repPeriod" attribute;

- sampling ratio as "sampRatio" attribute;

- partitioning criteria for partitioning the UEs before performing sampling as "partitionCriteria" attribute if the EneNA feature is supported; and/or

- group reporting guard time as "grpRepTime" attribute;

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

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

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

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

- create a new subscription;

- assign a subscription correlation ID;

- select an expiry time that is equal to or less than the expiry time potentially received in the request;

- store the subscription;

- if the feature "UPEAS" is supported, and if the NF service consumer subscribed to "QOS\_MON" event, the SMF shall check if there is an active PCC rule that includes a Data Collection Application Identifier as described in 3GPP TS 29.512 [14] that matches the Application Identifier received within "appIds" attribute. If there is an active PCC rule, the SMF shall allow the NF service consumer to receive QoS monitoring reports enabled by that PCC rule. If no PCC rule is identified and the "defQosSupp" attribute was received and set to true, the SMF may instruct the UPF to perform QoS monitoring for the QoS Flow associated to the default QoS rule as described in 3GPP TS 29.244 [23]. If no PCC rule is identified and the "defQosSupp" attribute was received and set to false or not received, the SMF may, based on local configuration, reject the request by sending the NO\_ACTIVE\_PCC\_RULE error described in clause 5.7 or include the "qosMonPending" indication set to true in the response to inform the NF service consumer that the reporting will be activated when the measurements are enabled by a PCC rule;

- if the feature "UPEAS" is supported and the "upfEvents" attribute is provided together with the "networkArea" attribute in the EventSubscription data type, the SMF shall subscribe to the UPF for the respective UPF events as described in 3GPP TS 29.564 [26] only when the UE is located in the indicated area. When the UE leaves the indicated area, the SMF shall unsubscribe those events from the UPF as described in 3GPP TS 29.564 [26].

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

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

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

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

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

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

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

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

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

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

\*\*\* 2nd 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) |  |
| gpsi | Gpsi | C | 0..1 | Generic Public Subscription Identifier (NOTE 1)  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) |  |
| groupId | GroupId | C | 0..1 | Identifies a group of UEs. (NOTE 1) |  |
| pduSeId | PduSessionId | C | 0..1 | PDU session ID (NOTE 1) |  |
| dnn | Dnn | O | 0..1 | Data Network Name. |  |
| snssai | Snssai | O | 0..1 | A single Network Slice Selection Assistance Information. (NOTE 4) |  |
| dnai | Dnai | O | 0..1 | Data network access identifier.  (NOTE 1) | UPEAS |
| ssId | string | O | 0..1 | SSID that the PDU session is related to.  (NOTE 1) | UPEAS |
| bssId | string | O | 0..1 | BSSID that the PDU session is related to.  (NOTE 1) | 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 1) (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 | It is included and set to true if the immediate reporting of the current status of the subscribed event, if available is required.  (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.  True: NF service consumer requests to receive QoS Flow performance information for the QoS Flow associated with the default QoS rule.  False (default): NF service consumer does not request to receive QoS Flow performance information for the QoS Flow associated with the default QoS rule. | UPEAS |
| qosMonPending | boolean | O | 0..1 | Indicates that the reporting will be activated when the measurements are enabled by a PCC rule. It shall be always set to true when present.  It may only be provided in the response.  Default value is false. | UPEAS |
| NOTE 1: If the event subscription applies for a specific PDU session, the PDU session of a single UE (pduSeId, and gpsi/supi) shall be included; otherwise one and only one of a single UE (gpsi/supi), a group of UEs (groupId), or anyUeInd set to true together with any of "dnai", "ssId", "bssId" attributes and/or "networkArea" attribute within the "eventSubs" attribute shall be included.  NOTE 2: If the UDM as NF service consumer subscribes to event (e.g. downlink data delivery status, PDU Session Establishment, PDU Session Release) on behalf of AF/NEF, "notifId" shall be set the same as "referenceId" received from the AF/NEF as defined in clause 6.4.6.2.4 of 3GPP TS 29.503 [14].  NOTE 3: For a given type of partitioning criteria, the UE shall belong to only one single partition as long as it is served by the NF service producer.  NOTE 4: If EneNA feature is supported, when the "snssai" attribute is presented together with "anyUeInd" attribute and the "eventSubs" attribute contains "PDU\_SES\_EST" and "PDU\_SES\_REL", then only the "ON\_EVENT\_DETECTION" value is applicable in the "notifMethod" attribute together with "maxReportNbr" attribute and/or "expiry"attribute presence.  NOTE 5: The attribute "maxReportNbr" is not applicable when the value of "notifMethod" is set to "ONE\_TIME".  NOTE 6: The attribute does not follow the related naming convention (i.e. "lowerCamel") defined in clause 5.1.4 of 3GPP TS 29.501 [7]. This attribute is however kept as currently defined in this specification for backward compatibility considerations. | | | | | |

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