**3GPP TSG CT WG3 Meeting #142 *C3-253489***

**Goteborg, SE, 25th – 29th August, 2025 was C3-253347**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **29.508** | **CR** | **0358** | **rev** | **1** | **Current version:** | **19.3.0** |  |
|  | | | | | | | | |
| *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:*** | Access type for energy consumption information | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei, Samsung, Ericsson | | | | | | | | | |
| ***Source to TSG:*** | CT3 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** |  | | | | |  | ***Date:*** | | | 2025-08-25 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***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:*** | | According to S2-2506100, only the energy consumption information over the 3GPP access is considered in this release. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Adding the procedure and condition that SMF only reports the energy consumption information of the UP resources over the 3GPP access for the UE . | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The definition of energy consumption information collection not aligned with SA2. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 4.2.2.2, 5.6.2.5 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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 file. | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

\* \* \* Start of Changes \* \* \*

#### 4.2.2.2 Notification about subscribed events

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

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

- If:

- the SMF supports the "DownlinkDataDeliveryStatus" feature,

- the event "DDDS" is subscribed,

- the traffic descriptors of the downlink data source have been provided for that subscription, and

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

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

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

Figure 4.2.2.2-1 illustrates the notification about subscribed events.



Figure 4.2.2.2-1: Notification about subscribed events

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

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

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

1. the Event Trigger as "event" attribute, and if the "EnhEventMgmt" feature is supported and optionally, a reference identifier within the "referenceId" attribute;

2. for a UP path change notification:

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

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

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

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

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

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

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

h) if the "CommonEASDNAI" feature is supported,

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

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

NOTE 1: In this release, when SMF acting as the I-SMF based on the Local Offloading Management does not cover common DNAI/EAS selection.

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

NOTE 2: The SMF gets the knowledge of the feature supported by the NF service consumer as described in clause 5.8.

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

NOTE 3: The SMF can determine that the target DNAI is supported by an AF different to the one that shall receive this notification by comparing the AF ID of the EAS Deployment Information entry that contains the old DNAI with the AF ID of the EAS Deployment Information entry that contains the target DNAI. These EAS Deployment Information entries are received via the Nnef\_EASDeployment API defined in 3GPP TS 29.591 [25].

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

l) if available and if the "UeSatUeComm" feature is supported, the serving satellite identity in the "servSatId" attribute, when the UE is accessible via regenerative satellite access.

NOTE 4: UP path change notification, i.e. DNAI change notification and/or N6 traffic routing information change notification, can be the result of an implicit subscription of the PCF on behalf of the NEF/AF as part of setting PCC rule(s) via the Npcf\_SMPolicyControl service (see clause 4.2.6.2.6.2 of 3GPP TS 29.512 [14]).

NOTE 5: If the DNAI is not changed while the N6 traffic routing information change, the source DNAI and target DNAI are not provided.

NOTE 6: The change from the UP path status where no DNAI applies to a status where a DNAI applies indicates the activation of the related AF request and therefore only the target DNAI and N6 traffic routing information is provided in the event notification; the change from the UP path status where a DNAI applies to a status where no DNAI applies indicates the de-activation of the related AF request and therefore only the source DNAI and N6 traffic routing information is provided in the event notification.

NOTE 7: UP path change notification, i.e. DNAI change notification can be the result of an implicit subscription of the PCF on behalf of the AF as part of setting PCC rule(s) in case of UE-Satellite-UE communication in IMS via the Npcf\_SMPolicyControl service (see clause 4.2.6.2.6.2 of 3GPP TS 29.512 [14]). The DNAI mapping to satellite identifier is derived as per operator policy and implementation.

3. for a UE IP address change:

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

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

4. for an access type change:

a) new access type as "accType" attribute;

5. for a PLMN Change:

a) new PLMN as "plmnId" attribute;

6. for a PDU Session Release:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

NOTE 8: The UPF reports one UL, DL and/or round-trip packet delay measurement for each periodic and/or event-triggered report as described in 3GPP TS 29.244 [23]. i.e, the SMF can include only one element within the "ulDelays", "dlDelays", and/or "rtDelays" array(s), each one with the received report from the UPF for the UL, DL and/or round trip delay(s).

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

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

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

NOTE 9: The SMF gets the knowledge of the NF service consumer support of "QoSMonitoring", "PacketDelayFailureReport" and "EnQoSMon" features as described in 3GPP TS 29.512 [14].

NOTE 10: QoS Monitoring notification can be the result of an implicit subscription of the PCF on behalf of the NEF/AF as part of setting PCC rule(s) via the Npcf\_SMPolicyControl service (see clause 4.2.3.25 of 3GPP TS 29.512 [14]).

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

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

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

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

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

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

14. for a QFI allocation, if the "QfiAllocation" feature is supported, or for a QFI deallocation or a QoS flow change if the "QoSAssistance" feature is supported:

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

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

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

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

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

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

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

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

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

g) if the "QoSAssistance" feature is supported, the QoS parameters of the QoS flow in the "qosPara" attribute.

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

a) new RAT type as "ratType" attribute;

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

a) satellite backhaul category as "satBackhaulCat" attribute.

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

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

NOTE 11: Traffic correlation notification can be the result of an implicit subscription of the PCF on behalf of the NEF as part of setting PCC rule(s) via the Npcf\_SMPolicyControl service (see clause 4.2.6.2.6.2 of 3GPP TS 29.512 [14]).

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

NOTE 12: Based on the indication of AF acknowledgment to be expected in the PCC rules received from the PCF and local configuration, the SMF may determine to wait for the AF acknowledgement before activating the new UP path associated with the new DNAI.

24. for a traffic route requirement installation outcome notification, if the "TraffRouteReqOutcome" feature is supported:

a) the information indicating the installation outcome of the traffic routing requirements within the "traffRouteReqOutcome" attribute.

b) the source DNAI and/or target DNAI within the "sourceDnai" attribute and "targetDnai" attribute respectively, if the DNAI is changed;

c) if available, for the source DNAI, the N6 traffic routing information related to the UE within the "sourceTraRouting" attribute; and

d) if available, for the target DNAI, the N6 traffic routing information related to the UE within the "targetTraRouting" attribute;

NOTE 13: The Traffic Routing Requirement Installation Outcome Notification i.e. N6 traffic routing requirements installation outcome, can be the result of an implicit subscription of the PCF on behalf of the NEF/AF as part of setting PCC rule(s) via the Npcf\_SMPolicyControl service (see clause 4.2.6.2.6.2 of 3GPP TS 29.512 [14]).

25. for a simultaneous connectivity failure notification, if the "SimConnFailure" feature is supported:

a) the source DNAI and/or target DNAI within the "sourceDnai" attribute and "targetDnai" attribute respectively, if the DNAI is changed;

NOTE 14: The Simultaneous Connectivity Failure Notification can be the result of an implicit subscription of the PCF on behalf of the NEF/AF as part of setting PCC rule(s) via the Npcf\_SMPolicyControl service (see clause 4.2.6.2.6.2 of 3GPP TS 29.512 [14]).

26. for energy consumption information collection, if the "Energy" feature is supported:

a) the list of Data Volume information within the "dataVolInfos" attribute, which includes UL/DL Data Volume, (I-)UPF ID(s) and gNB ID; and

b) the SUPI as the "supi" attribute; or

c) the DNN as the "dnn" attribute and/or the slice as the "snssai" attribute.

27. for signalling information, if the "SignallingInfo" feature is supported:

a) the usage information of UE IP address resources as "usageInfo" attribute;

b) the load information of connected UPFs as "loadInfos" attribute;

c) the number of received Session Report from UPF as "numSessRep" attribute;

d) the session-related state transitions as "stateTransitions" attribute; and/or

e) the signalling information of the SMF as "nfSignalInfo" attribute.

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

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

If the feature "ES3XX" is not supported and,

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

NOTE 15: An AMF as NF service consumer and/or notified NF can change.

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

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

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

- if the SMF receives a "308 Permanent Redirect" response, the SMF shall resend the failed event notification request and send the subsequent event notification using the received URI in the Location header field as Notification URI.

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

If the "Energy" feature is supported,

- the SMF only reports the energy consumption information of the UP resources over the 3GPP access for the UE.

\* \* \* Next Change \* \* \*

#### 5.6.2.5 Type EventNotification

Table 5.6.2.5-1: Definition of type EventNotification

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| event | SmfEvent | M | 1 | Event that is notified. |  |
| referenceId | ReferenceId | O | 0..1 | Indicates the reference identifier of the event. | EnhEventMgmt |
| timeStamp | DateTime | M | 1 | Time at which the event is observed. |  |
| supi | Supi | C | 0..1 | Subscription Permanent Identifier. It is included when the subscription applies to a group of UE(s) or any UE. (NOTE 9) |  |
| gpsi | Gpsi | C | 0..1 | Identifies a GPSI. It shall contain an MSISDN. It is included when it is available and the subscription applies to a group of UE(s) or any UE.  This IE is not applicable to "SMCC\_EXP" event. |  |
| ueIpAddr | IpAddr | C | 0..1 | Indicates the UE IP address, It is included for event "DISPERSION" when it is available and requested in the subscription. | Dispersion |
| transacInfos | array(TransactionInfo) | C | 1..N | Transaction Information. Shall be included for event "DISPERSION". | Dispersion |
| sourceDnai | Dnai | C | 0..1 | Source DN Access Identifier. Shall be included for events "UP\_PATH\_CH", "TRAFF\_ROUTE\_REQ\_OUTCOME", and "SIM\_CONN\_FAIL", if the DNAI changed.  (NOTE 1, NOTE 2) |  |
| targetDnai | Dnai | C | 0..1 | Target DN Access Identifier. Shall be included for events "UP\_PATH\_CH", "TRAFF\_ROUTE\_REQ\_OUTCOME", and "SIM\_CONN\_FAIL", if the DNAI changed.  (NOTE 1, NOTE 2) |  |
| dnaiChgType | DnaiChangeType | C | 0..1 | DNAI Change Type. Shall be included for event "UP\_PATH\_CH". |  |
| traffRouteReqOutcome | TraffRouteReqOutcome | C | 0..1 | Contains the installation outcome of requested traffic routing requirements.  This attribute shall be present when the event is set to "TRAFF\_ROUTE\_REQ\_OUTCOME". | TraffRouteReqOutcome |
| candidateDnais | array(Dnai) | O | 1..N | The candidate DNAI(s) for the PDU Session. May be included for event "UP\_PATH\_CH". | CommonEASDNAI |
| easRediscoverInd | boolean | O | 0..1 | Indication of EAS re-discovery. If present and set to "true", it indicates the EAS re-discovery is performed, e.g. due to change of common EAS. Default value is "false" if omitted. | CommonEASDNAI |
| candDnaisPrioInd | boolean | O | 0..1 | If provided and set to "true", it indicates that the candidate DNAIs provided in the "candidateDnais" attribute are in descending priority order, i.e. the lower the array index the higher the priority of the respective DNAI. If omitted, the default value is "false". It may only be provided if the "candidateDnais" attribute is provided and the "dnaiChgType" attribute is set to the value "EARLY". | CommonEASDNAI |
| trafCorreInfo | TrafficCorrelationNotification | C | 0..1 | Contains traffic correlation information for notification.  It shall be provided if the event attribute has the value "TRAFFIC\_CORRELATION". | CommonEASDNAI |
| sourceUeIpv4Addr | Ipv4Addr | O | 0..1 | The IPv4 Address of the served UE for the source DNAI. May be included for event "UP\_PATH\_CH". |  |
| sourceUeIpv6Prefix | Ipv6Prefix | O | 0..1 | The Ipv6 Address Prefix of the served UE for the source DNAI. May be included for event "UP\_PATH\_CH". |  |
| targetUeIpv4Addr | Ipv4Addr | O | 0..1 | The IPv4 Address of the served UE for the target DNAI. May be included for event "UP\_PATH\_CH". |  |
| targetUeIpv6Prefix | Ipv6Prefix | O | 0..1 | The Ipv6 Address Prefix of the served UE for the target DNAI. May be included for event "UP\_PATH\_CH". |  |
| sourceTraRouting | RouteToLocation | C | 0..1 | N6 traffic routing information for the source DNAI. Shall be included for events "UP\_PATH\_CH" and "TRAFF\_ROUTE\_REQ\_OUTCOME" if available (NOTE 2). |  |
| targetTraRouting | RouteToLocation | C | 0..1 | N6 traffic routing information for the target DNAI. Shall be included for events "UP\_PATH\_CH" and "TRAFF\_ROUTE\_REQ\_OUTCOME" if available (NOTE 2). |  |
| ueMac | MacAddr48 | O | 0..1 | UE MAC address. May be included for event "UP\_PATH\_CH". |  |
| adIpv4Addr | Ipv4Addr | O | 0..1 | Added IPv4 Address(es). May be included for event "UE\_IP\_CH". |  |
| adIpv6Prefix | Ipv6Prefix | O | 0..1 | Added Ipv6 Address Prefix(es). May be included for event "UE\_IP\_CH". |  |
| reIpv4Addr | Ipv4Addr | O | 0..1 | Removed IPv4 Address(es). May be included for event "UE\_IP\_CH". |  |
| reIpv6Prefix | Ipv6Prefix | O | 0..1 | Removed Ipv6 Address Prefix(es). May be included for event "UE\_IP\_CH". |  |
| plmnId | PlmnIdNid | C | 0..1 | New PLMN Identifier or the SNPN Identifier. Shall be included for event "PLMN\_CH".  It shall be included for event "UP\_PATH\_CH" to contain the new serving PLMN identifier, if the "HR-SBO" feature is supported and the UE has moved to a serving PLMN where local traffic offloading is allowed.  (NOTE 7) |  |
| accType | AccessType | C | 0..1 | New Access Type. Shall be included for event "AC\_TY\_CH" and may be included for events "QFI\_ALLOC", "QFI\_DEALLOCATION", and "QOS\_FLOW\_CHANGE". |  |
| pduAccTypes | array(AccessType) | O | 1..N | The list of Access Types used for the PDU session. May be included for events "QFI\_ALLOC", "QFI\_DEALLOCATION", and "QOS\_FLOW\_CHANGE".  (NOTE 10) | MultipleAccessTypes |
| pduSeId | PduSessionId | C | 0..1 | PDU session ID. Shall be included for event "PDU\_SES\_REL" and "PDU\_SES\_EST". It shall also be included for events "QFI\_ALLOC", "QFI\_DEALLOCATION", and "QOS\_FLOW\_CHANGE" if the subscription was for a UE, a group of UEs, or any UE, and not for a specific PDU Session. |  |
| ratType | RatType | C | 0..1 | New RAT Type. Shall be included for event 'RAT\_TY\_CH'. | EneNA |
| dddStatus | DlDataDeliveryStatus | C | 0..1 | Downlink data delivery status (discarded, transmitted, buffered). Shall be included for event "DDDS". | DownlinkDataDeliveryStatus |
| maxWaitTime | DateTime | C | 0..1 | The estimated maximum waiting time for downlink data delivery. Shall be included for event "DDDS" with status "BUFFERED". | DownlinkDataDeliveryStatus |
| dddTraDescriptor | DddTrafficDescriptor | C | 0..1 | The downlink data descriptor impacted by downlink data delivery status change. Shall be included for event "DDDS". | DownlinkDataDeliveryStatus |
| commFailure | CommunicationFailure | C | 0..1 | Describes the communication failure cause for the UE. Shall be included for event "COMM\_FAIL". | CommunicationFailure |
| ipv4Addr | Ipv4Addr | O | 0..1 | IPv4 address. May be included for event "PDU\_SES\_REL" or "PDU\_SES\_EST". | PduSessionStatus |
| ipv6Prefixes | array(Ipv6Prefix) | O | 1..N | IPv6 prefixes. May be included for event "PDU\_SES\_REL" or "PDU\_SES\_EST". (NOTE 3) | PduSessionStatus |
| ipv6Addrs | array(Ipv6Addr) | O | 1..N | IPv6 addresses. May be included for event "PDU\_SES\_REL" or "PDU\_SES\_EST". (NOTE 3) | PduSessionStatus |
| pduSessType | PduSessionType | C | 0..1 | PDU session type. Shall be included if the PduSessionStatus or PduSessionInfo feature is supported. (NOTE 8) | PduSessionStatus  PduSessionInfo |
| sscMode | SscMode | O | 0..1 | Represents the SSC mode of the PDU Session. It may be included for events "QFI\_ALLOC", "QFI\_DEALLOCATION", and "QOS\_FLOW\_CHANGE".  (NOTE 8) | PduSessionInfo |
| qfi | Qfi | C | 0..1 | QoS flow identifier. May be included for events "QFI\_ALLOC", "QFI\_DEALLOCATION", and "QOS\_FLOW\_CHANGE".  (NOTE 12) | QfiAllocation |
| appId | ApplicationId | O | 0..1 | Contains the application identifier. May be included for events "QFI\_ALLOC", "QFI\_DEALLOCATION", and "QOS\_FLOW\_CHANGE".  (NOTE 4) (NOTE 8) | QfiAllocation  PduSessionInfo |
| ethFlowDescs | array(EthFlowDescription) | O | 1..N | Descriptor(s) for non-IP traffic in which only ethernet flow description is defined. It allows the encoding of multiple UL and/or DL flows. Each entry of the array describes a single Ethernet flow. May be included for events "QFI\_ALLOC",, "QFI\_DEALLOCATION", and "QOS\_FLOW\_CHANGE" when the description of the Ethernet traffic requires multiple UL and/or DL flows.  (NOTE 4) | MultipleFlowDescriptions |
| ethfDescs | array(EthFlowDescription) | O | 1..2 | Contains the flow description for the Uplink and/or Downlink Ethernet flows. May be included for events "QFI\_ALLOC", "QFI\_DEALLOCATION", and "QOS\_FLOW\_CHANGE".  (NOTE 4) | QfiAllocation |
| flowDescs | array(FlowDescription) | O | 1..N | Descriptor(s) of IP traffic. It allows the encoding of multiple UL and/or DL flows. Each entry of the array describes a single IP flow. May be included for events "QFI\_ALLOC", "QFI\_DEALLOCATION", and "QOS\_FLOW\_CHANGE", when the description of the IP traffic requires multiple UL and/or DL flows.  (NOTE 4) | MultipleFlowDescriptions |
| fDescs | array(FlowDescription) | O | 1..2 | Contains the flow description for the Uplink and/or Downlink IP flows. May be included for events "QFI\_ALLOC", "QFI\_DEALLOCATION", and "QOS\_FLOW\_CHANGE".  (NOTE 4) | QfiAllocation |
| dnn | Dnn | C | 0..1 | Data network name.  Shall be included for events "QFI\_ALLOC", "QFI\_DEALLOCATION", and "QOS\_FLOW\_CHANGE". May be included for event "PDU\_SES\_REL" or "PDU\_SES\_EST".  Shall be included to indicate the DNN associated with URLLC service for event "RED\_TRANS\_EXP".  Shall be included if DNN based SMCC is applied.  It shall be included for event "UP\_PATH\_CH" to contain the HPLMN DNN, if the "HR-SBO" feature is supported and the UE has moved to a serving PLMN where local traffic offloading is allowed. | QfiAllocation, PduSessionStatus  RedundantTransmissionExp  SMCCE  HR-SBO |
| snssai | Snssai | C | 0..1 | Identifies the slice information. Shall be included for events "QFI\_ALLOC", "QFI\_DEALLOCATION", and "QOS\_FLOW\_CHANGE".  Shall be included if S-NSSAI based SMCC is applied.  It shall be included for event "UP\_PATH\_CH" to contain the HPLMN S-NSSAI, if the "HR-SBO" feature is supported and the UE has moved to a serving PLMN where local traffic offloading is allowed. | QfiAllocation  EneNA  SMCCE  HR-SBO |
| ulDelays | array(Uinteger) | O | 1..N | Uplink packet delay in units of milliseconds. May be included for event "QOS\_MON". (NOTE 5) | QoSMonitoring |
| dlDelays | array(Uinteger) | O | 1..N | Downlink packet delay in units of milliseconds. May be included for event "QOS\_MON". (NOTE 5) | QoSMonitoring |
| ulCongInfo | Uinteger | O | 0..1 | Uplink congestion information. Percentage of packets that UPF uses for ECN marking for L4S (without "%" sign).  May be included for event "QOS\_MON". | EnQoSMon |
| dlCongInfo | Uinteger | O | 0..1 | Downlink congestion information. Percentage of packets that UPF uses for ECN marking for L4S (without "%" sign).  May be included for event "QOS\_MON". | EnQoSMon |
| rtDelays | array(Uinteger) | O | 1..N | Round trip delay in units of milliseconds. May be included for event "QOS\_MON". (NOTE 5) | QoSMonitoring |
| ulDataRate | BitRate | O | 0..1 | Uplink data rate. May be included for event "QOS\_MON". | EnQoSMon |
| dlDataRate | BitRate | O | 0..1 | Downlink data rate. May be included for event "QOS\_MON". | EnQoSMon |
| timeWindow | TimeWindow | C | 0..1 | Time window representing a start time and a stop time of the data collection period. Shall be included for event "SMCC\_EXP". | SMCCE |
| smNasFromUe | array(SmNasFromUe) | C | 1..N | Information on the SM NAS messages that SMF receives from UE for PDU Session. Shall be included for event "SMCC\_EXP". | SMCCE |
| smNasFromSmf | array(SmNasFromSmf) | C | 1..N | Information on the SM congestion control applied SM NAS messages that SMF sends to UE for PDU Session. Shall be included for event "SMCC\_EXP". | SMCCE |
| upRedTrans | boolean | C | 0..1 | Indicates whether the redundant transmission is setup or terminated. Set to "true" if the redundant transmission is setup, otherwise set to "false" if the redundant transmission is terminated. Default value is "false" if omitted. Shall be included for event "RED\_TRANS\_EXP". | RedundantTransmissionExp |
| ssId | string | C | 0..1 | SSID that the PDU session is related to. (NOTE 6) | WlanPerformance |
| bssId | string | C | 0..1 | BSSID that the PDU session is related to. (NOTE 6) | WlanPerformance |
| startWlan | DateTime | C | 0..1 | The time stamp that indicates when the existing PDU Session's access type changes to WLAN or when the new PDU Session for WLAN is established. (NOTE 6) | WlanPerformance |
| endWlan | DateTime | C | 0..1 | The time stamp that indicates when the existing WLAN based PDU Session's access type is not WLAN any more or when the PDU Session for WLAN is released. (NOTE 6) | WlanPerformance |
| pduSessInfos | array(PduSessionInformation) | C | 1..N | The PDU session related information. It shall be included for event "UP\_STATUS\_INFO". | UeCommunication |
| upfInfo | UpfInformation | C | 0..1 | The information of the UPF serving the UE.  Shall be included for event "UPF\_INFO". | ServiceExperience  DnPerformance |
| pdmf | boolean | O | 0..1 | Packet delay measurement failure indicator. When set to true, it indicates that a packet delay failure has occurred, i.e. no measurement result is available during the reporting period.  Default value is false if omitted.  May be included for event "QOS\_MON". | PacketDelayFailureReport |
| satBackhaulCat | SatelliteBackhaulCategory | C | 0..1 | The satellite backhaul category or non-satellite backhaul used for the PDU session. Shall be included for event "SATB\_CH". | EnSatBackhaulCategoryChg |
| supportedFeatures | SupportedFeatures | C | 0..1 | List of negotiated features supported by the SMF and NF service consumer as described in clause 5.8.  This parameter shall be supplied by the SMF when the SMF detects that at least one feature related to an implicit subscription is supported by both the SMF and the NF service consumer. |  |
| targetAfId | string | O | 0..1 | Identifier of the Application Function responsible for the target DNAI. May be included for event "UP\_PATH\_CH" if the target DNAI is not known to the source AF. | EasRelocationEnh |
| 5qi | 5Qi | O | 0..1 | The 5G QoS Identifier. May be included for event "QFI\_ALLOC", "QFI\_DEALLOCATION", and "QOS\_FLOW\_CHANGE". | EnQfiAllocation |
| servSatId | SatelliteId | C | 0..1 | Indicates UE serving satellite Identity.  Shall be included for event "UP\_PATH\_CH" when the identifier of satellite serving the UE has changed. | UeSatUeComm |
| qosPara | QosPara | O | 0..1 | The QoS parameters of the QoS flow. May be included for "QFI\_ALLOC", "QFI\_DEALLOCATION" and "QOS\_FLOW\_CHANGE" events. | QoSAssistance |
| dataVolInfos | array(DataVolumeInformation) | C | 1..N | Indicates the list of data volume information.  This attribute shall be included for the event "ENERGY\_USAGE\_DATA" only when energy consumption information for the UE over the 3GPP access is available. | Energy |
| usageInfo | IpAddrUsageInfo | O | 0..1 | Indicates the usage information of UE IP address resources.  May be included for event "SIGNALLING\_INFO". | SignallingInfo |
| loadInfos | array(NfLoadLevelInformation) | O | 1..N | Each element indicates the load level information of connected UPFs.  May be included for event "SIGNALLING\_INFO".  (NOTE 13) | SignallingInfo |
| numSessRep | Uinteger | O | 0..1 | Contains the number of received Session Report from UPF triggered by DL packet in case of PDU Session is in 5GCM-idle state.  May be included for event "SIGNALLING\_INFO". | SignallingInfo |
| stateTransitions | array(StateTransitionInfo) | O | 1..N | Contains information about session-related state transitions of specific UEs.  May be included for event "SIGNALLING\_INFO". | SignallingInfo |
| nfSignalInfo | NfSignallingInfo | O | 0..1 | Indicates the signalling information of the SMF per SMF service, e.g. the number of requests to each service and related statistics (e.g. successful vs failed responses, etc.).  May be included for event "SIGNALLING\_INFO". | SignallingInfo |
| NOTE 1: If the DNAI is not changed while the N6 traffic routing information is changed, the "sourceDnai" attribute and "targetDnai" attribute shall not be provided.  NOTE 2: The change from the UP path status where no DNAI applies to a status where a DNAI applies indicates the activation of the related AF request and therefore only the target DNAI and N6 traffic routing information is provided in the event notification; the change from the UP path status where a DNAI applies to a status where no DNAI applies indicates the de-activation of the related AF request and therefore only the source DNAI and N6 traffic routing information is provided in the event notification.  NOTE 3: If provided, either ipv6Prefixes or ipv6Addrs shall be present.  NOTE 4: Only one of the "appId", "ethfDescs", "ethFlowDescs", "flowDescs" or "fDescs" attributes shall be provided.  NOTE 5: In this release of the specification one element may be included in the array as specified in clause 4.2.2.2.  NOTE 6: If notified event is "WLAN\_INFO", then one of the "ssId" or "bssId" attribute and one of the "startWlan" or "endWlan" attribute shall be present.  NOTE 7: The SNPN Identifier consists of the PLMN Identifier and the NID.  NOTE 8: When the subscribed event is "QFI\_ALLOC" and the PduSessionInfo feature is supported, if the "pduSessType" attribute and/or "sscMode" attribute is included, the associated "appId" attribute shall be provided.  NOTE 9: If the "WlanPerformanceExt\_AIML" feature is supported, the "supi" attribute may also be included for a single UE when the subscription applies to the "WLAN\_INFO" event.  NOTE 10: If multiple Access Types are used for the PDU Session and the "MultipleAccessTypes" feature is supported, the SMF shall include each PDU Session Access Type in the "pduAccTypes" attribute.  NOTE 11: Void.  NOTE 12: The "qfi" attribute and "5qi" attribute are mutually exclusive, either "qfi" attribute or "5qi" attribute shall be included for event "QFI\_ALLOC".  NOTE 13: The "nfLoadAvgInAoi", "snssai" and "confidence" attributes are not applicable in this release of the specification, and the other attributes are provided based on the values that are known to the SMF. | | | | | |

Editor's note: Whether the used QoS profile needs to be provided is FFS.

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