**3GPP TSG-CT3 Meeting #118e C3-215060**

**E-Meeting, 11th – 15th October 2021**

|  |
| --- |
| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  |  | **CR** | **0058** | **rev** |  | **Current version:** |  |  |
|  |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
|  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **x** |

|  |
| --- |
|  |
| ***Title:***  | Notification on the outcome of UE Policies delivery due to service specific parameter provisioning |
|  |  |
| ***Source to WG:*** |  |
| ***Source to TSG:*** | CT3 |
|  |  |
| ***Work item code:*** | eEDGE\_5GC |  | ***Date:*** | 2021-09-23 |
|  |  |  |  |  |
| ***Category:*** | B |  | ***Release:*** | Rel-17 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
|  |  |
| ***Reason for change:*** | SA2 has agreed on making the AF aware of the outcome of the UE Policies provisioning procedure performed by the PCF for the involved UE(s). According to the new functionality, the AF may subscribe to events related to the outcome of the UE Policy provisioning due to the invocation of Service Specific parameter provisioning procedure. This information needs to be stored in the UDR, recovered by the PCF and used for the notification to the NEF and then to the AF when the event is enforced.TS 29.523 needs to introduce the impacts related to the implicit subscription to AF subscribed events and the corresponding notification. |
|  |  |
| ***Summary of change:*** | Procedures are updated to introduce the possibility of implicit subscription to events.It is clarified that the information to be used to report the events subscribed by the AF is obtained from the UDR.Two new values for the PcEvent data type have been defined to report about the successful/unsuccessful outcome of UE Policy delivery. A new data type is proposed to be reused from TS 29.522, CR#0421, to include the possible cause of failure when the required event could not be successfully enforced.The OpenAPI specification is updated accordingly. |
|  |  |
| ***Consequences if not approved:*** | Misalignment with stage 2. PCF will not be able to report to the NEF/AF about the outcome of the UE Policy delivery. |
|  |  |
| ***Clauses affected:*** | 2; 4.2.2.1; 4.2.4.1; 4.2.4.2; 5.5.2.1; 5.5.2.2; 5.6.1; 5.6.2.8; 5.6.3.3; 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 impacts Npcf\_EventExposure API with a backward compatible feature. |
|  |  |
| ***This CR's revision history:*** |  |

\* \* \* First Change \* \* \* \*

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 23.501: "System Architecture for the 5G System; Stage 2".

[3] 3GPP TS 23.502: "Procedures for the 5G System; Stage 2".

[4] 3GPP TS 23.503: "Policy and Charging Control Framework for the 5G System; Stage 2".

[5] 3GPP TS 29.500: "5G System; Technical Realization of Service Based Architecture; Stage 3".

[6] 3GPP TS 29.501: "5G System; Principles and Guidelines for Services Definition; Stage 3".

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

[8] 3GPP TS 29.513: "5G System; Policy and Charging Control signalling flows and QoS parameter mapping; Stage 3".

[9] 3GPP TS 29.512: "5G System; Session Management Policy Control Service; Stage 3".

[10] 3GPP TS 29.507: "5G System; Access and Mobility Policy Control Service; Stage 3".

[11] 3GPP TS 29.525: "5G System; UE Policy Control Service; Stage 3".

[12] 3GPP TS 29.514: "5G System; Policy Authorization Service; Stage 3".

[13] 3GPP TS 29.214: "Policy and Charging Control over Rx reference point".

[14] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces; Stage 3".

[15] 3GPP TS 29.508: "5G System; Session Management Event Exposure Service; Stage 3".

[16] IETF RFC 7540: "Hypertext Transfer Protocol Version 2 (HTTP/2)".

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

[18] IETF RFC 7807: "Problem Details for HTTP APIs".

[19] 3GPP TS 33.501: "Security architecture and procedures for 5G system".

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

[21] 3GPP TS 29.510: "5G System; Network Function Repository Services; Stage 3".

[22] 3GPP TR 21.900: "Technical Specification Group working methods".

[23] 3GPP TS 29.534: "5G System; Access and Mobility Policy Authorization Service; Stage 3".

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

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

\* \* \* Second Change \* \* \* \*

#### 4.2.2.1 General

This service operation is used by an NF service consumer to explicitly subscribe for policy events notifications on a specified context for a group of UE(s) or any UE, or to modify an existing subscription.

The following are the types of events for which a subscription can be made:

- PLMN identifier notification;

NOTE x1: Within the PLMN identifier notification event the PLMN Identifier or SNPN Identifier where the UE is currently located is provided. The SNPN Identifier consists of the PLMN Identifier and the NID.

- change of Access Type;

- when the feature "AMPoliciesEvents" is supported, change of Service Area Restrictions;

- Satellite backhaul category change; and

- notification request for an AF subscribed event.

The following procedures using the Npcf\_EventExposure\_Subscribe service operation are supported:

- creating a new subscription;

- modifying an existing subscription.

NOTE x2: It is also possible to implicitly subscribe for policy events notifications for a group of UE(s) or any UE. Implicit subscription information is obtained from the UDR for application data. In this case, the PCF will use the callback URI provided by the AF to the UDR, see 3GPP TS 29.519 [xx] for the details.

\* \* \* Third Change \* \* \* \*

#### 4.2.4.1 General

The Npcf\_EventExposure\_Notify service operation enables the PCF to notify the NF service consumers that the previously (explicit or implicitly) subscribed policy control event occurred.

The following procedure using the Npcf\_EventExposure\_Notify service operation is supported:

- notification about subscribed events.

\* \* \* Fourth Change \* \* \* \*

#### 4.2.4.2 Notification about subscribed events

Figure 4.2.4.2-1 illustrates the notification about subscribed events.



Figure 4.2.4.2-1: Notification about subscribed events

If the PCF observes policy control related event(s) for which an NF service consumer has subscribed or an implicit subscription exists, the PCF shall send an HTTP POST request as shown in figure 4.2.4.2-1, step 1, with the "{notifUri}" as request URI containing the value previously provided by the NF service consumer within the corresponding subscription or, for implicit subscriptions, obtained from the UDR as specified in 3GPP TS 29.519 [xx], and the "PcEventExposureNotif" data structure.

The "PcEventExposureNotif" data structure shall include:

- The notification correlation ID provided by the NF service consumer during the subscription as "notifId" attribute or obtained from the UDR as specified in 3GPP TS 29.519 [xx]; and

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

1. the Policy Control event as "event" attribute;

2. for an access type change:

a) new access type as "accType" attribute;

b) the new RAT type as "ratType" attribute, if applicable for the notified access type; and

c) if the "ATSSS" feature is supported:

i. if it is the first access type report for a PDU session, and both, 3GPP and non-3GPP access information is available, the "addAccessInfo" attribute. The "addAccessInfo" attribute contains the additional access type information, where the access type is encoded in the "accessType" attribute, and the RAT type is encoded in the "ratType" attribute when applicable for the notified access type;

ii. if it is a subsequent access type change report:

- if a new access type is added to the MA PDU session, the "addAccessInfo" attribute with the added access type encoded in the "accessType" attribute, and the RAT type encoded in the "ratType" attribute when applicable for the notified access type;

- if an access type is released in the MA PDU session, the "relAccessInfo" attribute with the released access type encoded in the "accessType" attribute, and the RAT type encoded in the "ratType" attribute when applicable for the notified access type; and

NOTE 1: For a MA PDU session, if the "ATSSS" feature is not supported by the AF, the PCF includes the "accessType" attribute and the "ratType" attribute with a currently active combination of access type and RAT type (if applicable for the notified access type). When both 3GPP and non-3GPP accesses are available, the PCF includes the information corresponding to the 3GPP access.

d) for EPC interworking scenarios, the ePDG address as "anGwAddr" attribute, if applicable for the notified access type;

3. for a PLMN change:

a) new network identity containing the PLMN Identifier or the SNPN Identifier in the "plmnId" attribute;

NOTE 2: The SNPN Identifier consists of the PLMN Identifier and the NID.

4. when the feature "AMPoliciesEvents" is supported, for a service area change, the new service area in the "servAreaRes" attribute, encoded as specified in 3GPP TS 29.507 [10], subclause 4.2.2.3.1;

5. when the feature "SatelliteBackhaul" is supported, for a satellite backhaul category change:

a) the satellite backhaul category (i.e., GEO, MEO, LEO, or other satellite) or the indication of non-satellite backhaul category in the "satBackhaulCategory" attribute;

6. when the feature "DeliveryOutcome" is supported, to report the unsuccessful outcome of the UE Policy Delivery related to the invocation of AF provisioned service parameters, the reason of failure within the "delivFailure" attribute;7. the identity of the affected UE in the "supi" attribute and, if available, in the "gpsi" attribute;

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

9. if available, and if the feature "ExtendedSessionInformation" is supported, information about the PDU session involved in the reported event in the "pduSessInfo" attribute, that shall include:

a) the S-NSSAI of the PDU session in the "snssai" attribute;

b) the DNN of the PDU session in the "dnn" attribute; and

c) the IPv4 address in the "ueIpv4" attribute and/or the IPv6 prefix in the "ueIpv6" attribute, or the Ethernet MAC address in the "ueMac" attribute; and

if the IPv4 address is included in the "ueIpv4" attribute, may include the IP domain in the "ipDomain" attribute;

10. if available, and if the feature "ExtendedSessionInformation" is supported, information about the services involved in the reported event in the indicated PDU session in the "repServices" attribute, which may include per identified service:

a) a list of Ethernet flows in the "servEthFlows" attribute which contains an impacted Ethernet flow number within the "flowNumber" attribute in each EthernetFlowInfo data structure; or

b) a list of IP flows in the "servIpFlows" attribute which contains an impacted IP flow number within the "flowNumber" attribute in each IpFlowInfo data structure; and/or

c) an AF application identifier in the "afAppId" attribute.

If the NF service consumer cannot successfully fulfil the received HTTP POST request due to an internal error or an error in the HTTP POST request, the NF service consumer shall send an HTTP error response as specified in subclause 5.7.

If the feature "ES3XX" is supported, and the NF service consumer determines the received HTTP POST request needs to be redirected, the NF service consumer shall send an HTTP redirect response as specified in subclause 6.10.9 of 3GPP TS 29.500 [5].

Upon successful reception of the HTTP POST request with "{notifUri}" as request URI and a "PcEventExposureNotif" data structure as request body, the NF service consumer shall send a "204 No Content" HTTP response, as shown in figure 4.2.4.2-1, step 2, for a successful processing.

\* \* \*Fifth Change \* \* \* \*

#### 5.5.2.1 Description

The Policy Control Event Notification is used by the PCF to report one or several observed policy control events to the NF service consumer that has explicitly subscribed to such notifications via the Individual Policy Control Events Subscription resource as described in subclause 4.2.2 or has implicitly subscribed providing the related subscription information via UDR.

NOTE 1: Implicit subscription applies when the PCF gets information from the UDR about AF subscribing to notifications about AF specific required events for application data. See 3GPP TS 29.519 [xx] for the details.

The "callback" clause of the OpenAPI specification found in Annex A.2 associated to the POST method of the "Policy Control Events Subscriptions" resource shall be used as the notification request for both explicit and implicit subscriptions.

NOTE 2: When implicit subscription applies, the NEF has previously stored in the UDR the notification URI to be used in the notifications initiated by the PCF. See 3GPP TS 29.519 [xx] for the details.

\* \* \* Sixth Change \* \* \* \*

#### 5.5.2.2 Target URI

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

Table 5.5.2.2-1: Callback URI variables

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| notifUri | Uri | The Notification Uri as assigned by the NF service consumer either during the explicit subscription service operation and described within the PcEventExposureSubsc data type (see table 5.6.2.2-1) or during the implicit subscription via the provisioning of the corresponding application data in UDR (see 3GPP TS 29.519 [xx]. (NOTE) |
| NOTE : When obtained from the UDR, it corresponds to the notification URI previously stored by the NEF. |

\* \* \* Seventh Change \* \* \* \*

### 5.6.1 General

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

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

Table 5.6.1-1: Npcf\_EventExposure specific Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Section defined | Description | Applicability |
| EthernetFlowInfo | 5.6.2.6 | Identification of an UL/DL ethernet flow. | ExtendedSessionInformation |
| IpFlowInfo | 5.6.2.7 | Identification of an UL/DL IP flow. | ExtendedSessionInformation |
| PcEvent | 5.6.3.3 | Policy Control Events. |  |
| PcEventExposureSubsc | 5.6.2.2 | Represents an Individual Policy Events Subscription resource. |  |
| PcEventExposureNotif | 5.6.2.3 | Describes notifications about Policy Control events that occurred in an Individual Policy Events Subscription resource. |  |
| PcEventNotification | 5.6.2.8 | Represents the information reported for a Policy Control event. |  |
| PduSessionInformation | 5.6.2.9 | Represents PDU session identification information. | ExtendedSessionInformation |
| ReportingInformation | 5.6.2.4 | Represents the type of reporting the subscription requires. |  |
| ServiceIdentification | 5.6.2.5 | Identification of the service to which the subscription applies. | ExtendedSessionInformation |
| SnssaiDnnCombination | 5.6.2.10 | Represents a combination of S-NSSAI and DNN(s). | EneNA |

Table 5.6.1-2 specifies data types re-used by the Npcf\_EventExposure service based interface protocol from other specifications, including a reference to their respective specifications and when needed, a short description of their use within the Npcf\_EventExposure service based interface.

Table 5.6.1-2: Npcf\_EventExposure re-used Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Reference | Comments | Applicability |
| AccessType | 3GPP TS 29.571 [14] | Access Type. |  |
| AdditionalAccessInfo | 3GPP TS 29.512 [9] | Indicates the combination of additional Access Type and RAT Type for MA PDU session. | ATSSS |
| AfAppId | 3GPP TS 29.514 [12] | AF application Identifier. | ExtendedSessionInformation |
| AnGwAddress | 3GPP TS 29.514 [12] | Carries the control plane address of the EPC untrusted non-3GPP access network gateway. (NOTE 1) |  |
| DateTime | 3GPP TS 29.571 [14] | Time stamp. |  |
| Dnn | 3GPP TS 29.571 [14] | Identifies a DNN. |  |
| DurationSec | 3GPP TS 29.571 [14] | Seconds of duration. |  |
| EthFlowDescription | 3GPP TS 29.514 [12] | Identifies an ethernet flow description. (NOTE 2) | ExtendedSessionInformation |
| Failure | 3GPP TS 29.522 [yy] | Indicates the failure reason for an unsuccessful outcome of the UE Policy Delivery. | DeliveryOutcome |
| FlowDescription | 3GPP TS 29.514 [12] | Identifies an IP flow description. | ExtendedSessionInformation |
| Gpsi | 3GPP TS 29.571 [14] | Generic Public Subscription Identifier. |  |
| GroupId | 3GPP TS 29.571 [14] | Identifies a group of UEs. |  |
| MacAddr48 | 3GPP TS 29.571 [14] | Mac Address of the UE. | ExtendedSessionInformation |
| NotificationFlag | 3GPP TS 29.571 [14] | Notification flag. | EneNA |
| NotificationMethod | 3GPP TS 29.508 [15] | Represents the Notification Method. |  |
| PartitioningCriteria | 3GPP TS 29.571 [14] | Used to partition UEs before applying sampling. | EneNA |
| PlmnIdNid | 3GPP TS 29.571 [14] | Identifies the network: the PLMN Identifier or the SNPN Identifier. (NOTE 3) |  |
| RatType | 3GPP TS 29.571 [14] | RAT Type. |  |
| RedirectResponse | 3GPP TS 29.571 [14] | Contains redirection related information. | ES3XX |
| SamplingRatio | 3GPP TS 29.571 [14] | Sampling Ratio. |  |
| SatelliteBackhaulCategory | 3GPP TS 29.512 [9] | Indicates the satellite or non-satellite backhaul category. | SatelliteBackhaul |
| ServiceAreaRestriction | 3GPP TS 29.571 [14] | Service area restrictions. | AMPoliciesEvents |
| Snssai | 3GPP TS 29.571 [14] | Identifies a S-NSSAI. |  |
| Supi | 3GPP TS 29.571 [14] | Identifies the SUPI of the UE. |  |
| SupportedFeatures | 3GPP TS 29.571 [14] | Used to negotiate the applicability of the optional features defined in subclause 5.8. |  |
| Uinteger | 3GPP TS 29.571 [14] | Unsigned integer. |  |
| NOTE 1: "AnGwAddress" data structure is only used to encode the ePDG address and is only applicable to the 5GS and EPC/E-UTRAN interworking scenario as defined in 3GPP TS 29.512 [9], Annex B.NOTE 2: In order to support a set of MAC addresses with a specific range in the traffic filter, feature MacAddressRange as specified in subclause 5.8 shall be supported.NOTE 3: The SNPN Identifier consists of the PLMN Identifier and the NID. |

\* \* \* Eighth Change \* \* \* \*

#### 5.6.2.8 Type PcEventNotification

Table 5.6.2.8-1: Definition of type PcEventNotification

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| event | PcEvent | M | 1..N | Reported Policy Control event. |  |
| accType | AccessType | C | 0..1 | Access Type. It shall be included when the reported PcEvent is "AC\_TY\_CH". |  |
| addAccessInfo | AdditionalAccessInfo | O | 0..1 | Indicates the additional combination of Access Type and RAT Type available for MA PDU session. It may be present when the notified event is "AC\_TY\_CH" and the PDU session is a Multi-Access PDU session. | ATSSS |
| relAccessInfo | AdditionalAccessInfo | O | 0..1 | Indicates the release of a combination of Access Type and RAT Type available for MA PDU session. It may be present when the notified event is "AC\_TY\_CH" and the PDU session is a Multi-Access PDU session. | ATSSS |
| anGwAddr | AnGwAddress | O | 0..1 | ePDG address. It shall be included if applicable when the reported PcEvent is "AC\_TY\_CH". |  |
| ratType | RatType | O | 0..1 | RAT Type. It shall be included if applicable when the reported PcEvent is "AC\_TY\_CH". |  |
| plmnId | PlmnIdNid | C | 0..1 | PLMN Identifier or the SNPN Identifier. It shall be included when the reported PcEvent is "PLMN\_CH".(NOTE) |  |
| servAreaRes | ServiceAreaRestriction | C | 0..1 | Service Area Restriction as part of the AMF Access and Mobility Policy. It shall be included when the reported PcEvent is "SAR\_CH". | AMPoliciesEvents |
| supi | Supi | C | 0..1 | SUPI of the UE. It shall be present if available. |  |
| gpsi | Gpsi | O | 0..1 | Gpsi shall contain either an External Id or an MSISDN. |  |
| timeStamp | DateTime | M | 1 | Time at which the event is observed. |  |
| pduSessInfo | PduSessionInformation | O | 0..1 | Represents PDU session information related to the observed event. | ExtendedSessionInformation |
| repServices | ServiceIdentification | O | 0..1 | Represents service information related to the observed event. | ExtendedSessionInformation |
| satBackhaulCategory | SatelliteBackhaulCategory | C | 0..1 | Indicates the satellite or non-satellite backhaul category of the PDU session. It shall be included when the reported PcEvent is "SAT\_CATEGORY\_CH". | SatelliteBackhaul |
| delivFailure | Failure | C | 0..1 | Indicates the failure reason for an unsuccessful outcome of the UE Policy Delivery. It shall be included when the reported PcEvent is "UNSUCCESS\_UE\_POL\_DEL\_SP". | DeliveryOutcome |
| NOTE: The SNPN Identifier consists of the PLMN Identifier and the NID. |

\* \* \* Nineth Change \* \* \* \*

#### 5.6.3.3 Enumeration: PcEvent

The enumeration PcEvent represents the policy control events that can be subscribed. It shall comply with the provisions defined in table 5.6.3.3-1.

Table 5.6.3.3-1: Enumeration PcEvent

|  |  |  |
| --- | --- | --- |
| Enumeration value | Description | Applicability |
| AC\_TY\_CH | Access Type Change |  |
| PLMN\_CH | PLMN Change |  |
| SAR\_CH | Service Area Restriction change | AMPoliciesEvents |
| SAT\_CATEGORY\_CH | Indicates that a change between different satellite backhaul category, or non-satellite backhaul, has been detected. | SatelliteBackhaul |
| SUCCESS\_UE\_POL\_DEL\_SP | Indicates about the successful UE Policy delivery related to the invocation of AF provisioned service parameters. | DeliveryOutcome |
| UNSUCCESS\_UE\_POL\_DEL\_SP | Indicates about the unsuccessful UE Policy delivery related to the invocation of AF provisioned service parameters. | DeliveryOutcome |

\* \* \* Tenth Change \* \* \* \*

## 5.8 Feature negotiation

The optional features in table 5.8-1 are defined for the Npcf\_EventExposure API. They shall be negotiated using the extensibility mechanism defined in subclause 6.6 of 3GPP TS 29.500 [5].

Table 5.8-1: Supported Features

|  |  |  |
| --- | --- | --- |
| Feature number | Feature Name | Description |
| 1 | ExtendedSessionInformation | Indicates the support of additional session information in the subscription and report of policy control event. |
| 2 | MacAddressRange | Indicates the support of a set of MAC addresses with a specific range in the traffic filter. |
| 3 | ATSSS | Indicates the support of the report of the multiple access types of a MA PDU session. |
| 4 | ES3XX | Extended Support for 3xx redirections. This feature indicates the support of redirection for any service operation, according to Stateless NF procedures as specified in subclauses 6.5.3.2 and 6.5.3.3 of 3GPP TS 29.500 [5] and according to HTTP redirection principles for indirect communication, as specified in subclause 6.10.9 of 3GPP TS 29.500 [5].  |
| 5 | AMPoliciesEvents | Indicates the support of the report of changes of service area restrictions for a UE. |
| 6 | EneNA | This feature indicates support for the enhancements of network data analytics requirements. |
| 7 | SatelliteBackhaul | Indicates the support of the report of the satellite or non-satellite backhaul category of the PDU session. |
| x | DeliveryOutcome | Indicates the support of notifications about the outcome of the UE Policy delivery related to the invocation of AF provisioned service parameters. |

\* \* \* Eleventh Change \* \* \* \*

# A.2 Npcf\_EventExposure API

openapi: 3.0.0

info:

 version: 1.2.0-alpha.3

 title: Npcf\_EventExposure

 description: |

 PCF Event Exposure Service.

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externalDocs:

 description: 3GPP TS 29.523 V17.3.0; 5G System; Policy Control Event Exposure Service; Stage 3.

 url: http://www.3gpp.org/ftp/Specs/archive/29\_series/29.523/

servers:

 - url: '{apiRoot}/npcf-eventexposure/v1'

 variables:

 apiRoot:

 default: https://example.com

 description: apiRoot as defined in subclause 4.4 of 3GPP TS 29.501

security:

 - {}

 - oAuth2ClientCredentials:

 - npcf-eventexposure

paths:

 /subscriptions:

 post:

 summary: Creates a new Individual Policy Control Events Subscription resource

 operationId: PostPcEventExposureSubsc

 tags:

 - Policy Control Events Subscription (Collection)

 requestBody:

 required: true

 content:

 application/json:

 schema:

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

 responses:

 '201':

 description: Success

 content:

 application/json:

 schema:

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

 headers:

 Location:

 description: 'Contains the URI of the created individual policy control events subscription resource, according to the structure: {apiRoot}/npcf-eventexposure/v1/subscriptions/{subscriptionId}'

 required: true

 schema:

 type: string

 '400':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/400'

 '401':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/401'

 '403':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/403'

 '404':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/404'

 '411':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/411'

 '413':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/413'

 '415':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/415'

 '429':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/429'

 '500':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/500'

 '503':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/503'

 default:

 $ref: 'TS29571\_CommonData.yaml#/components/responses/default'

 callbacks:

 PcEventNotification:

 '{$request.body#/notifUri}':

 post:

 requestBody:

 required: true

 content:

 application/json:

 schema:

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

 responses:

 '204':

 description: No Content, Notification was succesfull

 '307':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/307'

 '308':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/308'

 '400':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/400'

 '401':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/401'

 '403':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/403'

 '404':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/404'

 '411':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/411'

 '413':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/413'

 '415':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/415'

 '429':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/429'

 '500':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/500'

 '503':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/503'

 default:

 $ref: 'TS29571\_CommonData.yaml#/components/responses/default'

 /subscriptions/{subscriptionId}:

 get:

 summary: "Reads an existing Individual Policy Control Events Subscription"

 operationId: GetPcEventExposureSubsc

 tags:

 - Individual Policy Control Events Subscription (Document)

 parameters:

 - name: subscriptionId

 in: path

 description: Policy Control Event Subscription ID

 required: true

 schema:

 type: string

 responses:

 '200':

 description: OK. Resource representation is returned

 content:

 application/json:

 schema:

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

 '307':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/307'

 '308':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/308'

 '400':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/400'

 '401':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/401'

 '403':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/403'

 '404':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/404'

 '406':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/406'

 '429':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/429'

 '500':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/500'

 '503':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/503'

 default:

 $ref: 'TS29571\_CommonData.yaml#/components/responses/default'

 put:

 summary: "Modifies an existing Individual Policy Control Events Subscription "

 operationId: PutPcEventExposureSubsc

 tags:

 - Individual Policy Control Events Subscription (Document)

 requestBody:

 required: true

 content:

 application/json:

 schema:

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

 parameters:

 - name: subscriptionId

 in: path

 description: Policy Control Event Subscription ID

 required: true

 schema:

 type: string

 responses:

 '200':

 description: OK. Resource was succesfully modified and representation is returned

 content:

 application/json:

 schema:

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

 '204':

 description: No Content. Resource was succesfully modified

 '307':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/307'

 '308':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/308'

 '400':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/400'

 '401':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/401'

 '403':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/403'

 '404':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/404'

 '411':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/411'

 '413':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/413'

 '415':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/415'

 '429':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/429'

 '500':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/500'

 '503':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/503'

 default:

 $ref: 'TS29571\_CommonData.yaml#/components/responses/default'

 delete:

 summary: "Cancels an existing Individual Policy Control Events Subscription "

 operationId: DeletePcEventExposureSubsc

 tags:

 - Individual Policy Control Events Subscription (Document)

 parameters:

 - name: subscriptionId

 in: path

 description: Policy Control Event Subscription ID

 required: true

 schema:

 type: string

 responses:

 '204':

 description: No Content. Resource was succesfully deleted

 '307':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/307'

 '308':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/308'

 '400':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/400'

 '401':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/401'

 '403':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/403'

 '404':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/404'

 '429':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/429'

 '500':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/500'

 '503':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/503'

 default:

 $ref: 'TS29571\_CommonData.yaml#/components/responses/default'

components:

 securitySchemes:

 oAuth2ClientCredentials:

 type: oauth2

 flows:

 clientCredentials:

 tokenUrl: '{nrfApiRoot}/oauth2/token'

 scopes:

 npcf-eventexposure: Access to the Npcf\_EventExposure API.

 schemas:

 PcEventExposureNotif:

 description: Represents notifications about Policy Control events related to an Individual Policy Events Subscription resource.

 type: object

 properties:

 notifId:

 type: string

 eventNotifs:

 type: array

 items:

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

 minItems: 1

 required:

 - notifId

 - eventNotifs

 PcEventExposureSubsc:

 description: Represents an Individual Policy Events Subscription resource.

 type: object

 properties:

 eventSubs:

 type: array

 items:

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

 minItems: 1

 eventsRepInfo:

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

 groupId:

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

 filterDnns:

 type: array

 items:

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

 minItems: 1

 filterSnssais:

 type: array

 items:

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

 minItems: 1

 snssaiDnns:

 type: array

 items:

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

 minItems: 1

 filterServices:

 type: array

 items:

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

 minItems: 1

 notifUri:

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

 notifId:

 type: string

 suppFeat:

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

 required:

 - eventSubs

 - notifId

 - notifUri

 ReportingInformation:

 description: Represents the type of reporting that the subscription requires.

 type: object

 properties:

 immRep:

 type: boolean

 notifMethod:

 $ref: 'TS29508\_Nsmf\_EventExposure.yaml#/components/schemas/NotificationMethod'

 maxReportNbr:

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

 monDur:

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

 repPeriod:

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

 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'

 ServiceIdentification:

 description: Identifies the service to which the subscription applies.

 type: object

 properties:

 servEthFlows:

 type: array

 items:

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

 minItems: 1

 servIpFlows:

 type: array

 items:

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

 minItems: 1

 afAppId:

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

 # All conditions in allOf must be met

 allOf:

 # First condition is that servEthFlows and servIpFlows are mutually exclusive

 - not:

 required: [servEthFlows, servIpFlows]

 # Second condition is that at least one the servEthFlows, servIpFlows and afAppId shall be present

 - anyOf:

 - required: [servEthFlows]

 - required: [servIpFlows]

 - required: [afAppId]

 EthernetFlowInfo:

 description: Identifies an UL/DL ethernet flow.

 type: object

 properties:

 ethFlows:

 type: array

 items:

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

 minItems: 1

 maxItems: 2

 flowNumber:

 type: integer

 required:

 - flowNumber

 IpFlowInfo:

 description: Identifies an UL/DL IP flow.

 type: object

 properties:

 ipFlows:

 type: array

 items:

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

 minItems: 1

 maxItems: 2

 flowNumber:

 type: integer

 required:

 - flowNumber

 PcEventNotification:

 description: Represents the information reported for a Policy Control event.

 type: object

 properties:

 event:

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

 accType:

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

 addAccessInfo:

 $ref: 'TS29512\_Npcf\_SMPolicyControl.yaml#/components/schemas/AdditionalAccessInfo'

 relAccessInfo:

 $ref: 'TS29512\_Npcf\_SMPolicyControl.yaml#/components/schemas/AdditionalAccessInfo'

 anGwAddr:

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

 ratType:

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

 plmnId:

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

 satBackhaulCategory:

 $ref: 'TS29512\_Npcf\_SMPolicyControl.yaml#/components/schemas/SatelliteBackhaulCategory'

 servAreaRes:

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

 supi:

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

 gpsi:

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

 timeStamp:

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

 pduSessionInfo:

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

 repServices:

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

 delivFailure:

 $ref: 'TS29522\_ServiceParameter.yaml#/components/schemas/Failure'

 required:

 - event

 - timeStamp

 PduSessionInformation:

 description: Represents PDU session identification information.

 type: object

 properties:

 snssai:

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

 dnn:

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

 ueIpv4:

 $ref: 'TS29571\_CommonData.yaml#/components/schemas/Ipv4Addr'

 ueIpv6:

 $ref: 'TS29571\_CommonData.yaml#/components/schemas/Ipv6Prefix'

 ipDomain:

 type: string

 ueMac:

 $ref: 'TS29571\_CommonData.yaml#/components/schemas/MacAddr48'

 required:

 - snssai

 - dnn

 oneOf:

 - required: [ueMac]

 - anyOf:

 - required: [ueIpv4]

 - required: [ueIpv6]

 SnssaiDnnCombination:

 description: Represents a combination of S-NSSAI and DNN(s).

 type: object

 properties:

 snssai:

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

 dnns:

 type: array

 items:

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

 minItems: 1

# Simple data types and Enumerations

 PcEvent:

 description: Represents the policy control events that can be subscribed.

 anyOf:

 - type: string

 enum:

 - AC\_TY\_CH

 - PLMN\_CH

 - SAR\_CH

 - SAT\_CATEGORY\_CH

 - SUCCESS\_UE\_POL\_DEL\_SP

 - UNSUCCESS\_UE\_POL\_DEL\_SP

 - type: string

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