**3GPP TSG-CT WG3 Meeting #108-eC3-201117**

[**E-Meeting**](https://www.3gpp.org/ftp/tsg_ct/WG3_interworking_ex-CN3/TSGC3_108_Sophia_Antipolis/)**, 19th -28th February 2020 (Revision of C3-201xyz)**

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **29.525** | **CR** | **0073** | **rev** | **-** | **Current version:** | **16.2.0** |  |
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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:*** | UE Policy for V2XARC | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei | | | | | | | | | |
| ***Source to TSG:*** | CT3 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | eV2XARC | | | | |  | ***Date:*** | | | 2020-02-28 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *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-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Stage 2 has agreed that the PCF may provision the UE policies for V2X communication over PC5 and Uu reference points. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Defines the UE policy provisioning for V2X communication over PC5 and Uu reference points. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Not aligned with stage 2 | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 2, 4.2.2.1, 4.2.2.2.1, 4.2.2.2.1.1(new), 4.2.2.2.1.2(new), 4.2.2.2.x1(new), 4.2.2.2.x2(new), 4.2.3.1, 4.2.3.2, 4.2.4.x, 5.6.1, 5.6.2.3, 5.6.2.4, 5.6.3.2, 5.6.3.3, 5.6.3.x, 5.8, A.2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | | This CR introduces a backwards compatible feature to the OpenAPI file. | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

\*\*\* 1st Change \*\*\*

# 2 References

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

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

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

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

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

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

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

[4] 3GPP TS 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] 3GPP TS 29.513: "5G System; Policy and Charging Control signalling flows and QoS parameter mapping; Stage 3".

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

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

[10] OpenAPI, "OpenAPI 3.0.0 Specification", <https://github.com/OAI/OpenAPI-Specification/blob/master/versions/3.0.0.md>.

[11] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces; Stage 3".

[12] 3GPP TS 23.402: "Architecture enhancements for non-3GPP accesses".

[13] 3GPP TS 29.510: "5G System; Network Function Repository Services; Stage 3".

[14] 3GPP TS 29.518: "5G System; Access and Mobility Management Services; Stage 3".

[15] 3GPP TS 24.501: "Non-Access-Stratum (NAS) protocol for 5G System (5GS); Stage 3".

[16] 3GPP TS 24.526: "UE policies for 5G System (5GS); Stage 3".

[17] 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".

[18] 3GPP TS 32.422: "Telecommunication management; Subscriber and equipment trace; Trace control and configuration management".

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

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

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

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

[23] 3GPP TS 23.316: "Wireless and wireline convergence access support for the 5G System (5GS)".

[x1] 3GPP TS 24.587: "Vehicle-to-Everything (V2X) services in 5G System (5GS); Stage 3".

[x2] 3GPP TS 24.588: "Vehicle-to-Everything (V2X) services in 5G System (5GS); User Equipment (UE) policies; Stage 3".

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

#### 4.2.2.1 General

The procedure in the present subclause is applicable when the NF service consumer creates a UE policy association in the following cases:

- UE initial registers to the network as defined in subclause 5.5.1.2.2 of 3GPP TS 24.501 [15];

- UE performs the mobility registration if the UE operating in the single-registration mode performs inter-system change from S1 mode to N1 mode as defined in subclause 5.5.1.3.2 of 3GPP TS 24.501 [15] and there is no existing UE Policy Association between AMF and PCF for this UE;

- the AMF is relocated (between the different AMF sets) and the new AMF selects a new PCF. The procedure for the case where the AMF is relocated and the new AMF selects the old PCF is defined in subclause 4.2.3.1.

The creation of an UE policy association only applies for normally registered UEs, i.e., it does not apply for emergency-registered UEs.

Figure 4.2.2.1-1 illustrates the creation of a policy association.



Figure 4.2.2.1-1: Creation of a UE policy association

NOTE 1: For the roaming case, the PCF represents the V-PCF if the NF service consumer is an AMF and the PCF represents the H-PCF if the NF service consumer is a V-PCF.

To establish a UE policy association with the PCF, the NF service consumer (e.g. AMF) shall send an HTTP POST request with: "{apiRoot}/npcf-ue-policy-control/v1/policies/" as Resource URI and the PolicyAssociationRequest data structure as request body that shall include:

- Notification URI encoded as "notificationUri" attribute; and

- SUPI encoded as "supi" attribute,

and that shall include when available:

- GPSI encoded as "gpsi" attribute;

- Access type encoded as "accessType" attribute;

- Permanent Equipment Identifier (PEI) encoded as "pei" attribute;

- User Location Information encoded as "userLoc" attribute;

- UE Time Zone encoded as "timeZone" attribute;

- Serving PLMN Identifier and for SNPN the NID encoded as "servingPlmn" attribute;

- RAT type encoded as "ratType" attribute;

- the received UE policy delivery protocol message defined in Annex D of 3GPP TS 24.501 [15] or defined in subclause 7.2.1.1 of 3GPP TS 24.587 [x1] encoded as "uePolReq" attribute;

- if the NF service consumer is an AMF, H-PCF ID (if the consumer is V-PCF, when receiving the H-PCF ID from AMF) encoded as "hPcfId" attribute;

- Internal Group Identifier(s) encoded as "groupIds" attribute;

- the PC5 capability for V2X encoded as "pc5Capab" attribute if the "V2X" feature defined in subclause 5.8 is suppoted;

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

- if the NF service consumer is an AMF, the name of a service produced by the AMF that expects to receive information within Npcf\_UEPolicyControl\_UpdateNotify service operation encoded as "serviceName" attribute;

- if the NF service consumer is an AMF, alternate or backup IPv4 Address(es) where to send Notifications encoded as "altNotifIpv4Addrs" attribute;

- if the NF service consumer is an AMF, alternate or backup IPv6 Address(es) where to send Notifications encoded as "altNotifIpv6Addrs" attribute; and

- if the NF service consumer is an AMF, serving AMF Id encoded in the "servingNfId" attribute.

Upon the reception of the HTTP POST request,

- the (V-)(H-)PCF shall assign a UE policy association ID;

- based on operator policy the V-PCF should send as the NF service consumer towards the H-PCF a request for the Creation of a UE policy association as described in the present clause;

- the (V-)(H-)PCF shall determine the applicable UE policy as detailed in subclause 4.2.2.2, for the V-PCF taking into consideration any policy received from the H-PCF in the reply to the possible request for the Creation of a policy association;

- if the (V-)PCF determines that UE policy needs to be provisioned, it shall use the Namf\_Communication service specified in 3GPP TS 29.518 [14] to provision the UE policy according to subclause 4.2.2.2 and as follows:

(i) the V-PCF shall subscribe at the AMF to notifications of N1 messages for UE Policy Delivery Results using the Namf\_Communication\_N1N2MessageSubscribe service operation;

(ii) the V-PCF shall send the determined UE policy using Namf\_Communication\_N1N2MessageTransfer service operation(s); and

(iii) the V-PCF shall be prepared to receive UE Policy Delivery Results from the AMF within the Namf\_Communication\_N1MessageNotify service operation and for the V-PCF if the received UE Policy Delivery results relate to UE policy sections provided by the H-PCF shall use the Npcf\_UEPolicyControl\_Update Service Operation to send those UE Policy Delivery results to the H-PCF;

- for the succesfull case the (V-)(H-)PCF shall send a HTTP "201 Created" response with the URI for the created resource in the "Location" header field

NOTE 2: The assigned policy association ID is part of the URI for the created resource and is thus associated with the SUPI.

and the the PolicyAssociation data type as body including:

- optionally for the H-PCF as service producer communicating with the V-PCF, UE policy (see subclause 4.2.2.2) encoded as "uePolicy" attribute;

- optionally one or several of the following Policy Control Request Trigger(s) encoded as "triggers" attribute (see subclause 4.2.3.2):

a) Location change (tracking area); and

b) Change of UE presence in PRA; and

c) Change of PLMN if the "PlmnChange" feature is supported; and

d) Change of UE connectivity state if the "ConnectivityStateChange" feature is supported; and

- if the Policy Control Request Trigger "Change of UE presence in PRA" is provided, the presence reporting areas for which reporting is required encoded as "pras" attribute; and

- if errors occur when processing the HTTP POST request, the (V-)(H-)PCF shall apply error handling procedures as specified in subclause 5.7 and according to the following provisions:

- if the user information received within the "supi" attribute is unknown, the PCF shall reject the request and include in an HTTP "400 Bad Request" response message the "cause" attribute of the ProblemDetails data structure set to "USER\_UNKNOWN"; and

- if the PCF is, due to incomplete, erroneous or missing information in the request not able to provision an UE policy decision, the PCF may reject the request and include in an HTTP "400 Bad Request" response message the "cause" attribute of the ProblemDetails data structure set to "ERROR\_REQUEST\_PARAMETERS".

If the (V-)PCF received an GUAMI, the (V-)PCF may subscribe to GUAMI changes using the AMFStatusChange service operation of the Namf\_Communication service specified in 3GPP TS 29.518 [14], and it may use the Nnrf\_NFDiscovery Service specified in 3GPP TS 29.510 [13] (using the obtained GUAMI and possibly service name) to query the other AMFs within the AMF set.

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

##### 4.2.2.2.1 General

The UE policy consists of

* UE Access Network discovery and selection policies and UE Route Selection Policy (URSP). The encoding of UE policies is defined in 3GPP TS 24.526 [16];
* Vehicle-to-Everything Policy (V2XP). The encoding of UE policies is defined in 3GPP TS 24.588 [x2].

Editor's note: It is FFS whether there are configuration parameters provided using UE policies for interworking with EPC.

The UE Policy is transferred to the UE using the UE policy delivery protocol defined in Annex D of 3GPP TS 24.501 [15]. The (V-)(H-)PCF shall send UE policy using the "MANAGE UE POLICY COMMAND" message and will receive the "MANAGE UE POLICY COMPLETE" or the "MANAGE UE POLICY COMMAND REJECT" messages in the response. Those messages are transparently forwarded by the AMF.

The (V-)PCF shall use the Namf\_Communication\_N1N2MessageTransfer service operation defined in subclause 5.2.2.3.1 of 3GPP TS 29.518 [14] to send MANAGE UE POLICY COMMAND" messages to the UE and use the Namf\_Communication\_N1MessageNotify service operation defined in subclause 5.2.2.3.5 of 3GPP TS 29.518 [14] to receive "MANAGE UE POLICY COMPLETE" and "MANAGE UE POLICY COMMAND REJECT" messages from the UE. The (V-)PCF shall only send "MANAGE UE POLICY COMMAND" messages below a predefined size limit.

The H-PCF shall use service operations as defined in the present specification to receive "MANAGE UE POLICY COMPLETE" and "MANAGE UE POLICY COMMAND REJECT" messages from the V-PCF and to send MANAGE UE POLICY COMMAND" messages to the V-PCF. The H-PCF shall encode the "MANAGE UE POLICY COMMAND" message in an "uePolicy" attribute. The H-PCF shall only send "MANAGE UE POLICY COMMAND" messages below a predefined size limit.

The (V-)(H-)PCF may deliver the UE policy to the UE in several "MANAGE UE POLICY COMMAND" messages.

For the purpose of such fragmented delivery and subsequent partial updates of UE policies, the UE policy is divided into policy sections. Such policy sections may be predefined in the (V-)(H-)PCF, may be retrieved by the (V-)(H-)PCF from the UDR as specified in 3GPP TS 29.519 [17], or may be dynamically generated by the (V-)(H-)PCF, but shall comply to the rules below. The (V-)(H-)PCF may combine several policy sections into one "MANAGE UE POLICY COMMAND" message if the predefined size limit is observed.

The following rules apply for policy sections:

- The size shall be below the predefined size limit.

- The policy section shall only contain complete URSP rule(s), WLANSP rule(s), and/or complete N3AN node configuration information, but no fractions of such rules or configuration information.

- To ease a subsequent partial update of UE policies, policy sections should only contain a small number of policies, e.g. URSP rule(s), and/or WLANSP rule(s).

- The entire content of a policy section shall be provided by a single PLMN.

A PCF shall only determine policy sections of its own PLMN. However, a V-PCF may forward UE policy sections received from the H-PCF to the UE.

Each UE policy section is identified by a UE policy section identifier (UPSI). The UPSI is composed of two parts:

a) a PLMN ID part containing the PLMN ID for the PLMN of the PCF which provides the UE policies; and

b) a UE policy section code (UPSC) containing a unique value within the PLMN selected by the PCF.

The (V-)(H-)PCF provides an UPSI when providing a new UE policy section and may then identify that policy section using that UPSI when requesting that this UE policy section is modified or deleted, as specified in Annex D of 3GPP TS 24.501 [15].

If the (V-)(H-)PCF determines that changes are required and/or the V-PCF receives possible new or modified policy sections determined by the H-PCF in the roaming case, it shall send the determined new, updated or deleted policy sections using one or several "MANAGE UE POLICY COMMAND" messages towards the NF service consumer. In the roaming case, the V-PCF may either combine policy sections received from the H-PCF and policy sections the V-PCF selected in the same "MANAGE UE POLICY COMMAND" (as long as the predefined size limit is observed), or use separate "MANAGE UE POLICY COMMAND" messages; however, the V-PCF shall not distribute the policy sections received in one "MANAGE UE POLICY COMMAND" from the H-PCF into several "MANAGE UE POLICY COMMAND" messages as long as the predefined size limit is observed for the policy sections received from the H-PCF. The V-PCF shall allocate a new PTI for the "MANAGE UE POLICY COMMAND" sent by the V-PCF and store the mapping between the new PTI and the PTI within the "MANAGE UE POLICY COMMAND" received from the H-PCF.

After sending a "MANAGE UE POLICY COMMAND" messages, the (V-)(H-)PCF shall wait for a related confirmation in a "MANAGE UE POLICY COMPLETE" messages or failure indication in a "MANAGE UE POLICY COMMAND REJECT" message. When receiving no such message until the expiry of a supervision timer specified in Annex D of 3GPP TS 24.501 [15], or when receiving a failure indication, the PCF should re-send related instructions for the policy sections. In the roaming case, the H-PCF and the V-PCF shall each be responsible for resending those policy sections that it originally supplied. In the case that the V-PCF combined policy sections received from the H-PCF and policy sections the V-PCF selected in the same "MANAGE UE POLICY COMMAND" described below, the V-PCF shall wait for the H-PCF to resend the policy sections of HPLMN, and then resend the combined policy sections. The (V-)(H-)PCF shall always include the initially supplied policy sections when resending the UE policy.

The (V-)(H-)PCF shall determine that a received "MANAGE UE POLICY COMPLETE" message or "MANAGE UE POLICY COMMAND REJECT" message is related to the result of a "MANAGE UE POLICY COMMAND" based on the PTI within that message. In the roaming case, the V-PCF shall determine that the received message is related to the result of the UE policy provided by the H-PCF if the PTI within the message belongs to one of the stored PTI mapping.

If the V-PCF combined policy sections received from the H-PCF and policy sections the V-PCF selected in the same "MANAGE UE POLICY COMMAND", upon reception of a "MANAGE UE POLICY COMPLETE" message or "MANAGE UE POLICY COMMAND REJECT" message the V-PCF shall:

- forward the corresponding "MANAGE UE POLICY COMPLETE" message to the H-PCF;

- if a "MANAGE UE POLICY COMMAND REJECT" message with UPSI(s) of the HPLMN is received, forward the parts of the "MANAGE UE POLICY COMMAND REJECT" message that relate to the UPSI(s) of the HPLMN to the H-PCF;

- if a "MANAGE UE POLICY COMMAND REJECT" message without UPSI(s) of the HPLMN is received, send a "MANAGE UE POLICY COMPLETE" message to the H-PCF; and

- provide the stored PTI received from the HPLMN in the corresponding "MANAGE UE POLICY COMMAND" within the "MANAGE UE POLICY COMPLETE" message or "MANAGE UE POLICY COMMAND REJECT" message towards the H-PCF.

If the V-PCF sent a separate "MANAGE UE POLICY COMMAND" containing only the policy sections received from the H-PCF, the V-PCF shall forward the corresponding "MANAGE UE POLICY COMPLETE" or "MANAGE UE POLICY COMMAND REJECT" message to the H-PCF and provide the stored PTI received from the HPLMN in the corresponding "MANAGE UE POLICY COMMAND" within the "MANAGE UE POLICY COMPLETE" message or "MANAGE UE POLICY COMMAND REJECT" message towards the H-PCF.If the V-PCF distributed the policy sections received in one "MANAGE UE POLICY COMMAND" from the H-PCF into several "MANAGE UE POLICY COMMAND" messages to the UE (because the predefined size limit of the VPLMN was exceeded), the V-PCF shall aggregate all corresponding "MANAGE UE POLICY COMPLETE" or "MANAGE UE POLICY COMMAND REJECT" messages received from the UE into one "MANAGE UE POLICY COMPLETE" or "MANAGE UE POLICY COMMAND REJECT" message towards the H-PCF.

When the (V-)PCF receives an Namf\_Communication\_N1N2MessageTransfer failure response as defined in subclause 5.2.2.3.1.2 of 3GPP TS 29.518 [14], or an N1N2 Transfer Failure Notification as defined in subclause 5.2.2.3.2 of 3GPP TS 29.518 [14], the (V-)PCF shall stop the supervision timer specified in Annex D of 3GPP TS 24.501 [15] corresponding to the affected PTIs. For the N1N2 Transfer Failure Notification case, the (V-)PCF determines the affected PTIs allocated by the V-PCF based on the resource URI within the "n1n2MsgDataUri" attribute of the N1N2MsgTxfrFailureNotification data structure as defined in subclause 6.1.6.2.30 of 3GPP TS 29.518 [14].

NOTE: The (V-)PCF correlates the Namf\_Communication\_N1N2MessageTransfer request and the corresponding N1N2 Transfer Failure Notification based on the resource URI within the "Location" header included in the response HTTP status code "202 Accepted" of the Namf\_Communication\_N1N2MessageTransfer response and the resource URI within the "n1n2MsgDataUri" attribute of and N1N2 Transfer Failure Notification. And then the V-PCF determines the affected PTIs related with the resource URI.

For the roaming case and if the V-PCF determines that the affected UE policy is related with the UE policy delivered by the H-PCF, the V-PCF shall send the POST message as defined in subclause 4.2.3.1 to notify the H-PCF of the failure of UE policy transfer by including the "uePolTransFailNotif" attribute within the PolicyAssociationUpdateRequest data structure. Within the UePolicyTransferFailureNotification data structure, the V-PCF shall include the cause of the UE Policy Transfer Failure within the "cause" attribute and the PTI(s) allocated by the H-PCF corresponding to the PTI(s) allocated by the V-PCF within the "ptis" attribute. The H-PCF shall stop the supervision timer corresponding to the affected PTIs.

In the failure case described above, the (H-)(V-)PCF may provision the policy control request trigger "CON\_STATE\_CH" if not provisioned yet. Upon receiving the notification of UE connectivity state change indicating that the UE enters the CM-Connected state, the (H-)(V-)PCF may retry to deliver the UE Policy.

###### 4.2.2.2.1.1 Provisioning of the UE Access Network discovery and selection policies and UE Route Selection Policy

When the UE registers to the network, the "UE STATE INDICATION" message as defined in subclause D.5.4.1 of 3GPP TS 24.501 [15] may be transferred transparently within the "uePolReq" attribute during the creation of a policy association, as described in subclause 4.2.2.1.

The (H-)PCF may store in the UDR and/or retrieve from the UDR, as specified in 3GPP TS 29.519 [17]:

a) UPSCs and related policy sections of the own PLMN it provided to a UE;

b) the PEI received from the AMF;

c) the OSId(s) received from the UE as described in the Annex D of 3GPP TS 24.501 [15]; and

d) the indication of UE's support for ANDSP included in the "UE STATE INDICATION" message as described in the Annex D of 3GPP TS 24.501 [15].

The (H-)PCF will use the SUPI of the UE as data key and store separate information for each UE in the UDR.

The V-PCF may retrieve UPSCs and related policy sections applicable for all UEs from a HPLMN from the UDR, using the HPLMN ID as key as specified in 3GPP TS 29.519 [17].

When receiving the "UE STATE INDICATION" message, the (V-)(H-)PCF shall determine based on the UPSIs, the ANDSP support indication and the OSId(s) indicated in that message, UPSC stored in the UDR and local policy whether any new UE policy sections need to be installed and any existing UE policy section need to be updated or deleted.

If the "EnhancedBackgroundDataTransfer" feature is supported, the (H-)PCF may retrieve the Background Data Transfer Reference ID(s) by retrieving the UE's Application Data from the UDR as defined in subclause 6.2.9 of 3GPP TS 29.519 [17]. In this case, the PCF shall retrieve the transfer policy corresponding to the Background Data Transfer Reference ID(s) as defined in subclause 5.2.8 of 3GPP TS 29.519 [17] and then may make the URSP rules including the Route Selection Validation Criteria for the UE as defined in subclause 6.6.2.1 of 3GPP TS 23.503 [4]. If the (H-)PCF provisions the URSP rules including the Route Selection Validation Criteria for the UE, it shall use the associated S-NSSAI and DNN to store in the UDR the Background Data Transfer Reference ID(s) in the UE's session management policy data as specified in 3GPP TS 29.519 [17].

###### 4.2.2.2.1.2 Provisioning of Vehicle-to-Everything Policy

When the UE registers to the network, if the AMF receives the PC5 capability for V2X in the Registration Request message from UE, the AMF further reports the PC5 capability for V2X within the "pc5Capab" attribute to the PCF as defined in subclause 4.2.2.1. The PCF may determine the V2XP over PC5 interface based on the received UE's PC5 capability for V2X, the subscription retrieved from the UDR and the operator’s policy.

If the UE supports V2X communication and it does not have valid V2XP, the UE includes the "UE POLICY PROVISIONING REQUEST" message as defined in subclause 7.2.1 of 3GPP TS 24.587 [x1] during registration procedure. The "UE POLICY PROVISIONING REQUEST" message is transferred transparently within the "uePolReq" attribute during the creation of a policy association as described in subclause 4.2.2.1 or during the update of the policy association as described in subclause 4.2.3.1. The PCF may reject the request by sending the "UE POLICY PROVISIONING REJECT" message as defined in subclause 7.2.2 of 3GPP TS 24.587 [x1] or provision the policy as defined in subclause 4.2.2.2.1 based on the subscription retrieved from the UDR and the operator’s policy.

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

##### 4.2.2.2.x1 Vehicle-to-Everything Policy (V2XP)

V2XP includes the V2XP over PC5 and over Uu interfaces.

The V2XP over PC5 are defined in subclause 5.2.3 of 3GPP TS 24.587 [x1] and corresponding encoding is defined 5.3.1 of 3GPP TS 24.588 [x2].

The V2XP over Uu are defined in subclause 5.2.4 of 3GPP TS 24.587 [x1] and corresponding encoding is defined 5.3.2 of 3GPP TS 24.588 [x2].

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

#### 4.2.3.1 General

The procedure in the present subclause is applicable when the NF service consumer modifies an existing UE policy association (including the case where the AMF is relocated and the new AMF selects to maintain the policy association with the old PCF and to update the Notification URI).

Figure 4.2.3.1-1 illustrates the update of a policy association.



Figure 4.2.3.1-1: Update of a UE policy association

NOTE 1: For the roaming case, the PCF represents the V-PCF if the NF service consumer is an AMF and the PCF represents the H-PCF if the NF service consumer is a V-PCF.

The AMF as NF service consumer invokes this procedure when a subscribed policy control request trigger (see subclause 4.2.3.2) occurs: When the location change trigger, the change of UE presence in PRA trigger, the PLMN change trigger or the UE connectivity state change trigger occurs, the AMF shall only invoke the procedure if the PCF has subscribed to that event trigger.

NOTE 2: The AMF uses the Namf\_Communication\_N1MessageNotify service operation specified in 3GPP TS 29.518 [14] to send a "MANAGE UE POLICY COMPLETE" message or a "MANAGE UE POLICY COMMAND REJECT" message, as defined in Annex D.5 of 3GPP TS 24.501 [15], to the V-PCF.

If an AMF knows by implementation specific means that the UE context has been transferred to an AMF with another GUAMI within the AMF set, it may also invoke this procedure to update the Notification URI.

NOTE 3: Either the old or the new AMF can invoke this procedure.

During the AMF relocation, if the new AMF received the resource URI of the individual AM Policy from the old AMF and selects the old PCF, the new AMF shall also invoke this procedure to update the Notification URI. The new AMF may also update the alternate or backup IP addresses.

The V-PCF as NF service consumer invokes this procedure when a policy control request trigger (see subclause 4.2.3.2) occurs. When the "UE\_POLICY", trigger occurs, the V-PCF shall always invoke the procedure. When the PLMN change trigger, the location change trigger, the change of UE presence in PRA trigger or the UE connectivity state change trigger occurs, the V-PCF shall only invoke the procedure if the H‑PCF has subscribed to that event trigger.

To request policies from the PCF or to update the Notification URI, or to update the trace control configuration, or to request the termination of trace, the NF Service Consumer shall request the update of an AM Policy Association by providing relevant parameters about the UE context by sending an HTTP POST request with "{apiRoot}/npcf-ue-policy-control/v1/policies/{polAssoId}/update" as Resource URI and the PolicyAssociationUpdateRequest data structure as request body that shall include:

- at least one of the following:

1. a new Notification URI encoded in the "notificationUri" attribute; and/or

2. observed Policy Control Request Trigger(s) (see subclause 4.2.3.2) encoded as "triggers" attribute;

3. if a UE location change occurred, the UE location encoded as "userLoc" attribute;

4. if a "MANAGE UE POLICY COMPLETE" message or a "MANAGE UE POLICY COMMAND REJECT" message of the UE policy delivery protocol defined in Annex D of 3GPP TS 24.501 [15] has been received by the V-PCF as NF service consumer, and at least parts of the contents relate to UPSIs of the HPLMN, the parts of that message that relate to UPSIs of the HPLMN encoded as "uePolDelResult" attribute;

5. if the Policy Control Request Trigger "Change of UE presence in PRA" is provided, the presence reporting areas for which reporting was requested and the status has changed encoded as "praStatuses" attribute;

6. if the NF service consumer is an AMF, for AMF relocation scenarios, if available, alternate or backup IPv4 Address(es) where to send Notifications encoded as "altNotifIpv4Addrs" attribute;

7. if the NF service consumer is an AMF, for AMF relocation scenarios, if available, alternate or backup IPv6 Address(es) where to send Notifications encoded as "altNotifIpv6Addrs" attribute;

8. for AMF relocation scenarios, if available, the GUAMI encoded as "guami" attribute;

NOTE 4: An alternate NF service consumer than the one that requested the generation of the subscription resource can send the request. For instance, an AMF as service consumer can change.

9. if the NF service consumer is an AMF, for AMF relocation scenarios, the new serving AMF Id encoded in the "servingNfId" attribute;

10. if a UE PLMN change occurred, the PLMN identifier encoded as “plmnId” attribute; and/or

x. if a "UE POLICY PROVISIONING REQUEST" message defined in subclause 7.2.1.1 of 3GPP TS 24.587 [x1] and the "V2X" feature defined in subclause 5.8 is supported, the message encoded as "uePolReq" attribute.

Upon the reception of the HTTP POST request,

- if the PCF is a V-PCF and the V-PCF has an established policy association, the V-PCF shall determine based on the contents of a potentially received "uePolDelResult" attribute (see above) and requested event triggers of the H-PCF whether to send as the NF service consumer towards the H-PCF a request for the update of the policy association as described in the present clause;

- the (V-)(H-)PCF shall determine the applicable policy based on local policy and for the V-PCF any policy received from the H-PCF in the reply to the possible request for the update of a policy association;

- the (V-)(H-)PCF for the succesfull case shall send a HTTP "200 OK" response with the PolicyUpdate data type as body with possible updates for that applicable UE policy (for the H-PCF) and Policy Control Request Trigger(s) encoded as described in subclause 4.2.3.3;

- if the (V-)PCF determines that UE policy needs to be updated, it shall use the Namf\_Communication service specified in 3GPP TS 29.518 [14] to provision the UE policy according to subclause 4.2.2.2 and as follows:

(i) the (V-)PCF shall send the determined UE policy using Namf\_Communication\_N1N2MessageTransfer service operation(s); and

(ii) the (V-)PCF shall be prepared to receive UE Policy Delivery Results from the AMF within the Namf\_Communication\_N1MessageNotify service operation and for the V-PCF if the received UE Policy Delivery results relate to UE policy sections provided by the H-PCF shall use the Npcf\_UEPolicyControl\_Update Service Operation to send those UE Policy Delivery results to the H-PCF; and

- if errors occur when processing the HTTP POST request, shall apply error handling procedures as specified in subclause 5.7 and according to the following provisions:

- if the (V-)(H-)PCF is, due to incomplete, erroneous or missing information in the request not able to provision a UE policy decision, the PCF may reject the request and include in an HTTP "400 Bad Request" response message the "cause" attribute of the ProblemDetails data structure set to "ERROR\_REQUEST\_PARAMETERS".

If the PCF received a new GUAMI, the PCF may subscribe to GUAMI changes using the AMFStatusChange service operation of the Namf\_Communication service specified in 3GPP TS 29.518 [14], and it may use the Nnrf\_NFDiscovery Service specified in 3GPP TS 29.510 [13] (using the obtained GUAMI and possibly service name) to query the other AMFs within the AMF set.

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

#### 4.2.3.2 Policy Control Request Triggers

The following Policy Control Request Triggers are defined (see subclause 6.1.2.5 of 3GPP TS 23.503 [4]):

- "LOC\_CH", i.e. location change (tracking area): the tracking area of the UE has changed;

- "PRA\_CH", i.e. change of UE presence in PRA: the UE is entering/leaving a Presence Reporting Area;

- "UE\_POLICY", i.e. a "MANAGE UE POLICY COMPLETE" message or a "MANAGE UE POLICY COMMAND REJECT" message, as defined in Annex D.5 of 3GPP TS 24.501 [15] or a "UE POLICY PROVISIONING REQUEST" message, as defined in subclause 7.2.1.1 of 3GPP TS 24.587 [x1], has been received by the V-PCF and is being forwarded to the H-PCF ;

- "PLMN\_CH", i.e. PLMN change: the serving PLMN of the UE has changed; and

- "CON\_STATE\_CH", i.e. connectivity state change: the connectivity state of UE has changed;

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

#### 4.2.4.x UE policy provisioning for V2X communication over PC5 and Uu reference points

If the "V2X" feature is supported, after the UE policy association establishment, the (H-)PCF may receive the Service specific parameter information notified by the UDR for the change of UE's Application Data as defined in subclause 6.3.4 of 3GPP TS 29.519 [17]. In this case, the (H-)PCF shall derive the V2XP and provision them to the UE as defined in subclause 4.2.4.1.

If the "V2X" feature is supported, when there is a subscription change in the list of PLMNs where the UE is authorized to perform V2XP over PC5 reference point, the PCF may update the V2XP over PC5 to the UE as defined in subclause 4.2.4.1. If the serving PLMN is removed from the list of PLMNs in the service authorization parameters, the service authorization is revoked in the UE.

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

### 5.6.1 General

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

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

Table 5.6.1-1: Npcf\_UEPolicyControl specific Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Section defined | Description | Applicability |
| Pc5Capability | 5.6.3.x | Indicates the specific PC5 RAT(s) which the UE supports for V2X communication over PC5 reference point. | V2X |
| PolicyAssociation | 5.6.2.2 | Description of a policy association that is returned by the PCF when a policy Association is created, updated, or read. |  |
| PolicyAssociationReleaseCause | 5.6.3.4 | The cause why the PCF requests the termination of the policy association. |  |
| PolicyAssociationRequest | 5.6.2.3 | Information that NF service consumer provides when requesting the creation of a policy association. |  |
| PolicyAssociationUpdateRequest | 5.6.2.4 | Information that NF service consumer provides when requesting the update of a policy association. |  |
| PolicyUpdate | 5.6.2.5 | Updated policies that the PCF provides in a notification or in the reply to an Update Request. |  |
| RequestTrigger | 5.6.3.3 | Enumeration of possible Request Triggers. |  |
| TerminationNotification | 5.6.2.6 | Request to terminate a policy Association that the PCF provides in a notification. |  |
| UePolicy | 5.6.3.2 | UE Policies |  |
| UePolicyDeliveryResult | 5.6.3.2 | UE Policy delivery Result |  |
| UePolicyRequest | 5.6.3.2 | Request for UE Policies |  |
| UePolicyTransferFailureNotification | 5.6.2.7 | Information that the UE policy is failure to be transferred to the UE because the UE is not reachable. |  |

Table 5.6.1-2 specifies data types re-used by the Npcf\_UEPolicyControl 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\_UEPolicyControl service based interface.

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

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Data type | Reference | | Comments | | Applicability | |
| AccessType | 3GPP TS 29.571 [11] | |  | |  | |
| CmState | 3GPP TS 29.518 [14] | | Connectivity state of UE | | ConnectivityStateChange | |
| Gpsi | 3GPP TS 29.571 [11] | | Generic Public Subscription Identifier | |  | |
| GroupId | 3GPP TS 29.571 [11] | |  | |  | |
| Guami | 3GPP TS 29.571 [11] | | Globally Unique AMF Identifier | |  | |
| Ipv4Addr | 3GPP TS 29.571 [11] | |  | |  | |
| Ipv6Addr | 3GPP TS 29.571 [11] | |  | |  | |
| N1N2MessageTransferCause | 3GPP TS 29.518 [14] | |  | |  | |
| NfInstanceId | 3GPP TS 29.571 [11] | |  | |  | |
| Pei | 3GPP TS 29.571 [11] | | Permanent Equipment Identifier | |  | |
| PlmnId | 3GPP TS 29.571 [11] | |  | |  | |
| PlmnIdNid | | 3GPP TS 29.571 [11] | | PLMN Identifier, and for SNPN NID | |  | |
| PresenceInfo | 3GPP TS 29.571 [11] | | Presence reporting area information | |  | |
| ProblemDetails | 3GPP TS 29.571 [11] | |  | |  | |
| Uri | 3GPP TS 29.571 [11] | |  | |  | |
| UserLocation | 3GPP TS 29.571 [11] | |  | |  | |
| RatType | 3GPP TS 29.571 [11] | |  | |  | |
| ServiceName | 3GPP TS 29.510 [13] | | Name of the service instance. | |  | |
| Supi | 3GPP TS 29.571 [11] | | Subscription Permanent Identifier | |  | |
| SupportedFeatures | 3GPP TS 29.571 [11] | | Used to negotiate the applicability of the optional features defined in table 5.8-1. | |  | |
| TimeZone | 3GPP TS 29.571 [11] | |  | |  | |
| Uinteger | 3GPP TS 29.571 [11] | |  | |  | |

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

#### 5.6.2.3 Type PolicyAssociationRequest

Table 5.6.2.3-1: Definition of type PolicyAssociationRequest

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| notificationUri | Uri | M | 1 | Identifies the recipient of Notifications sent by the PCF. |  |
| altNotifIpv4Addrs | array(Ipv4Addr) | O | 1..N | Alternate or backup IPv4 Addess(es) where to send Notifications. |  |
| altNotifIpv6Addrs | array(Ipv6Addr) | O | 1..N | Alternate or backup IPv6 Addess(es) where to send Notifications. |  |
| supi | Supi | M | 1 | Subscription Permanent Identifier. |  |
| gpsi | Gpsi | C | 0..1 | Generic Public Subscription Identifier. Shall be provided when available. |  |
| accessType | AccessType | C | 0..1 | The Access Type where the served UE is camping. Shall be provided when available. |  |
| pei | Pei | C | 0..1 | The Permanent Equipment Identifier of the served UE. Shall be provided when available. |  |
| userLoc | UserLocation | C | 0..1 | The location of the served UE. Shall be provided when available. |  |
| timeZone | TimeZone | C | 0..1 | The time zone where the served UE is camping. Shall be provided when available. |  |
| servingPlmn | PlmnIdNid | C | 0..1 | The serving PLMN where the served UE is camping. For an SNPN the NID together with the PLMN ID identifies the SNPN. Shall be provided when available. |  |
| ratType | RatType | C | 0..1 | The RAT Type where the served UE is camping. Shall be provided when available. |  |
| groupIds | array(GroupId) | C | 1..N | Internal Group Identifier(s) of the served UE. Shall be provided when available. |  |
| hPcfId | NfInstanceId | C | 0..1 | H-PCF Identifier. Shall be provided when available. |  |
| uePolReq | UePolicyRequest | C | 0..1 | A request for UE Policies. Shall be provided when the AMF receives an "UE STATE INDICATION" message, as defined in Annex D.5.4 of 3GPP TS 24.501 [15] or when the AMF receives an "UE POLICY PROVISIONING REQUEST" message, as defined in subclause 7.2.1.1 of 3GPP TS 24.587 [x1] if the "V2X" feature is supported. |  |
| guami | Guami | C | 0..1 | The Globally Unique AMF Identifier (GUAMI) shall be provided by an AMF as 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 information received within the Npcf\_UEPolicyControl\_UpdateNotify service operation. |  |
| servingNfId | NfInstanceId | C | 0..1 | If the NF service consumer is an AMF, it shall contain the identifier of the serving AMF. |  |
| pc5Capab | Pc5Capability | O | 0..1 | Indicates the PC5 Capability supported by the UE. | V2X |
| suppFeat | SupportedFeatures | M | 1 | Indicates the features supported by the service consumer. |  |

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

#### 5.6.2.4 Type PolicyAssociationUpdateRequest

Table 5.6.2.4-1: Definition of type PolicyAssociationUpdateRequest

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| notificationUri | Uri | O | 0..1 | Identifies the recipient of Notifications sent by the PCF. |  |
| 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. |  |
| triggers | array(RequestTrigger) | C | 1..N | Request Triggers that the NF service consumer observes. |  |
| praStatuses | map(PresenceInfo) | C | 1..N | If the Trigger "PRA\_CH" is reported, the UE presence status for tracking area for which changes of the UE presence occurred shall be provided. The "praId" attribute within the PresenceInfo data type shall also be the key of the map. The "presenceState" attribute within the PresenceInfo data type shall be supplied. |  |
| userLoc | UserLocation | C | 0..1 | The location of the served UE shall be provided for trigger "LOC\_CH". |  |
| uePolDelResult | UePolicyDeliveryResult | C | 0..1 | UE Policy Delivery Result. Shall be provided together with trigger "UE\_POLICY" when a "MANAGE UE POLICY COMPLETE" message or a "MANAGE UE POLICY COMMAND REJECT" message, as defined in Annex D.5 of 3GPP TS 24.501 [15], has been received by the V-PCF and is being forwarded to the H-PCF. |  |
| uePolTransFailNotif | UePolicyTransferFailureNotification | C | 0..1 | The UE policy transfer failure notification. Shall be the provided together with trigger "UE\_Policy" when a response with HTTP status code 4xx or 5xx as defined in subclause 5.2.2.3.1.2 of 3GPP TS 29.518 [14] or a N1N2 Transfer Failure Notification as defined in subclause 5.2.2.3.2 of 3GPP TS 29.518 [14] is received after the V-PCF provisioned the UE policy by invoking the Namf\_Communication\_N1N2MessageTransfer service operation to the AMF and is notifying the H-PCF. |  |
| uePolReq | UePolicyRequest | C | 0..1 | A request for UE Policies. Shall be provided when the AMF receives an "UE POLICY PROVISIONING REQUEST" message, as defined in subclause 7.2.1.1 of 3GPP TS 24.587 [x1] if the "V2X" feature is supported. | V2X |
| guami | Guami | O | 0..1 | The Globally Unique AMF Identifier (GUAMI) shall be provided by an AMF as service consumer. |  |
| servingNfId | NfInstanceId | C | 0..1 | It shall contain the identifier of the new AMF during the AMF relocation. |  |
| plmnId | PlmnId | C | 0..1 | The PLMN of the served UE shall be provided for trigger "PLMN\_CH". | PlmnChange |
| connectState | CmState | C | 0..1 | The connectivity state of the served UE shall be provided for trigger "CON\_STATE\_CH". | ConnectivityStateChange |

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

#### 5.6.3.2 Simple data types

The simple data types defined in table 5.6.3.2-1 shall be supported.

Table 5.6.3.2-1: Simple data types

|  |  |  |  |
| --- | --- | --- | --- |
| Type Name | Type Definition | Description | Applicability |
| UePolicy | Bytes | "MANAGE UE POLICY COMMAND" message content, as defined in Table D.5.1.1.1 of 3GPP TS 24.501 [15] |  |
| UePolicyDeliveryResult | Bytes | "MANAGE UE POLICY COMPLETE" message content, as defined in Table D.5.2.1.1 of 3GPP TS 24.501 [15], or "MANAGE UE POLICY COMMAND REJECT" message content, as defined in Table D.5.3.1.1 of 3GPP TS 24.501 [15] |  |
| UePolicyRequest | Bytes | "UE STATE INDICATION" message content, as defined in Table D.5.4.1.1 of 3GPP TS 24.501 [15] or "UE POLICY PROVISIONING REQUEST" message content, as defined in subclause 7.2.1.1 of 3GPP TS 24.587 [x1]. |  |

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

#### 5.6.3.3 Enumeration: RequestTrigger

The enumeration RequestTrigger represents the possible Policy Control Request Triggers.. It shall comply with the provisions defined in table 5.6.3.3-1.

Table 5.6.3.3-1: Enumeration RequestTrigger

|  |  |  |
| --- | --- | --- |
| Enumeration value | Description | Applicability |
| LOC\_CH | Location change (tracking area): the tracking area of the UE has changed. |  |
| PRA\_CH | Change of UE presence in PRA: the UE is entering/leaving a Presence Reporting Area. |  |
| UE\_POLICY | A "MANAGE UE POLICY COMPLETE" message, a "MANAGE UE POLICY COMMAND REJECT" message, as defined in Annex D.5 of 3GPP TS 24.501 [15] or a "UE POLICY PROVISIONING REQUEST" message, as defined in subclause 7.2.1.1 of 3GPP TS 24.587 [x1], has been received by the V-PCF and is being forwarded to the H-PCF. A Namf\_Communication\_N1N2MessageTransfer failure response as defined in subclause 5.2.2.3.1.2 of 3GPP TS 29.518 [14], or an N1N2 Transfer Failure Notification as defined in subclause 5.2.2.3.2 of 3GPP TS 29.518 [14], a UE Policy transfer failure is notifying to the H-PCF. This event does not require a subscription and is only applicable for the V‑PCF as NF service consumer and the H‑PCF as NF service producer. |  |
| PLMN\_CH | PLMN change: the serving PLMN of UE has changed. | PlmnChange |
| CON\_STATE\_CH | Connectivity state change: the connectivity state of UE has changed. | ConnectivityStateChange |

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

#### 5.6.3.x Enumeration: Pc5Capability

The enumeration Pc5Capability indicates the specific PC5 RAT(s) which the UE supports for V2X communication over PC5 reference point. It shall comply with the provisions defined in table 5.6.3.x-1.

Table 5.6.3.x-1: Enumeration Pc5Capability

|  |  |  |
| --- | --- | --- |
| Enumeration value | Description | Applicability |
| LTE\_PC5 | This value is used to indicate that UE supports PC5 LTE RAT for V2X communication over PC5 reference point. |  |
| NR\_PC5 | This value is used to indicate that UE supports PC5 NR RAT for V2X communication over PC5 reference point. |  |
| LTE\_NR\_PC5 | This value is used to indicate that UE supports both PC5 LTE and NR RAT for V2X communication over PC5 reference point. |  |

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

## 5.8 Feature negotiation

The optional features in table 5.8-1 are defined for the Npcf\_UEPolicyControl 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 | PendingTransaction | This feature indicates support for the race condition handling as defined in 3GPP TS 29.513 [7]. |
| 2 | PlmnChange | This feature indicates support for the change of PLMN trigger handling. |
| 3 | ConnectivityStateChange | This feature indicates support for the UE connectivity state change trigger handling. |
| x | V2X | This feature indicates support for the UE policy provisioning and N2 information provisioning for V2X communication. |

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

# A.2 Npcf\_UEPolicyControl API

openapi: 3.0.0

info:

version: 1.1.0.alpha-3

title: Npcf\_UEPolicyControl

description: |

UE Policy Control Service.

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externalDocs:

description: 3GPP TS 29.525 V16.2.0; 5G System; UE Policy Control Service.

url: 'http://www.3gpp.org/ftp/Specs/archive/29\_series/29.525/'

servers:

- url: '{apiRoot}/npcf-ue-policy-control/v1'

variables:

apiRoot:

default: https://example.com

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

security:

- {}

- oAuth2ClientCredentials:

- npcf-ue-policy-control

paths:

/policies:

post:

operationId: CreateIndividualUEPolicyAssociation

summary: Create individual UE policy association.

tags:

- UE Policy Associations (Collection)

requestBody:

required: true

content:

application/json:

schema:

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

responses:

'201':

description: Created

content:

application/json:

schema:

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

headers:

Location:

description: 'Contains the URI of the newly created resource, according to the structure: {apiRoot}/npcf-ue-policy-control/v1/policies/{polAssoId}'

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:

policyUpdateNotification:

'{$request.body#/notificationUri}/update':

post:

requestBody:

required: true

content:

application/json:

schema:

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

responses:

'204':

description: No Content, Notification was succesfull

'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'

policyAssocitionTerminationRequestNotification:

'{$request.body#/notificationUri}/terminate':

post:

requestBody:

required: true

content:

application/json:

schema:

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

responses:

'204':

description: No Content, Notification was succesfull

'307':

description: temporary redirect

'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'

/policies/{polAssoId}:

get:

operationId: ReadIndividualUEPolicyAssociation

summary: Read individual UE policy association.

tags:

- Individual UE Policy Association (Document)

parameters:

- name: polAssoId

in: path

description: Identifier of a policy association

required: true

schema:

type: string

responses:

'200':

description: OK. Resource representation is returned

content:

application/json:

schema:

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

'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'

delete:

operationId: DeleteIndividualUEPolicyAssociation

summary: Delete individual UE policy association.

tags:

- Individual UE Policy Association (Document)

parameters:

- name: polAssoId

in: path

description: Identifier of a policy association

required: true

schema:

type: string

responses:

'204':

description: No Content. Resource was succesfully deleted

'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'

/policies/{polAssoId}/update:

post:

operationId: ReportObservedEventTriggersForIndividualUEPolicyAssociation

summary: Report obeserved event triggers and possibly obtain updated policies for an individual UE policy association.

tags:

- Individual UE Policy Association (Document)

requestBody:

required: true

content:

application/json:

schema:

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

parameters:

- name: polAssoId

in: path

description: Identifier of a policy association

required: true

schema:

type: string

responses:

'200':

description: OK. Updated policies are returned

content:

application/json:

schema:

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

'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'

components:

securitySchemes:

oAuth2ClientCredentials:

type: oauth2

flows:

clientCredentials:

tokenUrl: '{nrfApiRoot}/oauth2/token'

scopes:

npcf-ue-policy-control: Access to the Npcf\_AMPolicyControl API

schemas:

PolicyAssociation:

type: object

properties:

request:

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

uePolicy:

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

triggers:

type: array

items:

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

minItems: 1

description: Request Triggers that the PCF subscribes. Only values "LOC\_CH" and "PRA\_CH" are permitted.

pras:

type: object

additionalProperties:

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

minProperties: 1

suppFeat:

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

required:

- suppFeat

PolicyAssociationRequest:

type: object

properties:

notificationUri:

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

altNotifIpv4Addrs:

type: array

items:

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

minItems: 1

description: Alternate or backup IPv4 Address(es) where to send Notifications.

altNotifIpv6Addrs:

type: array

items:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Ipv6Addr'

minItems: 1

description: Alternate or backup IPv6 Address(es) where to send Notifications.

supi:

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

gpsi:

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

accessType:

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

pei:

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

userLoc:

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

timeZone:

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

servingPlmn:

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

ratType:

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

groupIds:

type: array

items:

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

minItems: 1

hPcfId:

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

uePolReq:

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

guami:

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

serviceName:

$ref: 'TS29510\_Nnrf\_NFManagement.yaml#/components/schemas/ServiceName'

servingNfId:

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

pc5Capab:

$ref: '#/components/schemas/Pc5Capability'

suppFeat:

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

required:

- notificationUri

- suppFeat

- supi

PolicyAssociationUpdateRequest:

type: object

properties:

notificationUri:

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

altNotifIpv4Addrs:

type: array

items:

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

minItems: 1

description: Alternate or backup IPv4 Address(es) where to send Notifications.

altNotifIpv6Addrs:

type: array

items:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Ipv6Addr'

minItems: 1

description: Alternate or backup IPv6 Address(es) where to send Notifications.

triggers:

type: array

items:

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

minItems: 1

description: Request Triggers that the NF service consumer observes.

praStatuses:

type: object

additionalProperties:

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

description: Map of PRA status information.

minProperties: 1

userLoc:

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

uePolDelResult:

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

uePolTransFailNotif:

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

uePolReq:

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

guami:

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

servingNfId:

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

plmnId:

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

connectState:

$ref: 'TS29518\_Namf\_EventExposure.yaml#/components/schemas/CmState'

PolicyUpdate:

type: object

properties:

resourceUri:

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

uePolicy:

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

triggers:

type: array

items:

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

minItems: 1

nullable: true

description: Request Triggers that the PCF subscribes. Only values "LOC\_CH" and "PRA\_CH" are permitted.

pras:

type: object

additionalProperties:

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

description: Map of PRA information.

minProperties: 1

nullable: true

required:

- resourceUri

TerminationNotification:

type: object

properties:

resourceUri:

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

cause:

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

required:

- resourceUri

- cause

UePolicyTransferFailureNotification:

type: object

properties:

cause:

$ref: 'TS29518\_Namf\_Communication.yaml#/components/schemas/N1N2MessageTransferCause'

ptis:

type: array

items:

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

minItems: 1

required:

- cause

- ptis

UePolicy:

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

UePolicyDeliveryResult:

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

UePolicyRequest:

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

RequestTrigger:

anyOf:

- type: string

enum:

- LOC\_CH

- PRA\_CH

- UE\_POLICY

- PLMN\_CH

- CON\_STATE\_CH

- type: string

description: >

This string provides forward-compatibility with future

extensions to the enumeration but is not used to encode

content defined in the present version of this API.

description: >

Possible values are

- LOC\_CH: Location change (tracking area). The tracking area of the UE has changed.

- PRA\_CH: Change of UE presence in PRA. The UE is entering/leaving a Presence Reporting Area.

- UE\_POLICY: A MANAGE UE POLICY COMPLETE message or a MANAGE UE POLICY COMMAND REJECT message, as defined in Annex D.5 of 3GPP TS 24.501 or a "UE POLICY PROVISIONING REQUEST" message, as defined in subclause 7.2.1.1 of 3GPP TS 24.587 [x1], has been received by the AMF and is being forwarded.

- PLMN\_CH: PLMN change. the serving PLMN of UE has changed.

- CON\_STATE\_CH: Connectivity state change: the connectivity state of UE has changed.

PolicyAssociationReleaseCause:

anyOf:

- type: string

enum:

- UNSPECIFIED

- UE\_SUBSCRIPTION

- INSUFFICIENT\_RES

- type: string

description: >

This string provides forward-compatibility with future

extensions to the enumeration but is not used to encode

content defined in the present version of this API.

description: >

Possible values are

- UNSPECIFIED: This value is used for unspecified reasons.

- UE\_SUBSCRIPTION: This value is used to indicate that the policy association needs to be terminated because the subscription of UE has changed (e.g. was removed).

- INSUFFICIENT\_RES: This value is used to indicate that the server is overloaded and needs to abort the policy association.

Pc5Capability:

anyOf:

- type: string

enum:

- LTE\_PC5

- NR\_PC5

- LTE\_NR\_PC5

- type: string

description: >

This string provides forward-compatibility with future

extensions to the enumeration but is not used to encode

content defined in the present version of this API.

description: >

Possible values are

- LTE\_PC5: This value is used to indicate that UE supports PC5 LTE RAT for V2X communication over PC5 reference point.

- NR\_PC5: This value is used to indicate that UE supports PC5 NR RAT for V2X communication over PC5 reference point.

- LTE\_NR\_PC5: This value is used to indicate that UE supports both PC5 LTE and NR RAT for V2X communication over PC5 reference point..

\*\*\* End of Change \*\*\*