**3GPP TSG CT WG3 Meeting #136C3-244425**

Maastricht NL, 19th – 23rd August 2024 (revision of C3-244365)

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
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|  | **29.525** | **CR** | 0363 | **rev** | **1** | **Current version:** | **18.6.1** |  |
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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:***  | Support of spending limits for UE policies in roaming case |
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| ***Source to WG:*** | China Telecom, Nokia |
| ***Source to TSG:*** | CT3 |
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| ***Work item code:*** | TEI19\_SLUPiR |  | ***Date:*** | 2024-08-19 |
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| ***Category:*** | **B** |  | ***Release:*** | Rel-19 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories 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-12 (Release 12)**Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)* |
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| ***Reason for change:*** | H-PCF for the UE can interact with H-CHF in roaming scenario to make UE policies based on spending limits which is supported in Rel-19. The V-PCF will be the NF service consumer to receive "chfInfo" from H-PCF to enable the AMF select the same CHF. |
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| ***Summary of change:*** | Add V-PCF as service consumer when "SLAMUP" feature is supported. |
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| ***Consequences if not approved:*** | Spending limits for UE policies in roaming case is not supported. |
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| ***Clauses affected:*** | 4.2.2.1 |
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|  | **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 ...  |
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| ***Other comments:*** | This CR does not impact the OpenAPI file. |
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| ***This CR's revision history:*** |  |

**Additional discussion(if needed):**

**…**

**Proposed changes:**

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| **First change** |

#### 4.2.2.1 General

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

- UE performs initial registration to the network, as defined in clause 5.5.1.2.2 of 3GPP TS 24.501 [15];

- UE performs a mobility registration, if the UE operating in single-registration mode performs inter-system change from S1 mode to N1 mode, as defined in clause 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; and

- 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 clause 4.2.3.1.

To support the delivery of URSP in EPS, the procedure in the present clause is also applicable when:

- When the UE triggers a BEARER RESOURCE MODIFICATION REQUEST message with a UE policy container IE after the UE performs ePCO capability negotiation during PDN connection establishment procedure (during the Initial Attach with default PDN connection establishment or during the first PDN connection establishment or during PDN connection modification without QoS update or during new PDN connection establishment when no other existing PDN connection indicates support of URPS provisioning in EPS) as defined in 3GPP TS 24.301 [33], and both, the UE and the network support URSP provisioning in EPS PCO; and

- 5GS to EPS handover or 5GS to EPS Idle Mode mobility (both referred as 5GS to EPS mobility in the present document) as defined in 3GPP TS 24.501 [15] and if the UE and at least one of the PDN connection(s) supports URSP delivery in EPS as specified in 3GPP TS 29.512 [31].

The creation of a 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 procedure used for the creation of a policy association.



Figure 4.2.2.1-1: Creation of a UE policy association

NOTE 1: For the roaming scenario, 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.

When a UE registers to the network and a UE context is being established, if the AMF obtains from the UE a UE policy delivery protocol message as defined in Annex D of 3GPP TS 24.501 [15] and/or the authorized PC5 capability for 5G ProSe, and/or the authorized PC5 capability for V2X communications and/or A2X communications, and/or the authorized PC5 capability for Ranging/SL, the AMF shall establish a UE policy association with the (V-)PCF, in case there is no existing UE policy association for the UE; otherwise, the AMF may establish a UE Policy Association with the (V-)PCF based on AMF local configuration.

NOTE 2: In the roaming scenario, the visited AMF's local configuration can indicate whether UE Policy delivery is needed based on the roaming agreement with the home PLMN of the UE.

During UE Initial Attach with default PDN connection or the establishment of the first PDN connection in EPS or a new PDN connection when no other existing PDN connection indicates the support of URSP provisioning in EPS, if the UE and the SMF+PGW support URSP provisioning in EPS PCO, and the "EpsUrsp" feature is supported between the SMF+PGW-C and the PCF for the PDU session, the PCF for a PDU session associated with the SMF+PGW-C serving the PDN connection obtains from the UE a UE policy container in a Npcf\_SMPolicyControl\_Update procedure triggered by a bearer resource modification procedure as described in 3GPP TS 29.512 [31]. Then, if the "EpsUrsp" feature described in clause 5.8 is supported, the PCF for a PDU session shall establish a UE policy association with the (V-)PCF for the UE for the delivery of URSP only.

During 5GS to EPS mobility with N26, and if the "EpsUrsp" feature described in clause 5.8 is supported, the PCF for the PDU session determines whether 5GS to EPS mobility applies based on the received RAT and/or Access-Type change event as described in 3GPP TS 29.512 [31]. Then, for non-roaming and Home Routed roaming scenarios, the PCF for a PDU session shall determine whether the UE supports URSP provisioning in EPS by checking the UE Policy Set information in UDR as specified in 3GPP TS 29.519 [17], and if supported, shall establish a UE policy association with the PCF for the UE that is handling the UE policy association with the source AMF. For LBO roaming scenarios, the V-PCF for the PDU session determines based on local configuration whether to establish a UE Policy Association towards the V-PCF for the UE.

NOTE 3: The PCF for the PDU session discovers the address of the PCF for the UE handling the UE policy association with the source AMF by querying the BSF as described in 3GPP TS 29.521 [22].

NOTE 4: If during the 5GS to EPS mobility there are more than one PCF for the PDU session maintaining PDN connections for the UE, every PCF for the PDU session establishes a UE Policy Association towards the PCF for the UE. In LBO scenarios, the V-PCF for the UE will handle only one UE Policy Association towards the H-PCF for the UE.

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, which shall include:

- the Notification URI encoded as "notificationUri" attribute;

- the SUPI encoded as "supi" attribute; and

- the features supported by the NF service consumer encoded as "suppFeat" attribute,

shall also include, when available:

- the GPSI encoded as "gpsi" attribute;

- the Access type encoded as "accessType" attribute;

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

- the User Location Information encoded as "userLoc" attribute;

- the UE Time Zone encoded as "timeZone" attribute;

- the identifier of the serving network (the PLMN Identifier or the SNPN Identifier), encoded as "servingPlmn" attribute;

NOTE 5: The SNPN Identifier consists of the PLMN Identifier and the NID.

- the RAT type encoded as "ratType" attribute;

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

- for the roaming scenario, if the NF service consumer is an AMF, the H-PCF ID encoded as "hPcfId" attribute;

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

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

- the 5G ProSe capability within the "proSeCapab" attribute, if the "ProSe" feature defined in clause 5.8 is supported;

- the Ranging/SL capability within the "rangSlCapab" attribute, if the "Ranging\_SL" feature defined in clause 5.8 is supported;

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

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

NOTE 6: If the PCF received the "servingNfId" attribute, the PCF can use the Nnrf\_NFDiscovery Service specified in 3GPP TS 29.510 [13] to retrieve the NF profile of the Namf\_Communication service available in the indicated AMF instance Id.

- if the NF service consumer is an AMF, the "SliceAwareANDSP" feature is supported, and the AMF has determined that the UE has selected a non-3gpp access node (i.e. TNGF or N3IWF) that is not compatible with the allowed S-NSSAI(s), and the UE indicated the support of slice-based N3IWF and/or TNGF selection as specified in 3GPP TS 24.501 [15], the wrongly selected type of non-3gpp access node encoded as "n3gNodeReSel" attribute, and, in the roaming case, also the Configured NSSAI for the serving PLMN encoded as "confSnssais" attribute;

- if the NF service consumer is an AMF, the Satellite Backhaul Category encoded as "satBackhaulCategory" attribute, if the "EnSatBackhaulCategoryChg" feature defined in clause 5.8 is supported;

- if the NF service consumer is the PCF for the PDU session, and the "EpsUrsp" feature defined in clause 5.8 is supported, the indication that the trigger for the UE Policy Association Establishment is the 5GS to EPS mobility scenario encoded as the "5gsToEpsMob" attribute;

- for the roaming scenario, if the NF service consumer is an AMF and the "NssaiChange" feature is supported, the Configured NSSAI for the serving PLMN encoded as "confSnssais" attribute and optionally the mapped each S-NSSAI value of home network corresponding to the configured S-NSSAI values in the serving PLMN encoded as "mappedHomeSnssai" attribute within the "confSnssais" attribute;

- the A2X capability encoded as "a2xCapab" attribute if the "A2X" feature defined in clause 5.8 is supported;

- if the feature "AccessChange" is supported, the NF service consumer shall include:

a) the "accessTypes" attribute indicating registration in the 3GPP access, in the non-3GPP access, or in both 3GPP and non-3GPP access, if available; and

b) the RAT type entry corresponding to the 3GPP access and/or the RAT type entry corresponding to the non-3GPP access encoded in the "ratTypes" attribute, if available.

NOTE 7: If the feature "AccessChange" is not supported or it is not known yet whether it is supported in the PCF, the NF service consumer can also provide the "accessType" attribute and the "ratType" attribute, if available, with one available access type and RAT type.

NOTE 8: When the UE is simultaneously connected to the 5G Core Network of a PLMN/SNPN over a 3GPP access and a non-3GPP access, the UE is served by the same AMF, as specified in 3GPP TS 23.501 [2]. In this case, the UE Policy Association contains both, 3GPP and non-3GPP accesses.
When the UE is simultaneously connected to 5G Core Network over 3GPP access and non-3GPP access in different PLMN(s)/SNPN(s), the UE is served by different AMFs. In this case, there can be two UE Policy Associations, each with the corresponding access type.

- for the roaming scenario, if the NF service consumer is a V-PCF and the "VPLMNSpecificURSP" feature is supported, the AF guidance on VPLMN-specific URSP rules related information, if applicable, within the "vpsUePolGuidance" attribute, that shall contain for each related AF:

a. the AF guidance on VPLMN-Specific URSP rules within the "urspGuidance" attribute; and

b. if the AF requested to the VPLMN notifications about the delivery of UE Policies, the "deliveryEvents" attribute including the "SUCCESS\_UE\_POL\_DEL\_SP" and/or "UNSUCCESS\_UE\_POL\_DEL\_SP" events; and

- for the roaming scenario, if the NF service consumer is an AMF, and the "VPLMNSpecificURSP" feature is supported, LBO information within the "lboRoamInfo" attribute.

and may include:

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

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

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

- if the NF service consumer is an AMF, the alternate or backup FQDN(s) where to send Notifications encoded as "altNotifFqdns" attribute;

- if the NF service consumer is an AMF and the "SLAMUP" feature is supported, based on the operator policies the H-PCF indicates that the AMF should select the same CHF that is selected by the H-PCF for a UE, the charging address(es) information encoded in the "chfInfo" attribute.

Upon the reception of the HTTP POST request,

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

- for the roaming scenario and based on operator policy, the V-PCF (as the NF service consumer) should send to 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 clause 4.2.2.2. For the V-PCF, any policy received from the H-PCF in the reply to the possible request for the Creation of a policy association should be taken into consideration;

- 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 clause 4.2.2.2 and as follows:

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

(ii) the (V-)PCF shall send the determined UE policy (e.g. ANDSP, URSP, V2XP, A2XP, ProSeP, RSLPP) using Namf\_Communication\_N1N2MessageTransfer service operation(s); and

(iii) the (V-)PCF shall be prepared to receive UE Policy Delivery Results from the AMF and/or subsequent UE policy requests (e.g. for V2XP and/or A2XP and/or ProSeP and/or RSLPP) within the Namf\_Communication\_N1MessageNotify service operation. For the V-PCF, if the received UE Policy Delivery results relate to UE policy sections provided by the H-PCF, the V-PCF shall use the Npcf\_UEPolicyControl\_Update Service Operation defined in clause 4.2.3 to send those UE Policy Delivery results to the H-PCF;

- if the UE indicates the support of V2X communications over PC5 reference point and the "V2X" feature is supported, the (H-)PCF shall determine the applicable V2XP, as detailed in clause 4.2.2.2.1.2, and V2X N2 PC5 policy, as detailed in clause 4.2.2.3 and based on the operator's policy;

- if the UE indicates the support of 5G ProSe and the "ProSe" feature is supported, the (H-)PCF shall determine the applicable ProSeP, as detailed in clause 4.2.2.2.1.3, and 5G ProSe N2 PC5 policy, as detailed in clause 4.2.2.4 and based on the operator's policy;

- if the UE indicates the support of Ranging/SL and the "Ranging\_SL" feature is supported, the (H-)PCF shall determine the applicable RSLPP, as detailed in clause 4.2.2.2.1.5, and Ranging/SL N2 PC5 policy, as detailed in clause 4.2.2.7, and based on the operator's policy;

- if the PCF determines that N2 PC5 policy (e.g., for V2X communications, for 5G ProSe, for Ranging/SL) needs to be provisioned, including the case of the V-PCF when receiving the N2 PC5 policy from the H-PCF, the PCF shall use the Namf\_Communication service specified in 3GPP TS 29.518 [14] to provision the N2 PC5 policy according to clause 4.2.2.3 and/or clause 4.2.2.4;

- if the UE indicates support for URSP provisionng in EPS, the "EpsUrsp" feature is supported, and the (V-)PCF determines that UE policy needs to be provisioned via a PCF for a PDU session, the (V-)PCF shall select a UE Policy Association and shall provision the UE policy according to clause 4.2.2.2 and as follows:

(i) the (V-)PCF shall send a UE policy container with the determined URSP using Npcf\_UEPolicyControl\_Create response service operation(s); and

(ii) the (V-)PCF shall be prepared to receive UE Policy Delivery Results from the PCF for a PDU session. The PCF for a PDU session shall use the Npcf\_UEPolicyControl\_Update service operation defined in clause 4.2.3 to send those UE Policy Delivery results to the (V-)PCF;

- if the UE indicates the support of A2X communications over PC5 reference point and the "A2X" feature is supported, the (H-)PCF shall determine the applicable A2XP, as detailed in clause 4.2.2.2.1.4, and A2X N2 PC5 policy, as detailed in clause 4.2.2.5 and based on the operator's policy;

 for the successful 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 9: The assigned policy association ID is part of the URI for the created resource and is thus associated with the SUPI.

and the PolicyAssociation data type as response body, including:

- mandatorily, the negotiated supported features encoded as "suppFeat" attribute;

- optionally, the information provided by the NF service consumer when requesting the creation of this policy association encoded as "request" attribute;

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

- optionally, for the H-PCF as service producer communicating with the V-PCF, N2 PC5 policy (see clause 4.2.2.3 and/or clause 4.2.2.4 and/or clause 4.2.2.5 and/or clause 4.2.2.6) encoded as "n2Pc5Pol" attribute (for V2X communications) and/or "n2Pc5PolA2x" attribute (for A2X communications) and/or "n2Pc5ProSePol" attribute (for 5G ProSe) and/or "n2Pc5RsppPol" attribute (for Ranging/SL);

- optionally, for the H-PCF as service producer communicating with the V-PCF, and when the feature "UECapabilityIndication" is supported, if the H-PCF did not receive from the UE information about ANDSP support and the information is available and reliable in the UDR (see clause 4.2.2.2.1.1), the ANDSP support indication retrieved from UDR encoded as "andspInd" attribute;

- optionally, for the (V-)PCF communicating with the AMF, and if the "URSPEnforcement" feature is supported, the request to the AMF to be notified about the PDU session established/terminated events by providing the PCF for the UE callback information within the "pcfUeInfo" attribute, and the DNN and S-NSSAI combination of the concerned PDU session(s) within the "matchPdus" attribute.

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

a) Location change (tracking area);

b) Change of UE presence in PRA;

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

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

e) URSP rule enforcement information, if the "URSPEnforcement" feature is supported;

f) Change of Satellite Backhaul Category, if the "EnSatBackhaulCategoryChg" feature is supported;

g) Change of Access Type and RAT Type, if the "AccessChange" feature is supported;

h) LBO information change, applicable to roaming scenarios, if the "VPLMNSpecificURSP" feature is supported and the NF service consumer is an AMF; and

i) Change of Configured NSSAI, in roaming scenarios, if the "NssaiChange" feature is supported and the NF service consumer is the AMF;

- 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;

- if the Policy Control Request Trigger "LBO information change" is provided, optionally, the DNNs(s) and S-NSSAI(s) for which LBO information is required encoded as "pduSessions" attribute;

- for the roaming scenario, if the NF service consumer is a V-PCF and the "SLAMUP" feature is supported, based on the operator policies the H-PCF interacts with V-PCF to indicate that the AMF should select the same H-CHF that is selected by the H-PCF for a UE, the charging address(es) information encoded in the "chfInfo" attribute.

NOTE 10: If the PCF uses a Presence Reporting Area identifier referring to a Set of Core Network predefined Presence Reporting Areas as defined in 3GPP TS 23.501 [2], the PCF includes the identifier of this Presence Reporting Area set within the "praId" attribute.

- if the "SliceAwareANDSP" feature is supported, the PCF received the "n3gNodeReSel" attribute and the PCF has successfully delivered to the UE the ANDSP/WLANSP with the slice selection information for the corresponding non-3gpp node, the indication of the successful UE configuration by providing the "andspDelInd" attribute with the value "CONFIGURED". The PCF may delay the indication of the configuration result to a subsequent Npcf\_UEPolicyControl\_UpdateNotify request, as described in clause 4.2.4.2.

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

- if the user information received within the "supi" attribute is unknown, the (V-)(H-)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 (V-)(H-)PCF is, due to incomplete, erroneous or missing information in the request, not able to provision a UE policy decision, the (V-)(H-)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 a 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 (service) set.

When the "SliceAwareANDSP" feature is supported, and the AMF receives the "andspDelInd" attribute, the AMF, based on operator's policies, may reject the UE Registration request, and may provide a valid target N3IWF/TNGF within the Registration Reject message as specified in clause 5.5.1.3.5 of 3GPP TS 24.501 [15]. In this case, the AMF terminates the UE Policy Association as described in clause 4.2.5 (if the UE is not registered over 3GPP access).

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| **End of changes** |