**3GPP TSG-CT WG3 Meeting #135 *C3-243174r1***

**Hyderabad, IN, 27 - 31 May, 2024**

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
|  |
|  | **29.512** | **CR** | **1237** | **rev** | **-** | **Current version:** | **18.5.1** |  |
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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:***  | Handling of usage monitoring in S-NSSAI replacement scenarios |
|  |  |
| ***Source to WG:*** | Ericsson |
| ***Source to TSG:*** | CT3 |
|  |  |
| ***Work item code:*** | eNS\_Ph3 |  | ***Date:*** | 2024-04-29 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-18 |
|  | *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-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)Rel-20 (Release 20)* |
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| ***Reason for change:*** | According to the agreed CR in the last SA2 meeting, S2-2405702, the PCF:* will decide based on operator policies whether the usage monitoring applies for the replaced or the new S-NSSAI in use.
* When the usage monitoring applies for the new S-NSSAI in use, the PCF shall disable usage monitoring for the PDU session and for the applicable PCC Rules.
* When the usage monitoring applies for the new S-NSSAI in use, the PCF shall retrieve from the UDR the allowed usage and store the remaining usage for the replaced S-NSSAI.

These new impacts need to be covered in this specification. |
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| ***Summary of change:*** | New clauses are introduced in order to introduce the impacts in Usage monitoring procedures when Network Slice Replacement takes place:* PCF can interact with the UDR at SM Policy Association creation and modification when the PCF is aware of a new S-NSSAI and usage monitoring applies for that one.
* PCF shall interact with the UDR to update the remaining usage for the replaced S-NSSAI when there is a replacement of S-NSSAI and the PCF decides to apply usage monitoring to the new S-NSSAI.
* PCF may disable usage monitoring in the SMF for the replaced S-NSSAI when there is a replacement of S-NSSAI and the PCF decides to apply usage monitoring to the new S-NSSAI.
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| ***Consequences if not approved:*** | Unspecified impacts for usage monitoring in S-NSSAI replacement scenarios may bring interoperability issues. |
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| ***Clauses affected:*** | 4.2.2.1; 4.2.2.26(new); 4.2.4.1; 4.2.4.2; 4.2.4.33(new). |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **x** |  |  Other core specifications  | TS 23.503 CR#1289 |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** | This CR does not have any impact in the Npcf\_SMPolicyControl API. |
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| ***This CR's revision history:*** |  |

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

#### 4.2.2.1 General

The Npcf\_SMPolicyControl\_Create service operation provides means for the SMF to request the creation of a corresponding SM Policy Association with PCF.

The Session Management procedures of the SMF and related policies are defined in 3GPP TS 23.501 [2], 3GPP TS 23.502 [3] and 3GPP TS 23.503 [6].

The following procedures using the Npcf\_SMPolicyControl\_Create service operation are supported:

- Request the creation of a corresponding SM Policy Association with the PCF.

- Provisioning of PCC rules.

- Provisioning of policy control request triggers.

- Provisioning of charging related information for a PDU session.

- Provisioning of revalidation time.

- Policy provisioning and enforcement of authorized AMBR per PDU session.

- Policy provisioning and enforcement of authorized default QoS.

- Provisioning of PCC rule for Application Detection and Control.

- 3GPP PS Data Off Support.

- IMS Emergency Session Support.

- Request Usage Monitoring Control.

- Access Network Charging Identifier report.

- Request for the successful resource allocation notification.

- Provisioning of IP Index Information.

- Negotiation of the QoS flow for IMS signalling.

- PCF resource cleanup.

- Access traffic steering, switching and splitting support.

- DNN Selection Mode Support.

- Detection of the SM Policy Association enabling Time Sensitive Communications, Time Synchronization and Deterministic Networking.

- Support of Dual Connectivity end to end redundant User Plane paths.

- User Plane Remote Provisioning of UE SNPN Credentials in Onboarding Network.

- Network slice related data rate policy control.

- Request of Presence Reporting Area Change Report.

- Group related data rate policy control.

- Support of Network Slice Usage Control.

- VPLMN Specific Offloading Policy.

- Network Slice Replacement handling.

When the EMDBV feature defined in clause 5.8 is supported by both the PCF and the SMF, the PCF shall use the extMaxDataBurstVol attribute instead of the maxDataBurstVol attribute to signal maximum data burst volume values higher than 4095 Bytes.

When the EMDBV feature is supported by the PCF but not supported by the SMF and the PCF needs to signal maximum data burst volume values higher than 4095 Bytes, the PCF shall use the maxDataBurstVol attribute set to 4095 Bytes.

For values lower than or equal to 4095 Bytes, the PCF shall use the maxDataBurstVol attribute.

NOTE: Maximum data burst volume values are sent by the PCF in responses to the SMF or in an SM Policy Association Update request i.e. after feature negotiation, so the PCF knows whether the SMF supports the EMDBV feature.

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

#### 4.2.2.26 Network Slice Replacement handling

When the PCF receives a Npcf\_SMPolicyControl\_Create request, the "NetSliceRepl" feature is supported and the "altSliceInfo" attribute is received as part of the SmPolicyContextData data structure as defined in clause 4.2.2.2, the PCF may decide to apply usage monitoring for the DNN/ Alternative S-NSSAI combination. In that case, the PCF may receive information from the UDR about the total allowed usage per DNN / Alternative S-NSSAI combination and UE.

The PCF may enable the usage monitoring data corresponding to the monitoring key of the session rule(s) associated to the PDU session and for the PCC Rules applicable to the Alternative S-NSSAI/DNN combination as described in clause 4.2.6.5.3.1.

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

#### 4.2.4.1 General

The Npcf\_SMPolicyControl\_Update service operation provides means for the NF service consumer to inform the PCF that a policy control request trigger condition has been met and for the PCF to inform the NF service consumer of any resulting update of the Session Management related policies.

The following procedures using the Npcf\_SMPolicyControl\_Update service operation are supported:

- Provisioning of PCC rules.

- Provisioning of policy control request triggers.

- Request the policy based on revalidation time.

- Policy provisioning and enforcement of authorized AMBR per PDU session.

- Policy provisioning and enforcement of authorized default QoS.

- Application detection information reporting.

- Indication of QoS Flow Termination Implications.

- 3GPP PS Data Off Support.

- Request and report Access Network Information.

- Request Usage Monitoring Control and report Accumulated Usage.

- Ipv6 Multi-homing support.

- Request and report the result of PCC rule removal.

- Access Network Charging Identifier Request and report.

- Request and report the successful resource allocation notification.

- Negotiation of the QoS flow for IMS signalling.

- Notification about Service Data Flow QoS target enforcement.

- Request the termination of SM Policy association.

- Reporting of TSC user plane node management information and port management information.

- QoS Monitoring Report.

- Policy decision and condition data error handling.

- Request the policy after DDN failure events.

- Network slice related data rate policy control.

- Presence Reporting Area Information Report.

- PCC Rule Error Report.

- Session Rule Error Report.

- UE initiates a resource modification support.

- Trace Control.

- Group related data rate policy control.

- Support of Network Slice Usage Control.

- Network Slice Replacement handling.

- VPLMN Specific Offloading Policy.

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

#### 4.2.4.2 Requesting the update of the Session Management related policies



Figure 4.2.4.2-1: Requesting the update of the Session Management related policies

When the NF service consumer detects that one or more policy control request triggers are met, the NF service consumer shall send a POST request to the PCF to update an Individual SM Policy resource. The {smPolicyId} in the URI identifies the Individual SM Policy resource to be updated. The NF service consumer include SmPolicyUpdateContextData data structure in the content of the HTTP POST to request a update of representation of the "Individual SM Policy" resource. The NF service consumer shall include the met policy control request trigger(s) within the "repPolicyCtrlReqTriggers" attribute and applicable updated value(s) in the corresponding attribute(s).

The NF service consumer shall include (if the corresponding policy control request trigger is met and the applicable information is available) in the SmPolicyUpdateContextData data structure:

- type of access within the "accessType" attribute;

- type of the radio access technology within the "ratType" attribute;

- the new allocated UE Ipv4 address within the "ipv4Address" attribute and/or the UE Ipv6 prefix within the "ipv6AddressPrefix" attribute;

- an additional new allocated UE Ipv6 prefix within the "addIpv6AddrPrefixes" attribute, if the "MultiIpv6AddrPrefix" feature is supported;

- multiple new allocated UE Ipv6 prefixes within the "multiIpv6Prefixes" attribute, if the "UnlimitedMultiIpv6Prefix" feature is supported;

- the released UE Ipv4 address within the "relIpv4Address" attribute and/or the UE Ipv6 prefix within the "relIpv6AddressPrefix" attribute;

- an additional released UE Ipv6 prefix within the "addRelIpv6AddrPrefixes" attribute, if the "MultiIpv6AddrPrefix feature" is supported;

- multiple released UE Ipv6 prefixes within the "multiRelIpv6Prefixes" attribute, if the "UnlimitedMultiIpv6Prefix feature" is supported;

- the UE MAC address within the "ueMac" attribute;

- the released UE MAC address within the "relUeMac" attribute;

- the indication of UE supporting reflective QoS within the "refQosIndication" attribute;

- access network charging identifier within the "accNetChIds" attribute;

- the 3GPP PS data off status within the "3gppPsDataOffStatus" attribute, if the "3GPP-PS-Data-Off" feature is supported;

- the UE time zone information within the "ueTimeZone" attribute;

- the UDM subscribed Session-AMBR or, if the "DN-Authorization" feature is supported, the DN-AAA authorized Session-AMBR within the "subsSessAmbr" attribute;

NOTE 1: When both, the UDM subscribed Session-AMBR and the DN-AAA authorized Session-AMBR are available in the NF service consumer, the NF service consumer includes the DN-AAA authorized Session-AMBR.

- if the "VPLMN-QoS-Control" feature is supported, the highest Session-AMBR and the default QoS supported in the VPLMN within the "vplmnQos" attribute, if available;

NOTE 2: In home routed roaming, the H-SMF may provide the QoS constraints received from the VPLMN (defined in 3GPP TS 23.502 [3] clause 4.3.2.2.2) to the PCF.

- if the "DN-Authorization" feature is supported, the DN-AAA authorization profile index within the "authProfIndex" attribute;

- subscribed Default QoS Information within the "subsDefQos" attribute;

- detected application information within the "appDetectionInfos" attribute;

- if the "UMC" feature is supported, the accumulated usage reports within the "accuUsageReports" attribute;

- if the "PRA" feature is supported, the reported presence reporting area information within the "repPraInfos" attribute;

- the QoS flow usage required of the default QoS flow within the "qosFlowUsage" attribute;

- indication whether the QoS targets of one or more SDFs are not guaranteed or guaranteed again within the "qncReports" attribute;

- user location(s) information within the "userLocationInfo" attribute;

NOTE 3: The SMF encodes both 3GPP and non-3GPP access UE location in the "userLocationInfo" attribute when they are both received from the AMF.

- if the "GroupIdListChange" feature is supported, the Internal Group Identifier(s) of the served UE within the "interGrpIds " attribute;

- if the "SatBackhaulCategoryChg" feature is supported, the satellite backhaul category or non-satellite backhaul and, when the "EnSatBackhaulCatChg" feature is supported, also the dynamic satellite backhaul category, within the "satBackhaulCategory" attribute;

- if the "AMInfluence" feature is supported, the PCF for the UE callback URI and, if received, SBA binding information within the "pcfUeInfo" attribute;

- serving network function identifier within the "servNfId" attribute;

- identifier of the serving network within the "servingNetwork" attribute;

- when the "URSPEnforcement" feature is supported, the URSP rule enforcement information provided by the UE within the "urspEnfInfo" attribute. In this case, the NF service consumer shall also include, if they were not previously provided, the SSC mode within the "sscMode" attribute, the UE requested DNN (if available and different from the selected DNN) within the "ueReqDnn" attribute, and/or if the PDU session is redundant, the RSN and the PDU session pair ID within the "redundantPduSessionInfo" attribute. The NF service consumer shall also provide the "accessType" attribute, if changed compared to the latest reported value;

- if the "EnTSCAC" feature is supported, the BAT offset and the optionally adjusted periodicity within the "batOffsetInfo" attribute;

- when the "EneNA" feature is supported, the list of NWDAF instance IDs used for the PDU Session within the "nwdafInstanceId" and their associated Analytic ID(s) within "nwdafEvents" updated with the new values included within the "nwdafDatas" attribute;

NOTE 4: The NF service consumer provides the complete updated list of NWDAF instance IDs and associated Analytic ID(s) used for the PDU session. If all NWDAF data is deleted an empty list is included.

- for HR-SBO scenario, if the "HR-SBO" feature is supported, the H-SMF may include the HR-SBO support indication within the "hrsboInd" attribute; and

- when the "NetSliceRepl" feature is supported:

- if the NF service consumer reports a change from the initial S-NSSAI of the PDU Session to the Alternative S-NSSAI, the corresponding trigger and the Alternative S-NSSAI for the PDU Session within the "altsliceInfo" attribute; and

- if the NF service consumer reports a change back from the Alternative S-NSSAI to the initial S-NSSAI of the PDU Session, only the corresponding trigger with no additional information.

The NF service consumer may include in "SmPolicyUpdateContextData" data structure the IPv4 address domain identity within the "ipDomain" attribute.

In case of a successful update, "200 OK" response shall be returned. The PCF shall include in the "200 OK" response the representation of the updated policies within the SmPolicyDecision data structure. Detailed procedures related to the provisioning and enforcement of the policy decisions within the SmPolicyDecision data structure are contained in clause 4.2.6.

NOTE 5: An empty SmPolicyDecision data structure is included in the "200 OK" response when the PCF decides not to update policies.

If the PCF received a new list of NWDAF instance IDs used for the PDU Session in "nwdafInstanceId" attribute and their associated Analytic IDs in "nwdafEvents" attribute included within the "nwdafDatas" attribute the PCF may select those NWDAF instances based on this new list as described in 3GPP TS 29.513 [7].

If the "HR-SBO" feature is supported and if the PCF received information related to the HR-SBO support, the PCF may provide the "vplmnOffload" attribute indicating the new/updated/removed Specific Offloading Policy for the VPLMN as described in clause 4.2.4.32.

If the "NetSliceRepl" feature is supported and if the PCF received information related to the Network Slice Replacement as described in this clause, the PCF may behave as described in clause 4.2.4.33.

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

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

If the PCF is, due to incomplete, erroneous or missing information (e.g. QoS, RAT type, subscriber information) not able to provision a policy decision as response to the request for PCC rules by the NF service consumer, 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\_INITIAL\_PARAMETERS".

If the PCF receives the set of session information which is sent in the message originated due to a trigger being met is incoherent with the previous set of session information for the same session (E.g. trigger met was RAT changed, and the RAT notified is the same as before), 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\_TRIGGER\_EVENT".

If the PCF detects that the packet filters in the request for new PCC rules received from the NF service consumer is covered by the packet filters of outstanding PCC rules that the PCF is provisioning to the NF service consumer, the PCF may reject the request and include in an HTTP "403 Forbidden" response message the "cause" attribute of the ProblemDetails data structure set to "ERROR\_CONFLICTING\_REQUEST".

If the PCF does not accept one or more of the traffic mapping filters provided by the NF service consumer in an HTTP POST request (e.g. because the PCF does not allow the UE to request enhanced QoS for services not known to the PCF), the PCF shall reject the request and include in an HTTP "403 Forbidden" response message the "cause" attribute of the ProblemDetails data structure set to "ERROR\_TRAFFIC\_MAPPING\_INFO\_REJECTED".

If the NF service consumer receives HTTP response with these codes, the NF service consumer shall reject the PDU session modification that initiated the HTTP Request.

The PCF shall not combine a rejection with provisioning of PCC rule operations in the same HTTP response message.

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

#### 4.2.4.33 Network Slice Replacement handling

When the PCF receives a Npcf\_SMPolicyControl\_Update request and the "NetSliceRepl" feature is supported, the PCF may check whether S-NSSAI replacement is taking place as described in clause 4.2.4.1. In that case, if the PCF decides to apply usage monitoring for the new S-NSSAI in use based on operator policies, the PCF shall disable usage monitoring data for the monitoring key of the session rule(s) associated to the PDU session and for the monitoring key(s) for the PCC rule(s) corresponding to the replaced S-NSSAI as described in clause 4.2.6.5.3.2. The PCF shall update the usage monitoring information related to the replaced S-NSSAI in the UDR as defined in 3GPP TS 29.519 [15].

Once usage monitoring is disabled, the PCF may receive information from the UDR about the total allowed usage for the new DNN / S-NSSAI combination and the PCF.shall enable the usage monitoring data corresponding to the monitoring key of the session rule(s) associated to the PDU session and for the monitoring key(s) for the PCC Rules applicable for the new S-NSSAI/DNN combination as described in clause 4.2.6.5.3.1.

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