**3GPP TSG-CT WG3 Meeting #138C3-246314**

**Orlando, US, 14 - 18 October, 2024**

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **29.525** | **CR** | **0385** | **rev** | **-** | **Current version:** | **19.0.0** |  |
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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:*** | URSP rules provisioning for Background Data Transfer | | | | | | | | | |
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| ***Source to WG:*** | Ericsson | | | | | | | | | |
| ***Source to TSG:*** | CT3 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | UEP19 | | | | |  | ***Date:*** | | | 2024-10-21 |
|  |  | | | |  | |  | | |  |
| ***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 can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19) Rel-20 (Release 20)* | |
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| ***Reason for change:*** | | According to TS 23.503:  “When the PCF determines to send a URSP rule related to the Background Data Transfer Policy to the UE, the PCF creates the URSP rule using the MAC address or IP 3-tuple (to identify the Application server) as Traffic descriptor. The RSD part of the URSP rule is populated with the S-NSSAI and DNN associated with the ASP identifier. The Route Selection Validation Criteria of the URSP rule (see clause 6.6.2.1) is populated with the Time Window set to the recommended time window of the BDT policy and, if the BDT policy is not applicable for the whole network, the Location Criteria is set to the network area information of the BDT policy. The PCF will store the URSP rule in the UDR as part of the UE's Policy Set Entry. The PCF will use the associated S-NSSAI and DNN associated with the ASP identifier stored in the Application Data to store the Background Data Transfer Reference ID in the UE's PDU Session policy control subscription information (see clause 6.2.1.3).”  And  “The PCF uses local policies to decide when the URSP rule related to the Background Data Transfer Policy is going to be sent to the UE. The PCF may, based on operator configuration, trigger the UE Configuration Update procedure when the AF request to apply the BDT policy to a future session is received, or the PCF may wait until receiving a notification from the AMF that the UE has entered the Tracking Area or Presence Area where the BDT policy applies, and/or the PCF may wait until the time window when the BDT policy applies is approaching.”  And  “When the AF receives the notification, the AF may select one of the BDT policies included in the candidate list, and then inform the PCF about the selected BDT policy. The PCF stores the newly selected BDT policy into the UDR for the corresponding Background Data Transfer Reference ID and removes the BDT policy that is no longer valid. The PCF is also updating the URSP rule corresponding to the BDT policy with the new Validation Criteria in the Policy Set Entry of all UEs. As a consequence, the PCF identifies the UEs for which the BDT policy was already provided and updates the URSP rule corresponding to the BDT policy using the procedure described in clause 4.16.12.2 of TS 23.502 [3].”  However, TS 29.525 does not fully define how the URSP rules are created based on the information retrieved from the UDR nor specify when the PCF should initiate the UE Policy update procedure towards the UE. | | | | | | | | |
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| ***Summary of change:*** | | Clause 4.2.2.2.3.1 is updated to complete how the URSP rule is derived based on the information obtained from the UDR related to BDT Policies.  It is also specified when the URSP rules are provided to the UE, considering the derived revalidation criteria.  Clause 4.2.4.4 is updated to allow the PCF to consider the revalidation criteria for controlling when the URSP rules are provided to the UE. | | | | | | | | |
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| ***Consequences if not approved:*** | | Incomplete specification may bring incorrect behaviour in the PCF. | | | | | | | | |
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| ***Clauses affected:*** | | 4.2.2.2.3.1; 4.2.4.4. | | | | | | | | |
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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 ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | | This CR has no impact on OpenAPI. | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

**Additional discussion(if needed):**

**Proposed changes:**

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

###### 4.2.2.2.3.1 General

The UE Route Selection Policy is used by the UE to determine how to route outgoing traffic.

The UE Route Selection Policy shall consist of one or several URSP rules. The PCF determines whether URSP rule(s) have to be provisioned based on input parameters received from the NF service consumer, the received list of UPSIs from the UE, if available, the UE Policy Sections stored in the UDR, if available, other received UE parameters, if available, the policy subscription and application data retrieved from UDR, if available, analytics information received from NWDAF, if available, and local policies.

URSP rules are encoded as defined in 3GPP TS 24.526 [16].

UE Route Selection Policy may only be provided by a H-PCF or the PCF of the SNPN, but shall not be provided by a V-PCF. However, UE Route Selection Policy determined and provided by the H-PCF may be retrieved by a V-PCF from the H-PCF and forwarded to a UE.

The (H-)PCF shall use the UE policy subscription data stored in UDR as specified in 3GPP TS 29.519 [17] to ensure the values included in the Route Selection Descriptor of the generated URSP rules are always supported by subscription.

For the received list of internal group Ids, the (H-)PCF retrieves the corresponding 5G VN group configuration data stored from the UDR as specified in 3GPP TS 29.504[27] and 3GPP TS 29.505 [26], if available. For each available 5G VN group, the (H-)PCF may use the retrieved 5G VN group configuration values to encode the values for the Route Selection Descriptor and the values for the Traffic Descriptor of the generated URSP rules.

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 clause 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 clause 5.2.8 of 3GPP TS 29.519 [17] and then may create the URSP rules, which shall include the Traffic Descriptor based on the retrieved application traffic descriptor and the Route Selection Description based on the retrieved DNN and S-NSSAI. The (H-)PCF may include the corresponding network area information and time window, if available, within the Route Selection Validation Criteria for the UE as defined in clause 6.6.2.1 of 3GPP TS 23.503 [4]. The (H-)PCF 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].

NOTE 1: If the derived URSP rule(s) include Route Selection Validation criteria the (H-)PCF, based on local policies, can postpone the provisioning of the URSP rules as described in clause 4.2.4.4.

If the (H-)PCF retrieves the BDT policy and corresponding related information (e.g. network area information, the volume of data to be transferred per UE, etc.) within the BdtData data type, and the "bdtpStatus" attribute within the BdtData data type is set to value "INVALID" (i.e. BDT policy re-negotiation is ongoing), the (H-)PCF shall not provision the URSP rules based on the invalid BDT policy. When the BDT policy re-negotiation is completed the PCF may:

- if the new BDT Policy is determined, create or update the applicable URSP rules based on the new BDT policy; or

- if the invalid BDT policy is removed, remove applicable URSP rules.

If the "AfGuideURSP" feature is supported by the Nudr\_DataRepository service, the (H-)PCF may receive Service specific parameter information that contains data for AF guidance information on the URSP determination as defined in clause 6.4.2.15 of 3GPP TS 29.519 [17]. In this case, the (H-)PCF may also use this AF guidance information as input to determine the URSP that will be provisioned to the UE. If the received AF guidance information is not consistent with the UE subscription data, or the local operator policy does not allow the specific S-NSSAI and DNN provided by the AF guidance information, the corresponding AF guidance information shall not be used to determine the URSP rules. The PCF may also determine not to use AF guidance based on the analytics info received from the NWDAF.

When the (H-)PCF decides to provide URSP rules based on the AF guidance information, it shall derive the information as follows:

- Application traffic descriptor within the "trafficDesc" attribute is used to set the Traffic Descriptor of URSP rule (defined in Figure 5.2.2 of 3GPP TS 24.526 [16]).

- Each route selection parameter set within the "routeSelParamSets" attribute of the UrspRuleRequest data type is used to determine a Route selection descriptor (defined in Figure 5.2.2 of 3GPP TS 24.526 [16]) as follows:

- DNN (within the "dnn" attribute of the RouteSelectionParameterSet data type) and S-NSSAI (within the "snssai" attribute of the RouteSelectionParameterSet data type) from the route selection parameter set are used to set the Route selection descriptor contents (defined in Figure 5.2.4 of 3GPP TS 24.526 [16]);

- Route selection precedence (within the "precedence" attribute of the RouteSelectionParameterSet data type) is used to set the Precedence value of route selection descriptor (defined in Figure 5.2.4 of 3GPP TS 24.526 [16]); and

- the spatial validity condition (within the "spatialValidityTais" attribute of the RouteSelectionParameterSet data type) is used to set the Location criteria of the route selection descriptor (defined in Figure 5.2.5 of 3GPP TS 24.526 [16]).

- The PCF may use the requested PDU Session type provided within the "pduSessType" attribute of the RouteSelectionParameterSet data structure to derive the PDU Session type of the route selection descriptors of the URSP rule.

- The precedence for the generated URSP rule is determined by the (H-)PCF. The (H-)PCF may use the "relatPrecedence" attribute within the "UrspRuleRequest" data type to derive the relative precedence of the URSP rule for a request coming from the same AF.

URSP rules based on AF guidance should not be set as the URSP rules with the "match all" application traffic descriptor.

The (H-)PCF may obtain the information about the UE's OS from the UE as described in the Annex D of 3GPP TS 24.501 [15] or it may derive the information about the UE's OS from the PEI provided by the NF service consumer (e.g. AMF).

If the (H-)PCF is required to provide UE policies to the UE that includes application descriptors then:

a) If the (H-)PCF has been provided with one UE's OS Id by the UE, the (H-)PCF shall use either the traffic descriptor "OS App Id type" or the traffic descriptor "OS Id + OS App Id type" as defined in 3GPP TS 24.526 [16].

NOTE 2: The (H-)PCF uses the traffic descriptor "OS Id + OS App Id type" when the (H-)PCF does not take the received UE's OS Id into account.

b) If the (H-)PCF has been provided with more than one UE's OS Id by the UE,

- the (H-)PCF shall use the traffic descriptor "OS Id + OS App Id type" for the UE's OS Id provided by the UE as defined in 3GPP TS 24.526 [16]; and

- the (H-)PCF shall not use the traffic descriptor "OS App Id type" as defined in 3GPP TS 24.526 [16].

c) If the (H-)PCF has not been provided with the UE's OS Id by the UE,

- the (H-)PCF shall use the traffic descriptor "OS Id + OS App Id type" as defined in 3GPP TS 24.526 [16]; and

- the (H-)PCF shall not use the traffic descriptor "OS App Id type" as defined in 3GPP TS 24.526 [16].

d) If the (H-)PCF has been provided with the UE's OS Id by the UE and the (H-)PCF has derived the UE's OS Id from the PEI and if there is an inconsistency between the OS Id provided by the UE and the OS Id derived from the PEI, the (H-)PCF shall use the OS Id provided by the UE for providing UE policies to the UE that include application descriptors.

URSP rules may be used to support end to end redundant user plane paths by establishing two redundant PDU sessions. PCF configuration based on e.g. deployment, terminal implementation or policies per group of UE(s) may be used by the PCF to determine whether the URSP Rules shall include PDU Session Pair ID and RSN to indicate that they refer to redundant PDU sessions or whether the UE will determine these values instead.

NOTE 3: When the "EnSatBackhaulCategoryChg" feature defined in clause 5.8 is supported, the received satellite or non-satellite backhaul category can be used as input to provision or update URSP rules to enable appropriate PDU session capabilities. E.g., when satellite backhaul category is indicated by the AMF, the (H-)PCF can take it into account to determine, based on operator policies, an appropriate Route Selection Descriptor for the URSP rule and the services deployed on the satellite, (e.g., the provisioning or update of URSP rules to indicate the specific DNN for services deployed on-board satellites).

If the AF provided the (H-)PCF with Personal IoT Network identifier (PIN ID) associated with a DNN and S-NSSAI, and the received DNN and S-NSSAI corresponds to a subscribed DNN and S-NSSAI combination in the UE Policy Context as described in 3GPP TS 29.519 [17], the (H-)PCF shall include the PIN ID within the traffic descriptor of the URSP Rule attribute as defined in 3GPP TS 24.526 [16] for UE to choose an appropriate PIN to establish the PDU session.

NOTE 4: The PCF can provide two distinct URSP rules to support end to end redundant user plane paths using Dual Connectivity for the duplicated traffic of an application. Duplicated traffic from the UE application is differentiated by two distinct traffic descriptors (different DNNs, and for IP traffic, different IP descriptors or non-IP descriptors), each one defined in a different URSP rule, so that the two redundant PDU sessions are matched to the specific Route Selection Descriptors of distinct URSP rules. These Route Selection Descriptors of distinct URSP rules may include corresponding RSNs and PDU Session Pair IDs as defined in 3GPP TS 24.526 [16]. The Route Selection Descriptors share the same PDU Session Pair ID, if included, to denote the two traffic are redundant with each other.

NOTE 5: For backward compatibility, PCF can provide a Route Selection Descriptor with PDU Session Pair ID and RSN and a Route Selection Descriptor without PDU Session Pair ID and RSN in the URSP rule. In this case, the Route Selection Descriptor with PDU Session Pair ID and RSN has a lower precedence value (i.e. higher prioritised) than the one without PDU Session Pair ID. It allows that if a non-supporting UE receives the Route Selection Descriptor containing PDU Session Pair ID, it ignores this Route Selection Descriptor.

NOTE 6: PIN ID and other traffic descriptor components are mutually exclusive, i.e., if PIN ID is included in a URSP rule, then no other traffic descriptor components are supported in the same URSP rule.

The PCF may adjust the URSP rules when needed, based on awareness of URSP rule enforcement for an application by using the following mechanisms:

A. Awareness of URSP rule enforcement with UE assistance:

- Based on operator policies, and if the UE included in the UE STATE INDICATION message the indication of UE's support of reporting URSP rule enforcement as specified in the Annex D of 3GPP TS 24.501 [15], the PCF may indicate in a URSP rule sent to the UE to send reporting of URSP rule enforcement, as specified in 3GPP TS 24.526 [16]. For this URSP rule, the UE reports URSP rule enforcement information to the SMF if Connection Capabilities are included in the traffic descriptor, as specified in the Annex D of 3GPP TS 24.501 [15] and in 3GPP TS 24.526 [16]. When several URSP rules for multiple applications associated to a PDU session are enforced, several URSP rule enforcement reports are included within the URSP rule enforcement information. The SMF reports URSP rule enforcement information received from the UE and its PDU session parameters (e.g. requested DNN, SSC mode, S-NSSAI of the HPLMN, PDU Session Type) to the PCF for the PDU session as specifed in 3GPP TS 29.512 [31].

- For LBO roaming session case, if the feature "URSPEnforcement" is supported, the H-PCF for the UE may send the "URSP\_ENF\_INFO" Policy Control Request Trigger to the V-PCF for the UE during the UE Policy Association Establishment or Modification procedures. When the V-PCF receives URSP rule enforcement information and the PDU session parameters as described above, the V-PCF shall invoke the UE Policy Association Update Modification procedure as described in clause 4.2.3.1.

- If the (V-)(H-)PCF for a UE and the PCF for a PDU session are different, then the (V-)(H-)PCF for a UE may subscribe to the PCF for a PDU session to receive the reporting of URSP rule enforcement information as defined in 3GPP TS 29.514 [37] and the (V-)(H-)PCF for a UE may obtain UE reporting of URSP rule enforcement information and the PDU session parameters from the PCF for a PDU session as defined in 3GPP TS 29.514 [37], where the V-PCF for a UE interacts with the PCF for a PDU session in the VPLMN and the H-PCF for a UE interacts with the PCF for a PDU session in the HPLMN. The (V-)(H-)PCF for the UE discovers the PCF for the PDU session via subscription with the BSF as specified in 3GPP TS 29.521 [22] or, when the feature "URSPEnforcement" is supported, via the request to the AMF to be notified about whether the PCF for the PDU session is available as specified in clauses 4.2.2.1, 4.2.3.1 and 4.2.4.2.

- Based on the received URSP rule enforcement information and the PDU session parameters, the (H-)PCF may adjust the URSP rules e.g. when the (H-)PCF determines that the UE does not have up-to-date URSP rules. To identify the enforced URSP rule, the PCF may compare the reported Connection Capabilities with the Connection Capabilities of the URSP rules with the indication of "reporting of URSP rule enforcement" and, to identify the Route Selection Descriptor of the enforced URSP rule, the PCF may compare the received PDU session parameters with the parameters in the Route Selection Descriptor components. If there are more than one URSP rule(s) that match the reported Connection Capabilities, the PCF may identify the enforced URSP rule(s) based on implementation specific means. If there are inconsistencies between the received PDU session parameters and the parameters in the Route Selection Descriptor components of the enforced URSP rule, the PCF may perform appropriate actions (e.g. if the S-NSSAI does not match, the PCF may initiate slice replacement procedure).

- In this release of the specification, the received URSP rule enforcement information shall contain for each URSP rule enforcement report, the one or more Connection Capabilities contained in the traffic descriptor of the concerned URSP rule. If the URSP rule enforcement report does not include connection capabilities, based on local policies, the (H-)PCF for the UE may ignore the received URSP rule enforcement report.

NOTE 6: A UE supporting the report of URSP rule enforcement reports URSP rule enforcement when the UE (based on the application information matching the traffic descriptor of the URSP rule) associates a newly detected application to a new PDU session or to an existing PDU session and when based on URSP re-evaluation the UE changes the association of an existing application to a PDU session. The UE does not report URSP rule enforcement while the UE is in EPS, delaying the report to when the UE moves from EPS to 5GS.

B. Awareness of URSP rule enforcement without UE assistance: The PCF may subscribe to or request the PDU Session Traffic analytics statistics using the Nnwdaf\_EventsSubscription\_Subscribe service operation or Nnwdaf\_AnalyticsInfo\_Request service operation including the "PDU\_SESSION\_TRAFFIC" event for traffic monitoring of known traffic according to provisioned PDU Session Traffic requirements of corresponding URSP rule(s) at the NWDAF as defined in 3GPP TS 29.520 [38]. If the PCF is notified or responded with traffic that does not match Traffic Descriptor provided that is the traffic which is not expected according to a URSP rule, the PCF may adjust the URSP rules when unexpected application traffic is detected.

NOTE 7: The PCF can combine the UE reporting of URSP rule enforcement with the analytics information together to adjust the URSP rules.

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

#### 4.2.4.4 URSP provisioning for Background Data Transfer policy

If the "EnhancedBackgroundDataTransfer" feature is supported, after the UE policy association establishment, the (H‑)PCF may receive the Background Data Transfer Reference ID(s) notified by the UDR for the change of UE's Application Data as defined in clause 6.3.4 of 3GPP TS 29.519 [17]. In this case, the (H-)PCF shall retrieve the transfer policy corresponding to the Background Data Transfer Reference ID(s) as defined in clause 5.2.8 of 3GPP TS 29.519 [17] and derive the URSP including the Route Selection Validation Criteria for the UE as defined in clause 6.2.2.1 of 3GPP TS 23.503 [4]. Based on the Route Selection Validation Criteria, the (H-)PCF may control the provisioning of the URSP considering the derived temporal and spatial conditions (e.g. the (H-)PCF may wait until the AMF indicates that the UE has entered in the Tracking Area or Presence Area where the BDT policy applies or may wait until the time window when the BDT policy applies).

The H-PCF shall provision the URSP to the V-PCF as defined in clause 4.2.4.2 and then the V-PCF shall invoke the Namf\_Communication\_N1N2MessageTransfer service operation to provision it to the UE. The (H-)PCF 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].

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