**SA WG2 Meeting SA2#165S2-2410199**

**14-18, October 2024, Hyderabad, IN (Revision of S2-2408664)**

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
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|  | **503** | **CR** | **1367** | **rev** | **1** | **Current version:** | **19.1.0** |  |
|  |
| *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 | **X** | Radio Access Network |  | Core Network | **X** |

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| --- |
|  |
| ***Title:***  | UIA\_ARC Support of non-3GPP Device identifiers in Policy Control |
|  |  |
| ***Source to WG:*** | OPPO, Nokia, Charter, Cable Labs?, Ericsson? |
| ***Source to TSG:*** | SA2 |
|  |  |
| ***Work item code:*** | UIA\_ARC |  | ***Date:*** | 2024-09-28 |
|  |  |  |  |  |
| ***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-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
|  |  |
| ***Reason for change:*** | It has been agreed in TR 23.700-32 that For non-3GPP devices requiring QoS differentiation, UE/5G-RG may send the Device Identifier and user plane address of the non-3GPP device to the SMF in a NAS-SM message, and the SMF will forward the Device Identifier and user plane address to the PCF. The PCF will take it into account for policy decisions based on the Device Identifier information retrieved from the UDR. |
|  |  |
| ***Summary of change:*** | Update clause 6.6.2.1 to add non-3GPP Device ID Traffic Descriptor to support URSP;Update clause 6.6.2.3 to add non-3GPP Device ID support for URSP;Update clause 6.2.1.2 to add non-3GPP Device ID as Input for PCC decisions. |
|  |  |
| ***Consequences if not approved:*** | Not be able to support the new UIA feature |
|  |  |
| ***Clauses affected:*** | 6.6.2.1, 6.6.2.3, 6.1.2.2.1, 6.2.1.2 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications  | TS 23.502 |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

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

### 6.6.2 UE Route Selection Policy information

#### 6.6.2.1 Structure Description

The UE Route Selection Policy (URSP) includes a prioritized list of URSP rules.

Table 6.6.2.1-1: UE Route Selection Policy

| Information name | Description | Category | PCF permitted to modify in a URSP | Scope |
| --- | --- | --- | --- | --- |
| URSP rules | 1 or more URSP rules as specified in table 6.6.2.1-2 | Mandatory | Yes | UE context |

The structure of the URSP rules is described in Table 6.6.2.1-2 and Table 6.6.2.1-3.

Table 6.6.2.1-2: UE Route Selection Policy Rule

| Information name | Description | Category | PCF permitted to modify in a UE context | Scope |
| --- | --- | --- | --- | --- |
| Rule Precedence | Determines the order the URSP rule is enforced in the UE. | Mandatory(NOTE 1) | Yes | UE context |
| Indication for reporting URSP rule enforcement | Determines the need for reporting the URSP rule enforcement in the UE.(NOTE 10) | Optional | Yes | UE context |
| **Traffic descriptor** | *This part defines the Traffic descriptor components for the URSP rule.* | Mandatory(NOTE 3) |  |  |
| Application descriptors | It consists of OSId and OSAppId(s) (NOTE 2, NOTE 8). | Optional | Yes | UE context |
| IP descriptors(NOTE 6) | Destination IP 3 tuple(s) (IP address or IPv6 network prefix, port number, protocol ID of the protocol above IP) (NOTE 8, NOTE 12). | Optional | Yes | UE context |
| Domain descriptors | FQDN(s) or a regular expression which are used as a domain name matching criteria (NOTE 7, NOTE 8). | Optional | Yes | UE context |
| Non-IP descriptors(NOTE 6) | Descriptor(s) for destination information of non-IP traffic (NOTE 8, NOTE 12). | Optional | Yes | UE context |
| DNN | This is matched against the DNN information provided by the application (NOTE 8). | Optional | Yes | UE context |
| Connection Capabilities | This is matched against the information provided by a UE application when it requests a network connection with certain capabilities (NOTE 4, NOTE 8) or traffic categories (NOTE 5). | Optional | Yes | UE context |
| PIN ID | Matched against a PIN ID for a specific PIN configured in the PEGC (NOTE 9). | Optional | Yes | UE context |
| Connectivity Group ID | Matched against a Connectivity Group ID for a specific Connectivity Group configured in the 5G-RG (NOTE 11). | Optional | Yes | UE context |
| Non-3GPP Device Identifier  | Matched against a non-3GPP Device Identifier (NOTE X). | Optional | Yes | UE context |
| **List of Route Selection Descriptors** | A list of Route Selection Descriptors. The components of a Route Selection Descriptor are described in table 6.6.2.1-3. | Mandatory |  |  |
| NOTE 1: Rules in a URSP shall have different precedence values.NOTE 2: The information is used to identify the Application(s) that is(are) running on the UE's OS. The OSId does not include an OS version number. The OSAppId does not include a version number for the application.NOTE 3: At least one of the Traffic descriptor components shall be present.NOTE 4: The format and some values of Connection Capabilities, e.g. "ims", "mms", "internet", etc. are defined in TS 24.526 [19]. More than one Connection Capabilities value can be provided.NOTE 5: The format and values of Connection Capabilities Traffic Descriptor to match against standardized traffic categories are defined in TS 24.526 [19] according to the requirements in GSMA PRD NG.135 [39]. The reserved values of Connection Capabilities to match operator-specific traffic categories are specified in TS 24.526 [19]. Traffic categories requested by the UE application are independent from the UE's Operating System. Operator-specific traffic categories values are out of scope of 3GPP specifications. Details on how UE applications indicate traffic categories to the UE's Operating System are out of scope of 3GPP specifications.NOTE 6: A URSP rule cannot contain the combination of the Traffic descriptor components IP descriptors and Non-IP descriptors.NOTE 7: The match of this Traffic descriptor does not require successful DNS resolution of the FQDN provided by the UE Application.NOTE 8: Not applicable for PINE traffic.NOTE 9: The PCF delivers Traffic descriptor with PIN ID based on S-NSSAI/DNN as specified in clause 6.2.1.3. PIN ID only applies to traffic to/from PINEs. 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.NOTE 10: A URSP rule can contain this indication only if the URSP rule includes a Connection Capabilities Traffic descriptor.NOTE 11: Only applies to traffic to/from NAUN3 devices behind the 5G-RG (as defined in TS 23.316 [27]) and may only be combined with IP descriptors and/or non-IP descriptors in the same URSP rule.NOTE 12: May also be applied for traffic from NAUN3 devices behind the 5G-RG (as defined in TS 23.316 [27]).NOTE X: Non-3GPP Device Identifier is specified in clause 5.x of TS 23.501 [2]. This attribute is only applicable for support of differentiated QoS by establishing separate PDU session for each non-3GPP device. |

Table 6.6.2.1-3: Route Selection Descriptor

| Information name | Description | Category | PCF permitted to modify in URSP | Scope |
| --- | --- | --- | --- | --- |
| Route Selection Descriptor Precedence  | Determines the order in which the Route Selection Descriptors are to be applied.  | Mandatory(NOTE 1) | Yes | UE context |
| **Route selection components** | *This part defines the route selection components* | Mandatory(NOTE 2) |  |  |
| SSC Mode Selection | One single value of SSC mode.(NOTE 5) | Optional | Yes | UE context |
| Network Slice Selection | Either a single value or a list of values of S-NSSAI(s). | Optional(NOTE 3) | Yes | UE context |
| DNN Selection | Either a single value or a list of values of DNN(s). | Optional | Yes | UE context |
| PDU Session Type Selection | One single value of PDU Session Type | Conditional(NOTE 8) | Yes | UE context |
| Non-Seamless Offload indication | Indicates if the traffic of the matching application is to be offloaded to non-3GPP access outside of a PDU Session. | Optional(NOTE 4)(NOTE 10) | Yes | UE context |
| ProSe Layer-3 UE-to-Network Relay Offload indication | Indicates if the traffic of the matching application is to be sent via a ProSe Layer-3 UE-to-Network Relay outside of a PDU Session. | Optional(NOTE 4)(NOTE 10) | Yes | UE context |
| ProSe Multi-path Preference | Indicates if the traffic of the matching application is preferred to be sent via a PDU Session over the Uu reference point and a ProSe Layer-3 UE-to-Network Relay outside of a PDU Session. | Optional(NOTE 9)(NOTE 10) | Yes | UE context |
| Access Type preference | Indicates the preferred Access Type (3GPP or non-3GPP or Multi-Access) when the UE establishes a PDU Session for the matching application. | Optional | Yes | UE context |
| PDU Session Pair ID | An indication shared by redundant PDU Sessions as described in clause 5.33.2.1 of TS 23.501 [2]. | Optional(NOTE 10) | Yes | UE context |
| RSN | The RSN as described in clause 5.33.2.1 of TS 23.501 [2]. | Optional(NOTE 10) | Yes | UE context |
| **Route Selection Validation Criteria**(NOTE 6, NOTE 7) | *This part defines the Route Validation Criteria components* | Optional |  |  |
| Time Window | The time window when the matching traffic is allowed. The RSD is not considered to be valid if the current time is not in the time window. | Optional | Yes | UE context |
| Location Criteria | The UE location where the matching traffic is allowed. The RSD rule is not considered to be valid if the UE location does not match the location criteria. | Optional | Yes | UE context |
| NOTE 1: Every Route Selection Descriptor in the list shall have a different precedence value.NOTE 2: At least one of the route selection components shall be present.NOTE 3: When the Subscription Information contains only one S-NSSAI in UDR, the PCF needs not provision the UE with S-NSSAI in the Network Slice Selection information. The "match all" URSP rule has one S-NSSAI at most.NOTE 4: If this indication is present in a Route Selection Descriptor, no other components shall be included in the Route Selection Descriptor.NOTE 5: The SSC Mode 3 shall only be used when the PDU Session Type is IP.NOTE 6: The Route Selection Descriptor is not considered valid unless all the provided Validation Criteria are met.NOTE 7: To support VPLMN specific URSP rules, Location Criteria in the Route Selection Descriptor may contain VPLMN specific values.NOTE 8: This component shall be present when the Route Selection Component does neither include the "Non-Seamless Offload indication" nor "ProSe Layer-3 UE-to-Network Relay Offload indication".NOTE 9: If this indication is present in a Route Selection Descriptor, ProSe Layer-3 UE-to-Network Relay Offload indication shall not be included in the Route Selection Descriptor.NOTE 10: This indication is not applicable for PIN. |

Each URSP rule contains a Traffic descriptor (containing one or more components described in Table 6.6.2.1-2) that determines when the rule is applicable. A URSP rule is determined to be applicable when every component in the Traffic descriptor (for Traffic descriptor components other than the PIN ID) matches the corresponding information from the application, matches the information configured for a PIN (if the URSP rule contains a PIN ID Traffic descriptor component), matches the information configured for a Connectivity Group (if the URSP rule contains a Connectivity Group ID Traffic descriptor), or matches the non-3GPP Device Identifier (if the URSP rule contains the non-3GPP Device ID Traffic descriptor) . A URSP rule is determined not to be applicable when for any given component in the Traffic descriptor:

- No corresponding information from the application/for a PIN/for a Connectivity Group/for a non-3GPP Device ID is available; or

- The corresponding information from the application/for a PIN/for a Connectivity Group/for a non-3GPP Device ID does not match any of the values in the Traffic descriptor component.

NOTE 1: It is recommended to avoid listing more than two components in the Traffic descriptor of a URSP rule.

NOTE X: UE procedures for associating non-3GPP Device ID to PDU sessions based on URSP is described in clause 6.6.2.3.

If a URSP rule is provided that contains a Traffic descriptor with two or more components, it is recommended to also provide URSP rule(s) with lower precedence and a Traffic descriptor with less components, in order to increase the likelihood of URSP rule matching for a particular application.

Each URSP rule contains a list of Route Selection Descriptors containing one or multiple Route Selection Descriptors each having a different Route Selection Descriptor Precedence value. A Route Selection Descriptor contains one or more of the following components:

- Session and Service Continuity (SSC) Mode: Indicates that the traffic of the matching application/PIN shall be routed via a PDU Session supporting the included SSC Mode.

- Network Slice Selection: Indicates that the traffic of the matching application/PIN shall be routed via a PDU Session supporting any of the included S-NSSAIs, see clause 5.15.4 in TS 23.501 [2]. It includes one or more S-NSSAI(s).

- DNN Selection: Indicates that the traffic of the matching application/PIN shall be routed via a PDU Session supporting any of the included DNNs. It includes one or more DNN(s). If a DNN Selection component is provided in the Route Selection Descriptor then the UE shall use any of the DNNs of the DNN Selection component, instead of the DNN requested by the application for the PDU Session that is used to route the traffic of the matching application. If there is no DNN Selection component in the Route Selection Descriptor, then the UE shall use the DNN requested by the application for the PDU Session that is used to route the traffic of the matching application.

NOTE 2: To provide uniform service experience for UEs from earlier Releases, when a USRP rule with a DNN in both, Traffic descriptor and Route Selection Descriptor, is provided to the UEs, the DNN(s) used in the Traffic descriptor would also need to be included in the policy for DNN replacement in the network. In addition, a lower priority Route Selection Descriptor without a DNN would also need to be provided to the UEs.

- PDU Session Type Selection: Indicates that the traffic of matching application/PIN shall be routed via a PDU Session supporting the included PDU Session Type. The possible PDU Session Types are defined in clause 5.6.10 in TS 23.501 [2].

- Non-Seamless Offload indication: Indicates that traffic of the matching application is to be offloaded to non-3GPP access outside of a PDU Session when the rule is applied. If this component is present in a Route Selection Descriptor, no other components shall be included in the Route Selection Descriptor.

- ProSe Layer-3 UE-to-Network Relay Offload indication: Indicates that the traffic of the matching application is to be sent via a ProSe Layer-3 UE-to-Network Relay outside of a PDU Session when the rule is applied. If this indication is absent and the ProSe Multipath Preference indication is absent then the traffic matching the URSP rule shall not be sent via a ProSe Layer-3 UE-to-Network Relay outside of a PDU Session. If this component is present in a Route Selection Descriptor, no other components shall be included in the Route Selection Descriptor.

- ProSe Multipath Preference indication: Indicates that the traffic of the matching application is preferred to be sent via a PDU Session over the Uu reference point and a ProSe Layer-3 UE-to-Network Relay without N3IWF outside of a PDU Session. The traffic of the matching application may be sent via a PDU Session over Uu reference point or via ProSe Layer-3 UE-to-Network Relay outside of a PDU Session when e.g. one of the paths is not available. If this indication is absent and the ProSe Layer-3 UE-to-Network Relay Offload indication is absent then the traffic matching of the URSP rule shall not be sent via a ProSe Layer-3 UE-to-Network Relay outside of a PDU Session. If this component is present in a Route Selection Descriptor, other components can be included in the Route Selection Descriptor to determine the PDU Session over the Uu reference point.

- Access Type Preference: If the UE needs to establish a PDU Session when the rule is applied, this indicates the Access Type (3GPP or non-3GPP or multi-access) on which the PDU Session should be established. The type "Multi-Access" indicates that the PDU Session should be established as a MA PDU Session, using both 3GPP access and non-3GPP access.

NOTE 3: The Access Type of 3GPP also includes the use of 5G ProSe Layer-2 UE-to-Network Relay access as defined in TS 23.304 [34]. The Access Type of non-3GPP also includes the use of 5G ProSe Layer-3 UE-to-Network Relay with N3IWF as defined in TS 23.304 [34].

- PDU Session Pair ID: An indication shared by redundant PDU Sessions as described in clause 5.33.2.1 of TS 23.501 [2].

- RSN: The RSN for redundant PDU Sessions as described in clause 5.33.2.1 of TS 23.501 [2].

NOTE 4: For backward compatibility, PCF may provide a RSD with PDU Session Pair ID and RSN and a RSD without PDU Session Pair ID and RSN in the URSP rule. In this case, the RSD with PDU Session Pair ID and RSN has a lower precedence value (i.e. higher prioritised) than the one without PDU Session Pair ID. If a non-supporting UE receives the RSD containing PDU Session Pair ID, it ignores this RSD.

NOTE 5: The UE may also set the PDU Session Pair ID and RSN parameters based on UE implementation as described in clause 5.33.2.1 of TS 23.501 [2].

- Time Window: The Route Selection Descriptor is not be considered valid unless the UE is in the time window.

- Location Criteria: The Route Selection Descriptor is not be considered valid unless the UE's location matches the Location Criteria.

NOTE 6: The structure of the URSP does not define how the PCF splits the URSP when URSP cannot be delivered to the UE in a single NAS message.

NOTE 7: It is expected that UE applications will not be able to change or override the PDU Session parameters in the URSP rules. A UE application can express preferences when it requests a network connection (e.g. certain Connection Capabilities), which can be mapped into specific PDU Session parameters by the URSP rules.

NOTE 8: A Route Selection Descriptor can include a Time Window and/or a Location Criteria or neither a Time Window nor a Location Criteria. A URSP rule can include RSDs with or without validation criteria at the same time.

In the case of network rejection of the PDU Session Establishment Request, the UE may trigger a new PDU Session establishment based on the rejection cause and the URSP policy.

When the PCF provisions URSP rules to the UE, one URSP rule with a "match all" Traffic descriptor may be included.

NOTE 9: When URSP rules containing NSSP are available to the UE and the URSP rule with the "match all" Traffic descriptor is not part of them, a UE application that has no matching URSP rule and no UE Local Configuration cannot request a network connection.

The URSP rule with the "match all" Traffic descriptor is used to route the traffic of applications which do not match any other URSP rules and shall therefore be evaluated as the last URSP rule, i.e. with lowest priority. There shall be only one Route Selection Descriptor in this URSP rule. The Route Selection Descriptor in this URSP rule includes at most one value for each Route Selection Component.

NOTE 10: How to set the URSP rule with the "match all" Traffic descriptor as the URSP rule with lowest priority is defined in TS 24.526 [19].

NOTE 11: The URSP rule with the "match all" Traffic descriptor is not applicable to PINE traffic.

If a URSP rule is provided with an Indication for reporting URSP rule enforcement, the UE follows the procedures specified in clause 6.6.2.4.

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

#### 6.6.2.3 UE procedure for associating applications or non-3GPP Device ID to PDU Sessions based on URSP

For every newly detected application/PIN/non-3GPP Device ID the UE evaluates the URSP rules in the order of Rule Precedence and determines if the application/PIN/non-3GPP Device ID is matching the Traffic descriptor of any URSP rule. When a URSP rule is determined to be applicable for a given application/PIN/non-3GPP Device ID (see clause 6.6.2.1), the UE shall select a Route Selection Descriptor within this URSP rule in the order of the Route Selection Descriptor Precedence.

When a valid Route Selection Descriptor is found, the UE determines if there is an existing PDU Session that matches all components in the selected Route Selection Descriptor. The UE compares the components of the selected Route Selection Descriptor with the existing PDU Session(s) as follows:

- For a component which only contains one value (e.g. SSC mode), the value of the PDU Session has to be identical to the value specified in the Route Selection Descriptor.

- For a component which contains a list of values (e.g. Network Slice Selection), the value of the PDU Session has to be identical to one of the values specified in the Route Selection Descriptor.

- When some component(s) is not present in the Route Selection Descriptor, a PDU Session is considered matching only if it was established without including the missing component(s) in the PDU Session Establishment Request.

- When the Route Selection Descriptor includes a Time Window or a Location Criteria, the PDU Session is considered matching only if the PDU Session is associated with an RSD that has the same Time Window or a Location Criteria Validity Conditions.

When a matching PDU Session exists the UE associates the application/PIN to the existing PDU Session, i.e. route the traffic of the detected application/PIN on this PDU Session.

If the UE determines that there is more than one existing PDU Session which matches (e.g. the selected Route Selection Descriptor only specifies the Network Slice Selection, while there are multiple existing PDU Sessions matching the Network Slice Selection with different DNNs), it is up to UE implementation to select one of them to use.

NOTE 1: When more than one PDU Sessions of SSC mode 3 to the same DNN and S-NSSAI exist due to PDU Session anchor change procedure as described in clause 4.3.5.2 of TS 23.502 [3], the UE can take the PDU Session Address Lifetime value into account when selecting the PDU Session.

If none of the existing PDU Sessions matches, the UE tries to establish a new PDU Session using the values specified by the selected Route Selection Descriptor. If the PDU Session Establishment Request is accepted, the UE associates the application/PIN/non-3GPP Device ID to this new PDU Session. If the PDU Session Establishment Request is rejected, based on the rejection cause, the UE selects another combination of values in the currently selected Route Selection Descriptor if any other value for the rejected component in the same Route Selection Descriptor can be used. Otherwise, the UE selects the next Route Selection Descriptor, which contains a combination of component value which is not rejected by network, in the order of the Route Selection Descriptor Precedence, if any. If the UE fails to establish a PDU Session with any of the Route Selection Descriptors, it tries other URSP rules in the order of Rule Precedence with matching Traffic descriptors, except the URSP rule with the "match-all" Traffic descriptor, if any. The UE shall not use the UE Local Configuration in this case.

NOTE 2: An application can match the Traffic descriptor of different URSP rules and be associated with different PDU Sessions simultaneously.

If a UE receives tuple(s) (PLMN ID, list of PSIs associated with the PLMN ID), the UE uses the URSP rules associated with the PSIs indicated in the tuple(s) as VPLMN specific URSP rules and the UE uses the URSP rules associated with the PSI not indicated in the tuple(s) as non-VPLMN specific URSP rules.

If a UE receives VPLMN specific URSP rules and non-VPLMN specific URSP rules (i.e. the URSP rules which are applicable to both HPLMN and VPLMN), the VPLMN specific URSP rules take precedence over the non-VPLMN specific URSP rules and Local UE Configuration and any other URSP rules provided to the UE. The UE determines VPLMN specific URSP rules to be used taking serving PLMN ID into consideration. If the UE does not find a match to the VPLMN specific URSP rules associated to serving PLMN ID, then the UE uses the VPLMN specific URSP rules associated to the equivalent serving PLMN ID, if any. Otherwise, the UE uses the non-VPLMN specific URSP rules.

The UE receives the updated URSP rules and (re-)evaluates their validities in a timely manner when certain conditions are met, for example:

- the URSP is updated by the PCF;

- the UE moves from EPC to 5GC;

- change of Allowed NSSAI or Configured NSSAI;

- change of LADN DNN availability;

- change of PLMN;

- UE registers over 3GPP or non-3GPP access;

- UE establishes a connection with a ProSe Layer-3 UE-to-Network Relay;

- UE establishes connection to a WLAN access.

Details of the conditions are defined by TS 24.526 [19].

NOTE 3: When providing the updated URSP rules to the UE with a new DNN, the PCF can set the SMF selection management trigger in the AMF to contact the PCF at PDU Session establishment (as specified in clause 6.1.2.5) if the old DNN is requested by the UE.

The Route Selection Descriptor of a URSP rule shall be only considered valid if all of the following conditions are fulfilled:

1) If any S-NSSAI(s) is present, the S-NSSAI(s) is in the Allowed NSSAI or in the Partially Allowed NSSAI for the non-roaming case and in the mapping of the Allowed NSSAI (or of the Partially Allowed NSSAI) to HPLMN S-NSSAI(s) for the roaming case.

2) If any DNN is present and the DNN is an LADN DNN, the UE is in the area of availability of this LADN.

3) If Access Type preference is present and set to Multi-Access, the UE supports ATSSS.

4) If a Time Window is present and the time matches what is indicated in the Time Window.

5) If a Location Criteria is present and the UE location matches what is indicated in the Location Criteria.

6) If ProSe Layer-3 UE-to-Network Relay Offload indication is present and the UE supports the ProSe capability of 5G ProSe Layer-3 Remote UE.

7) If ProSe Multipath Preference indication is present and the UE supports the ProSe capability of 5G ProSe Layer-3 Remote UE.

If none of the conditions in bullet 1) are met for all the S-NSSAI(s) in the RSD during the validation of the route selection descriptor, the UE shall attempt to meet the condition by requesting any of the S-NSSAI(s) in the RSD through a Mobility Registration Update procedure to attempt to add the S-NSSAI(s) to the Allowed NSSAI (or to the Partially Allowed NSSAI), as specified in clause 5.15.5.2.2 of TS 23.501 [2]. The UE attempts the Mobility Registration Update for a S-NSSAI only if the S-NSSAI is in the Configured NSSAI or, in the roaming case, in the mapping of the S-NSSAIs of the Configured NSSAI for the VPLMN to the corresponding S-NSSAI values of the HPLMN, and any other restrictions to prevent triggering Mobility Registration Update as defined in TS 24.501 [22].

If a matching URSP rule has no valid RSD, the UE tries other URSP rules in the order of Rule Precedence with matching Traffic descriptors, except the URSP rule with "match-all" Traffic descriptor. The UE shall not use the UE Local Configuration in this case.

When URSP rules are updated or their validity according to the conditions above change, the association of existing applications/PINs to PDU Sessions may need to be re-evaluated. The UE may also re-evaluate the application/PIN to PDU Session association due to the following reasons:

- periodic re-evaluation based on UE implementation;

- an existing PDU Session that is used for routing traffic of an application/PIN based on a URSP rule is released;

- The expiration of Time Window in Route Selection Validation Criteria, i.e. the expiration of Time Window, or UE's location no longer matches the Location Criteria.

- change of PLMN.

NOTE 4: It is up to UE implementation to avoid frequent re-evaluation due to location change.

If the re-evaluation leads to a change of the application/PIN to PDU Session association, e.g. the application/PIN is to be associated with another PDU Session or a new PDU Session needs to be established, the UE may enforce such changes in a timely manner based on implementation, e.g. immediately or when UE enters CM-IDLE state.

If the selected Route Selection Descriptor contains a Non-Seamless Offload indication and the UE has established a connection to a WLAN access, the UE routes the traffic matching the Traffic descriptor of the URSP rule via the WLAN access outside of a PDU Session.

If the selected Route Selection Descriptor contains a ProSe Layer-3 UE-to-Network Relay Offload indication and the UE has established a connection with a ProSe Layer-3 UE-to-Network Relay, the UE routes the traffic matching the Traffic descriptor of the URSP rule (including the URSP rule with the "match-all" Traffic descriptor) via the ProSe Layer-3 UE-to-Network Relay outside of a PDU Session.

The 5G-RG and FN-RG procedure for associating applications to PDU Sessions based on URSP is defined in clause 9.5.2 of TS 23.316 [27].

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

#### 6.1.2.2 UE policy control

##### 6.1.2.2.1 General

The 5GC shall be able to provide policy information from the PCF to the UE. Such UE policy information includes:

1) Access Network Discovery & Selection Policy (ANDSP): It is used by the UE for selecting non-3GPP accesses and for selection of the N3IWF in the PLMN. The structure and the content of this policy are specified in clause 6.6.1.

2) UE Route Selection Policy (URSP): This policy is used by the UE to determine if a detected application, a non-3GPP Device ID, or a PIN:

- can be associated to an established PDU Session; or

- can be offloaded to non-3GPP access outside a PDU Session; or

- can be routed via a ProSe Layer-3 UE-to-Network Relay outside a PDU session; or

- multi-path communication via 5G ProSe Layer-3 UE-to-Network Relay outside of a PDU session and over Uu reference point or either path; or

- can trigger the establishment of a new PDU Session.

 The structure and the content of this policy are specified in clause 6.6.2. A URSP rule includes one Traffic descriptor that specifies the matching criteria and one or more of the following components:

2a) SSC Mode Selection Policy (SSCMSP): This is used by the UE to associate the matching application/PIN with SSC modes.

2b) Network Slice Selection Policy (NSSP): This is used by the UE to associate the matching application/PIN with S-NSSAI.

2c) DNN Selection Policy: This is used by the UE to associate the matching application/PIN with DNN.

2d) PDU Session Type Policy: This is used by the UE to associate the matching application/PIN with a PDU Session Type.

2e) Non-Seamless Offload Policy: This is used by the UE to determine that the matching application/Connectivity Group should be non-seamlessly offloaded to non-3GPP access (i.e. outside of a PDU Session).

2f) Access Type preference: If the UE needs to establish a PDU Session for the matching application/PIN, this indicates the preferred Access Type (3GPP or non-3GPP or Multi-Access).

NOTE 1: The Access Type of 3GPP also includes the use of ProSe UE-to-Network Relay access as defined in TS 23.304 [34].

2g) ProSe Layer-3 UE-to-Network Relay Offload Policy: This is used by the UE to determine if the matching application should be routed via a ProSe Layer-3 UE-to-Network Relay outside of a PDU Session. If this indication is not present the traffic shall not be routed via a ProSe Layer-3 UE-to-Network Relay outside of a PDU Session.

2h) PDU Session Pair ID: If the UE needs to establish a PDU Session for the matching application, this indicates PDU Sessions with same PDU Session Pair ID are paired for redundant transmission.

2i) RSN: If the UE needs to establish a PDU Session for the matching application, this indicates RSN for redundant transmission.

2j) ProSe Multi-path Preference: It indicates to UE whether a matching application is preferred to be routed via multipath (i.e. via a PDU Session over Uu reference point and via ProSe Layer-3 UE-to-Network Relay outside of a PDU Session).

3) V2X Policy (V2XP): This policy provides configuration parameters to the UE for V2X communication over PC5 reference point or over Uu reference point or both. V2X Policies are defined in clause 5.1.2.1 and clause 5.1.3.1 of TS 23.287 [28].

4) ProSe Policy (ProSeP): This policy provides configuration parameters to the UE for ProSe features as defined in clauses 5.1 of TS 23.304 [34].

5) Ranging/Sidelink Positioning Policy (RSLPP): This policy provides configuration parameters to the UE for Ranging/Sidelink Positioning control. Ranging/Sidelink Positioning Policies are defined in clause 5.1 of TS 23.586 [41].

6) A2X Policy (A2XP): This policy provides configuration parameters to the UE for A2X communication over PC5 reference point or over Uu reference point or both. A2X Policies are defined in clauses 6.2.1.2.1 and 6.2.1.3.1 of TS 23.256 [43].

The ANDSP and URSP may be pre-configured in the UE or may be provisioned to UE from PCF. The pre-configured policy shall be applied by the UE only when it has not received the same type of policy from PCF.

The methods of configuring V2XP to the UE, including (pre-) configuration and provisioning, and the priority of the same type of parameters acquired from different sources are defined in clause 5.1.1 of TS 23.287 [28].

The methods of configuring ProSeP to the UE, including (pre-)configuration and provisioning, and the priority of the same type of parameters acquired from different sources are defined in clause 5.1.1 of TS 23.304 [34].

The methods of configuring A2XP to the UE, including (pre-) configuration and provisioning, and the priority of the same type of parameters acquired from different sources are defined in clause 4.2.1.2.2 of TS 23.256 [43].

The methods of configuring RSLPP to the UE, including (pre-) configuration and provisioning, and the priority of the same type of parameters acquired from different sources are defined in clause 5.1.1 of TS 23.586 [41].

The ANDSP policy, V2X Policy, ProSe Policy (ProSeP), A2X Policy (A2XP) and Ranging/Sidelink Positioning Policy (RSLPP) are not applicable to any of 5G-RG, FN-RG and AUN3 devices. The ProSe Layer-3 UE-to-Network Relay Offload Policy, PDU Session Pair ID, RSN and ProSe Multi-path Preference components of the Route Selection descriptor are not applicable to 5G-RG, FN-RG and AUN3 devices.

The PCF selects the UE policy information applicable for each UE based on local configuration, operator policies taking into consideration the information defined in clause 6.2.1.2 and the PCF determines the URSP Rules for the UE using input from NWDAF as one of the inputs.

In the case of a roaming UE, the V-PCF may retrieve UE policy information from the H-PCF over N24/Npcf. When the UE is roaming and the UE has valid rules from both HPLMN and VPLMN, the UE gives priority to the valid ANDSP rules from the VPLMN.

In the case of a roaming UE, the V-PCF or UDR may provide the application guidance on VPLMN specific URSP determination to the H-PCF as defined in clause 4.15.6.10 of TS 23.502 [3] and clause 6.1.2.2.4. The H-PCF is required to generate VPLMN specific URSP rule(s) and provide the URSP rules to the UE. This can be triggered by the UE's registration in the VPLMN or it can happen before UE roams into the VPLMN. The URSP Rules received by UE for a VPLMN are only applicable when the UE is registered in that VPLMN or its equivalent VPLMNs. If a UE does not indicate support for VPLMN specific URSP rules, the H-PCF may still trigger an update of the UE's URSP Rules, which may be based on the application guidance from the VPLMN or HPLMN, upon receiving a notification that the UE has registered in the VPLMN.

The UE policy information shall be provided from the PCF to the AMF via N15/Namf interface and then from AMF to the UE via the N1 interface as described in clause 4.2.4.3 of TS 23.502 [3]. The AMF shall not change the UE policy information provided by PCF.

The PCF is responsible for delivery of UE policy. If the PCF is notified about UE policy information delivery failure (e.g. because of UE unreachable), the PCF may provide a new trigger "Connectivity state changes" in Policy Control Request Trigger of UE Policy Association to AMF as defined in clause 4.16.12.2 of TS 23.502 [3]. After reception of the Notify message indicating that the UE enters the CM-Connected state, the PCF may retry to deliver the UE policy information.

NOTE 2: For backward compatibility the PCF may subscribe the "Connectivity state changes (IDLE or CONNECTED)" event in Rel-15 AMF as defined in clause 5.2.2.3 of TS 23.502 [3].

If due to UE Local Configurations, a UE application requests a network connection using Non-Seamless Offload or ProSe Layer-3 UE-to-Network Relay Offload, the UE shall use Non-Seamless Offload for this application without evaluating the URSP rules. Otherwise, the UE shall select the PDU Session or Non-Seamless Offload in the following order:

- If the UE has an URSP rule (except the URSP rule with the "match all" Traffic descriptor) that matches the application as defined in clause 6.6.2.3, the UE shall perform the association of the application to the corresponding PDU Session or to Non-Seamless Offload or ProSe Layer-3 UE-to-Network Relay Offload according to this rule; Otherwise,

- If no URSP rule is applicable for the application (except the URSP rule with the "match all" Traffic descriptor), the UE shall perform the association of the application to a PDU Session according to the applicable UE Local Configurations, if any. If the UE attempts to establish a new PDU Session according to the UE Local Configurations and this PDU Session Establishment request is rejected by the network, then the UE shall perform the association of the application to a PDU Session or to Non-Seamless Offload or ProSe Layer-3 UE-to-Network Relay Offload according to the URSP rule with the "match all" Traffic descriptor; Otherwise,

NOTE 3: It is assumed that the S-NSSAI(s) in the UE Local Configurations are operator-provided S-NSSAI(s). The provision of the S-NSSAI(s) is not specified.

NOTE 4: The application layer is not allowed to set the S-NSSAI when the UE establishes a PDU Session based on the UE Local Configurations.

NOTE 5: Any missing information in the UE Local Configurations needed to build the PDU Session Establishment request can be the appropriate corresponding component from the URSP rule with the "match all" Traffic descriptor.

- If neither the UE Local Configurations nor the URSP rules are applicable for the application (except the URSP rule with the "match all" Traffic descriptor), the UE shall perform the association of the application to a PDU Session or to Non-Seamless Offload or ProSe Layer-3 UE-to-Network Relay Offload according to the URSP rule with the "match all" Traffic descriptor.

NOTE 6: The UE evaluates both VPLMN and non-VPLMN specific URSP Rules as defined in clause 6.6.2.3.

For the existing PDU Session(s), the UE shall examine the URSP rules within the UE policy information in order to determine whether the existing PDU Session(s) (if any) are maintained or not. If not, then the UE may initiate a PDU Session release procedure for the PDU Session(s) that cannot be maintained.

If there are multiple IPv6 prefixes within the PDU Session, then the IPv6 multi-homed routing rules, described in clause 5.8.2.2.2 in TS 23.501 [2], on the UE shall be used to select which IPv6 prefix to route the traffic of the application.

NOTE 7: For the case that an application cannot be associated to any PDU Session, the UE can inform the application that association of the application to PDU Session fails.

The PCF may subscribe to analytics on "WLAN performance" from NWDAF following the procedures and services described in TS 23.288 [24]. When the PCF gets a notification from the NWDAF, the PCF may try to update WLANSP rules.

The PCF may use Spending Limits information from the CHF to decide whether to install, update or delete URSP rules, as defined in clause 6.1.1.4.

The definition of UE policy control for 5G-RG, FN-RG and AUN3 devices is specified in TS 23.316 [27]

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

#### 6.2.1.2 Input for PCC decisions

The listed information below is not intended to be complete and describes only examples of the information that can be provided by the respective NF.

The PCF shall accept input for PCC decision-making from the SMF, the AMF, the CHF, the NWDAF if present, the UDR and if the AF is involved, from the AF, as well as the PCF may use its own predefined information. These different NFs should provide as much information as possible to the PCF. Depending on the particular scenario all the information may not be available or is already provided to the PCF.

The AMF may provide information related to the UE as defined in clauses 5.2.5.2 and 5.2.5.6 of TS 23.502 [3], for example:

- SUPI;

- PEI of the UE;

- Location of the subscriber;

- Service Area Restrictions;

- RFSP Index;

- RAT Type;

- GPSI;

- Access Type;

- Serving Network identifier (PLMN ID or PLMN ID and NID, see clause 5.34 of TS 23.501 [2]);

- Allowed NSSAI;

- UE time zone;

- Subscribed UE-AMBR;

- Configured NSSAI for the serving PLMN;

- Mapping Of Allowed NSSAI;

- S-NSSAI for the PDU Session;

- Satellite backhaul category;

- Requested DNN.

NOTE 1: The Access Type and RAT Type parameters should allow extension to include new types of accesses.

The UE may provide information such as:

- OSId;

- List of PSIs;

- Indication of UE support for ANDSP.

- Indication of URSP Provisioning Support in EPS.

- Indication of UE capability of reporting URSP rule enforcement to network (see clause 6.6.2.4).

The SMF may provide information related to the PDU Session as defined in clause 5.2.5.4 of TS 23.502 [3], for example:

- SUPI;

- PEI of the UE;

- IPv4 address of the UE;

- IPv6 network prefix assigned to the UE;

- Default 5QI and default ARP;

- Request type (initial, modification, etc.);

- Type of PDU Session (IPv4, IPv6, IPv4v6, Ethernet, Unstructured);

- Access Type;

- RAT Type;

- GPSI;

- Internal-Group Identifier;

- Location of the subscriber;

- S-NSSAI;

- DNN;

- Serving Network identifier (PLMN ID or PLMN ID and NID, see clause 5.34 of TS 23.501 [2]);

- Application Identifier;

- Allocated application instance identifier;

- Detected service data flow descriptions;

- UE support of reflective QoS (as defined in clause 5.7.5.1 of TS 23.501 [2]);

- Number of supported packet filters for signalled QoS rules for the PDU Session (indicated by the UE as defined in clause 5.7.1.4 of TS 23.501 [2]);

- 3GPP PS Data Off status;

- DN Authorization Profile Index (see clause 5.6.6 of TS 23.501 [2]);

- DN authorized Session AMBR (see clause 5.6.6 of TS 23.501 [2]);

- Satellite backhaul category;

- Provisioning Server address(es) (see clause 5.30 of TS 23.501 [2]);

- Non-3GPP Device ID;

- UE report of URSP rule enforcement from URSP rule associated with the PDU session (see clause 6.6.2.4).

- HR-SBO support indication for requesting VPLMN Specific Offloading Policy (see clause 6.2.1.12 and clause 6.7 of TS 23.548 [33]).

The UDR may provide the information for a subscriber connecting to a specific DNN and S-NSSAI, as described in the clause 6.2.1.3.

The UDR may provide policy information related to an ASP as defined in clause 5.2.12.2 of TS 23.502 [3], for example:

- The ASP identifier;

- A transfer policy together with a Background Data Transfer Reference ID, the volume of data to be transferred per UE, the expected amount of UEs;

- An PDTQ policy together with an PDTQ Reference ID, the requested QoS for each of the AF session for each of the UEs involved and the expected amount of UEs.

NOTE 2: The information related with AF influence on traffic routing may be provided by UDR when the UDR serving the NEF is deployed and stores the application request.

The UDR may provide the service specific information as defined in clause 4.15.6.7 of TS 23.502 [3].

The AF, if involved, may provide application session related information as defined in clause 5.2.5.3 of TS 23.502 [3] directly or via NEF, e.g. based on SIP and SDP, for example:

- Subscriber Identifier(s);

- IP address of the UE;

- Media Type;

- Media Format, e.g. media format sub-field of the media announcement and all other parameter information (a= lines) associated with the media format;

- Bandwidth;

- Sponsored data connectivity information;

- Flow description information, e.g. source and destination IP address and port numbers and the protocol and optionally, ToS (IPv4) or TC (IPv6) value (as described in clause 6.1.3.6);

- Indication of ECN marking for L4S;

- AF application identifier, i.e. an identifier that refers to the application the AF session belongs to, containing either an AF identifier, an external application identifier (if the NEF is involved and performs the mapping to the application identifier) or an application identifier (if the AF is configured accordingly);

NOTE 3: Either Flow description or (external) application identifier for application detection control can be provided.

- DNN and possibly S-NSSAI;

- AF Communication Service Identifier (e.g. IMS Communication Service Identifier), UE provided via AF;

- AF Application Event Identifier;

- AF Record Information;

- Flow status (for gating decision);

- Priority indicator, which may be used by the PCF to guarantee service for an application session of a higher relative priority;

NOTE 4: The AF Priority information represents session/application priority and is separate from the MPS 5GS Priority indicator.

- Emergency indicator;

- Application service provider;

- DNAI;

- Information about the N6 traffic routing requirements;

- GPSI;

- Internal-Group Identifier;

- Temporal validity condition;

- Spatial validity condition;

- AF subscription for early and/or late notifications about UP management events;

- AF transaction identifier;

- TSC individual QoS information as described in clause 6.1.3.22;

- QoS information to be monitored;

NOTE 5: The information related with QoS monitoring may be provided by UDR when the UDR serving the NEF is deployed and stores the application request.

- Service area coverage;

- Indication that high throughput is desired;

- Reporting frequency;

- User Plane Latency Requirement.

The AF may provide BDT related information as defined in clause 5.2.5.5 of TS 23.502 [3] via NEF, for example:

- Background Data Transfer Reference ID;

- BDT Policy;

- Volume per UE;

- Number of UEs;

- Desired time window;

- Network Area Information.

The CHF, if involved, may provide the following information for a subscriber as defined in clause 5.2.5.17 of TS 23.502 [3], for example:

- Policy counter status for each relevant policy counter.

The NWDAF, if involved, may provide analytics information as described in clause 6.1.1.3.

In addition, the predefined information in the PCF may contain additional rules based on charging policies in the network, whether the subscriber is in its home network or roaming, depending on the QoS Flow attributes.

The 5QIs (see clause 5.7.4 of TS 23.501 [2]) in the PCC rule is derived by the PCF from AF or UDR interaction if available. The input can be SDP information or other available application information, in line with operator policy.

The Allocation and Retention Priority in the PCC Rule is derived by the PCF from AF or UDR interaction if available, in line with operator policy.

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