**3GPP TSG-CT WG1 Meeting #141-eC1-232064**

**E-Meeting, 17th - 21st April 2023**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **24.526** | **CR** | **0179** | **rev** | **1** | **Current version:** | **18.2.0** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network | **X** |

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| ***Title:*** | Addition of ProSe Multi-path Preference | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Intel | | | | | | | | | |
| ***Source to TSG:*** | C1 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | 5G\_ProSe\_Ph2 | | | | |  | ***Date:*** | | | 2023-04-18 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***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 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-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | SA2 has agreed in CR 0908 to TS 23.503 (see S2-2303386) adds support for ProSe Multi-path Preference to indicate to the UE whether a matching application is preferred to be routed via multi-path (i.e. via a PDU Session over Uu reference point and via ProSe Layer-3 UE-to-Network Relay outside of a PDU Session). ProSe Multi-path Preference is added to Table 6.6.2.1-3 Route Selection Descriptor:   |  |  |  |  |  | | --- | --- | --- | --- | --- | | *Information name* | *Description* | *Category* | *PCF permitted to modify in URSP* | *Scope* | | *[..]* |  |  |  |  | | ***Route selection components*** | *This part defines the route selection components* | *Mandatory (NOTE 2)* |  |  | | *[..]* |  |  |  |  | | *ProSe Multipath 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 X)* | *Yes* | *UE context* | | *[..]* |  |  |  |  |   Accordingly, this CR adds ProSe Multi-path Preference to the RSD. | | | | | | | | |
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| ***Summary of change:*** | | Add ProSe Multi-path Preference to the RSD. | | | | | | | | |
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| ***Consequences if not approved:*** | | Stage 3 not alligned with stage 2. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 4.2.1, 4.2.2.2, 4.4.2, 5.2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

\*\*\* First change \*\*\*

### 4.2.1 General

The URSP is defined in 3GPP TS 23.503 [2] and is a set of one or more URSP rules, where a URSP rule is composed of:

a) a precedence value of the URSP rule identifying the precedence of the URSP rule among all the existing URSP rules;

b) a traffic descriptor, including either:

1) match-all traffic descriptor; or

2) at least one of the following components:

A) one or more application identifiers;

B) one or more IP 3 tuples as defined in 3GPP TS 23.503 [2] i.e. the destination IP address, the destination port number, and the protocol in use above the IP;

C) one or more non-IP descriptors, i.e. destination information of non-IP traffic;

D) one or more DNNs;

E) one or more connection capabilities; and

F) one or more domain descriptors, i.e. destination FQDN(s) or a regular expression as a domain name matching criteria; and

c) one or more route selection descriptors each consisting of a precedence value of the route selection descriptor and either

1) one PDU session type and, optionally, one or more of the followings:

A) SSC mode;

B) one or more S-NSSAIs. If the URSP rule is a part of a non-subscribed SNPN signalled URSP, the S-NSSAI is of the non-subscribed SNPN otherwise the S-NSSAI is of the HPLMN or the subscribed SNPN. Mapped HPLMN SST and mapped HPLMN SD are not included in the S-NSSAI;

C) one or more DNNs;

D) Void;

E) preferred access type;

F) multi-access preference;

G) a time window;

H) location criteria;

I) PDU session pair ID; and

J) RSN;

K) 5G ProSe multi-path preference;

2) non-seamless non-3GPP offload indication; or

3) 5G ProSe layer-3 UE-to-network relay offload indication.

Only one URSP rule in the URSP can be a default URSP rule and the default URSP rule shall contain a match all traffic descriptor. If a default URSP rule and one or more non-default URSP rules are included in the URSP, any non-default URSP rule shall have lower precedence value than (i.e. shall be prioritised over) the default URSP rule.

If a traffic descriptor lists one or more application identifiers together with one or more connection capabilities, the UE shall consider that the application identifiers identify the applications requesting access to the connection capabilities.

NOTE 1: The connection capabilities requested by the applications are OS dependent. The connection capability identifiers defined in table 5.2.1 are OS independent. It is based on the UE implementation how the UE matches the connection capabilities requested by the applications to the connection capability identifiers in table 5.2.1.

NOTE 2: If the UE has multiple concurrently active OS, the traffic descriptor can list as many multiple OS Ids.

NOTE 3: It is recommended to avoid the combination of more than two components in the traffic descriptor.

Editor’s Note [WI: 5G\_ProSe\_Ph2, CR#0179]: Additional impact of “5G ProSe multi-path preference” to the URSP handling layer is FFS.

\*\*\* Next change \*\*\*

#### 4.2.2.2 Association between an application and a PDU session, non-seamless non-3GPP offload or 5G ProSe layer-3 UE-to-network relay offload by a UE

In order to send a PDU of an application, the upper layers require information on the PDU session (e.g. PDU address) via which to send a PDU of an application.

NOTE 0: If PAP/CHAP is used, it is recommended that the request from the upper layers includes a DNN.

When the upper layers request information of the PDU session via which to send a PDU of an application;

- information on the non-3GPP access outside of a PDU session shall be provided to the upper layers, without evaluating the URSP rules, if due to UE local configuration non-seamless non-3GPP offload is requested; or

- information on the 5G ProSe layer-3 UE-to-network relay shall be provided to the upper layers, without evaluating the URSP rules, if due to UE local configuration 5G ProSe layer-3 UE-to-network relay offload is requested;

otherwise, the UE shall proceed in the following order:

a) the UE shall evaluate the URSP rules, except the default URSP rule, with a traffic descriptor matching the application information in increasing order of their precedence values, if any. If the traffic descriptor contains more than one traffic descriptor component type, each of a different type, all of them shall be matched. If the traffic descriptor contains more than one traffic descriptor component of the same traffic descriptor component type, at least one of the traffic descriptor components of the same traffic descriptor component type shall be matched with the application information. A URSP rule is determined not to be applicable when for any given component in the traffic descriptor no corresponding information from the application is available or the corresponding information from the application does not match any of the values in the traffic descriptor component as specified in clause 6.6.2.1 of 3GPP TS 23.503 [2].

If the UE finds the traffic descriptor in a non-default URSP rule matching the application information, and:

I) if there is an established connection to non-3GPP access, an established connection with a 5G ProSe layer-3 UE-to-network relay UE, or one or more established PDU sessions or any combinations of these, the UE shall evaluate the route selection descriptors of the URSP rule in increasing order as followings:

if:

1) the route selection descriptor of the URSP rule contains a non-seamless non-3GPP offload indication and the information on the non-3GPP access outside of a PDU session is available;

the UE shall provide information on the non-3GPP access outside of a PDU session to the upper layers;

1a) the route selection descriptor of the URSP rule contains a 5G ProSe layer-3 UE-to-network relay offload indication and the information on 5G ProSe layer-3 UE-to-network relay is available;

the UE shall provide information on the 5G ProSe layer-3 UE-to-network relay to the upper layers; and

2) there is one or more PDU sessions:

i) for which the parameters associated with the PDU session, the parameters requested by the UE during the PDU session establishment procedure or the mapped parameters from the parameters requested by the UE during the UE requested PDN connectivity procedure to establish a PDN connection as a user-plane resource of an MA PDU session as specified in clause 5.3.1 of 3GPP TS 24.193 [22] match the route selection descriptors of the URSP rule except the preferred access type and the multi-access preference, if any, wherein:

- a route selection descriptor with PDU session type IPv4v6 matches also with PDU session type IPv4 if the network has sent 5GSM cause value #50 "PDU session type IPv4 only allowed" in the PDU SESSION ESTABLISHMENT ACCEPT message or matches also with PDN type IPv4 if the network has sent ESM cause is #50 "PDN type IPv4 only allowed" in the ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message of the PDN connectivity procedure to establish a PDN connection as a user-plane resource of an MA PDU session as specified in clause 5.3.1 of 3GPP TS 24.193 [22];

- the route selection descriptor with PDU session type IPv4v6 matches also with PDU session type IPv6 if the network has sent 5GSM cause value #51 "PDU session type IPv6 only allowed" in the PDU SESSION ESTABLISHMENT ACCEPT message or matches also with PDN type IPv6 if the network has sent ESM cause is #51 "PDN type IPv6 only allowed" in the ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message of the PDN connectivity procedure to establish a PDN connection as a user-plane resource of an MA PDU session as specified in clause 5.3.1 of 3GPP TS 24.193 [22];

- the route selection descriptor with PDU session type IPv4v6 matches also with PDU session type IPv6 or IPv4 if the UE requested the PDU session type IPv4v6 but the selected PDU session type is set to IPv4 or IPv6 in the PDU SESSION ESTABLISHMENT ACCEPT message or if the UE requested the PDN type IPv4v6 but the network allocates a PDN address of a PDN type IPv4 or IPv6 in the ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message of the PDN connectivity procedure to establish a PDN connection as a user-plane resource of an MA PDU session as specified in clause 5.3.1 of 3GPP TS 24.193 [22]; and

- if the UE is in a non-subscribed SNPN and the URSP rule is a part of the non-subscribed SNPN signalled URSP, or is in the HPLMN or the subscribed SNPN, then a route selection descriptor with an S-NSSAI matches the S-NSSAI of the PDU session, otherwise a route selection descriptor with an S-NSSAI matches the mapped S-NSSAI of the PDU session; and

ii) established without requesting any parameter for which the matching route selection descriptor of the URSP rule does not provide a route selection descriptor component, except:

A) the preferred access type;

B) the multi-access preference;

C) the DNN, if no DNN is included in the route selection descriptor component and the DNN provided by the application is the same as the DNN requested by the UE during the PDU session establishment or the same as the DNN mapped from the APN requested by the UE during the PDN connectivity procedure to establish a PDN connection as a user-plane resource of an MA PDU session as specified in clause 5.3.1 of 3GPP TS 24.193 [22]; and

D) the S-NSSAI, if the UE has only one S-NSSAI in the allowed NSSAI.

the UE shall provide information on the PDU session that matches the route selection and the 5G ProSe multi-path preference if included in the route selection descriptor to the upper layers;

NOTE 1: It is up to the UE implementation which PDU session to select if there exist multiple PDU sessions matching the same route selection descriptor of the lowest precedence value.

II) otherwise:

1) the UE shall select a route selection descriptor with the next smallest precedence value which has not yet been evaluated;

2) if:

i) the selected route selection descriptor contains a non-seamless non-3GPP offload indication:

A) if the information on the non-3GPP access outside of a PDU session is available, it shall be provided to the upper layers and the UE shall stop selecting a route selection descriptor matching the application information.

B) if the information about the non-3GPP access outside of a PDU session is not available, or non-3GPP access is not available the UE shall proceed to step 4);

ia) the selected route selection descriptor contains a 5G ProSe layer-3 UE-to-network relay offload indication:

A) if the information on the 5G ProSe layer-3 UE-to-network relay is available and the UE supports acting as a 5G ProSe layer-3 remote UE as specified in 3GPP TS 24.554 [21], it shall be provided to the upper layers and the UE shall stop selecting a route selection descriptor matching the application information.

B) if the information about the 5G ProSe layer-3 UE-to-network relay is not available, the UE may initiate a UE-to-network relay discovery over PC5 interface as specified in clause 8.2.1 of 3GPP TS 24.554 [21] if the UE supports acting as a 5G ProSe layer-3 remote UE as specified in 3GPP TS 24.554 [21]. If the connection with a 5G ProSe layer-3 UE-to-network relay UE has been successfully established, the UE shall provide information on the 5G ProSe layer-3 UE-to-network relay to the upper layers and the UE shall stop selecting a route selection descriptor matching the application information. If the connection with a 5G ProSe layer-3 UE-to-network relay UE has not been successfully established or the UE does not support acting as a 5G ProSe layer-3 remote UE as specified in 3GPP TS 24.554 [21], the UE shall proceed to step 4);

ib) the selected route selection descriptor includes the 5G ProSe multi-path preference but the UE does not support acting as a 5G ProSe layer-3 remote UE as specified in 3GPP TS 24.554 [21], the UE shall proceed to step 4);

ii) the selected route selection descriptor includes a PDU session type or an SSC mode which is not supported by the UE (SSC mode 2 or 3), the UE shall proceed to step 4);

iii) the selected route selection descriptor contains a time window but the time does not match the time window, the UE shall proceed to step 4);

iv) the selected route selection descriptor contains location criteria but the UE location does not match the location criteria, the UE shall proceed to step 4);

v) the selected route selection descriptor includes the multi-access preference but the UE does not support ATSSS, the UE shall proceed to step 4);

va) the selected route selection descriptor includes an SSC mode which either has been rejected by the network with 5GSM cause value #68 "not supported SSC mode" for the same DNN (or no DNN, if no DNN was indicated by the UE) and the same S-NSSAI associated with (if available in roaming scenarios) a mapped S-NSSAI (or no S-NSSAI, if no S-NSSAI was indicated by the UE) or was not included in the Allowed SSC mode IE following a rejection with 5GSM cause value #68 "not supported SSC mode" for the same DNN (or no DNN, if no DNN was indicated by the UE) and the same S-NSSAI associated with (if available in roaming scenarios) a mapped S-NSSAI (or no S-NSSAI, if no S-NSSAI was indicated by the UE), the UE shall proceed to step 4); or

vi) the selected route selection descriptor does not contain a non-seamless non-3GPP offload indication nor a 5G ProSe layer-3 UE-to-network relay offload indication, the URSP handling layer requests the UE NAS layer to establish a PDU session providing the following PDU session attributes based on the selected route selection descriptor:

A) SSC mode if there is a SSC mode in the route selection descriptor;

NOTE 2: The SSC mode 3 is only used when the PDU session type is IPv4, IPv6 or IPv4v6.

B) one S-NSSAI if the S-NSSAI is in the route selection descriptor; and the S-NSSAI is in the allowed NSSAI. Additionally, if the UE supports LADN per DNN and S-NSSAI, the request is for a PDU session for LADN, the extended LADN information is available for that LADN and the S-NSSAI is associated with that LADN in the service area of that LADN. If none of the S-NSSAI(s) in the route selection descriptor is in the allowed NSSAI, the UE shall proceed to step 4);

NOTE 3: If there are multiple S-NSSAIs in the route selection descriptor, an S-NSSAI is chosen among the S-NSSAIs based on UE implementation.

C) one DNN, if the DNN is in the route selection descriptor; and if the DNN is an LADN DNN and the UE is in the service area of that LADN;

NOTE 4: If one or more DNNs are included in the traffic descriptor and no DNN is included in the route selection descriptor, the DNN provided by the application is selected as one of the PDU session attributes by the URSP handling layer to request the UE NAS layer.

NOTE 5: If there are multiple DNNs in the route selection descriptor, a DNN is chosen based on UE implementation.

D) the PDU session type of the route selection descriptor;

E) preferred access type or multi-access preference, if the preferred access type or the multi-access preference is in the route selection descriptor;

NOTE 6: If a preferred access type or a multi-access preference is included in the route selection descriptor of a URSP rule, it is recommended that the UE establishes a PDU session based on the preferred access type or the multi-access preference.

NOTE 7: If a preferred access type is included in the route selection descriptor of a URSP rule and the preferred access type is 3GPP access, the UE is allowed to discover a 5G ProSe layer-2 UE-to-network relay UE as specified in clause 8.2.1 of 3GPP TS 24.554 [21] to establish a PDU session if the UE is configured with the corresponding ProSe policy as specified in clause 5.2.5 of 3GPP TS 24.554 [21].

NOTE 8: If a preferred access type is included in the route selection descriptor of a URSP rule and the preferred access type is non-3GPP access, the UE is allowed to discover a 5G ProSe layer-3 UE-to-network relay UE with N3IWF support as specified in clause 8.2.7 of 3GPP TS 24.554 [21] to establish a PDU session if the UE is configured with the corresponding ProSe policy as specified in clause 5.2.5 of 3GPP TS 24.554 [21].

F) PDU session pair ID if there is a PDU session pair ID in the route selection descriptor; and

G) RSN if there is an RSN in the route selection descriptor;

The UE NAS layer indicates the result of the PDU session establishment. Upon successful completion of the PDU session establishment, the UE NAS layer shall additionally indicate the attributes of the established PDU session (e.g. PDU session identity, SSC mode, S-NSSAI, DNN, PDU session type, access type, PDU address) to the URSP handling layer, and shall provide information (e.g. PDU address) of the successfully established PDU session and the 5G ProSe multi-path preference if included in the route selection descriptor to the upper layers. The UE shall stop selecting a route selection descriptor matching the application information. If the PDU session establishment is unsuccessful, the UE shall proceed to step 3);

3) Based on the rejection cause and if there is another value which can be used for the rejected component in the same route selection descriptor, the UE shall select another combination of values in the currently selected route selection descriptor by using this value of the rejected component and proceed to step 2), otherwise the UE shall proceed to step 4); and

4) if there is any route selection descriptor which has not yet been evaluated, the UE shall proceed to step 1). If all route selection descriptors for the matching non-default URSP rule have been evaluated and there is one or more non-default matching URSP rule which has not yet been evaluated, the UE shall proceed to step a). If all non-default matching URSP rules have been evaluated, the UE shall inform the upper layers of the failure.

b) if no non-default matching URSP rule can be found and if UE local configuration for the application is available, the UE shall perform the association of the application to a PDU session accordingly. If no matching PDU session exists, the UE NAS layer shall attempt to establish a PDU session using UE local configuration.

NOTE 7: Any missing information in the UE local configuration needed to build the PDU session establishment request can be the appropriate corresponding component from the default URSP rule with the "match-all" traffic descriptor.

NOTE 8: If a DNN was provided by the application and no DNN is included in the UE local configuration, the DNN provided by the application is selected as one of the PDU session attributes by the URSP handling layer to request the UE NAS layer.

NOTE 9: If there are multiple DNNs in the UE local configuration, a DNN is chosen based on UE implementation.

If the PDU session establishment is successful, the UE NAS layer shall provide information (e.g. PDU address) of the successfully established PDU session to the upper layers. Otherwise, the UE shall go to step c);

c) if no non-default matching URSP rule can be found and if either UE local configuration for the application is not available or the PDU session establishment based on UE local configuration for the application was unsuccessful, the UE shall perform the association of the application to a PDU session, to non-seamless non-3GPP offload or to 5G ProSe layer-3 UE-to-network relay offload according to the default URSP rule with the "match-all" traffic descriptor, if any. If the association is unsuccessful, the UE shall inform the upper layers of the failure.

NOTE 10: If a DNN was provided by the application and no DNN is included in the route selection descriptor of the default URSP rule, the DNN provided by the application is selected as one of the PDU session attributes by the URSP handling layer to request the UE NAS layer. If one or more DNNs are included in the route selection descriptor of the default URSP rule, the DNN in the route selection descriptor is selected as one of the PDU session attributes by the URSP handling layer to request the UE NAS layer. When there are multiple DNNs in the route selection descriptor, the DNN is selected based on UE implementation.

Editor’s Note [WI: 5G\_ProSe\_Ph2, CR#0179]: Additional impact of “5G ProSe multi-path preference” to the URSP handling layer is FFS.

The HPLMN may pre-configure the UE with URSP in the ME or in the USIM and the subscribed SNPN(s) may pre-configure the UE with URSP in the corresponding entry of the "list of subscriber data" stored in ME. The HPLMN or subscribed SNPN may pre-configure URSP(s) in the ME for non-subscribed SNPN(s) and associate the URSP(s) with the entry of the subscribed SNPN of the "list of subscriber data" or associate the URSP(s) with the corresponding PLMN subscription of the HPLMN. It is up to implementation how many pre-configured URSP(s) for non-subscribed SNPN(s) per entry of the "list of subscriber data" or per PLMN subscription can be stored in the ME.The HPLMN, the subscribed SNPN(s) and the non-subscribed SNPN(s) may provide URSP to the UE by signalling as described in annex D of 3GPP TS 24.501 [11]. The HPLMN pre-configured URSP in the ME and the HPLMN signalled URSP shall be stored in a non-volatile memory in the ME together with the SUPI from the USIM. The subscribed SNPN(s) signalled URSP shall be stored per SNPN in a non-volatile memory in the ME together with the subscriber identifier and the associated SNPN identity of the SNPN in the "list of subscriber data" configured in the ME. If the UE accepts URSP rules signalled by a non-subscribed SNPN that the UE accesses using credentials from a credential holder (see 3GPP TS 24.501 [11] clause C.2 and D.2), the non-subscribed SNPN(s) signalled URSP shall be stored per non-subscribed SNPN and associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription. It is up to implementation how many signalled URSP(s) for non-subscribed SNPN(s) per entry of the "list of subscriber data" or per PLMN subscription can be stored in the ME. Only the subscribed SNPN(s) pre-configured URSP and the subscribed SNPN(s) signalled URSP shall be used when the selected SNPN identity matches the associated subscribed SNPN identity.

If the UE registered to a subscribed SNPN or a PLMN, has both pre-configured URSP(s) and signalled URSP, the UE shall only use the signalled URSP. For a UE not operating in SNPN access operation mode, if the UE has no signalled URSP, the UE shall:

- only use the pre-configured URSP rules of the HPLMN and ignore URSP rules of other PLMN(s) in the USIM, if there are pre-configured URSP rules of the HPLMN in the USIM; or

- use the pre-configured URSP rules in the ME if the UE has pre-configured URSP in the ME and:

- only pre-configured URSP rules of PLMN(s) other than HPLMN in the USIM; or

- no pre-configured URSP in the USIM.

When the UE is registered to a non-subscribed SNPN using credentials from a credentials holder:

a) if the UE has the non-subscribed SNPN signalled URSP associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription, or the subscribed SNPN signalled URSP when the credentials holder is an SNPN or the HPLMN signalled URSP when the credentials holder is a PLMN, the UE shall evaluate URSP rules, if available, in accordance with the following order until a matching URSP rule is found:

1) the non-subscribed SNPN signalled non-default URSP rules associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription stored in the ME;

2) if the credentials holder is:

- an SNPN, the subscribed SNPN signalled non-default URSP rules stored in the ME; or

- a PLMN, the HPLMN signalled non-default URSP rules stored in the ME;

3) UE local configuration for the application;

4) the non-subscribed SNPN signalled default URSP rule associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription stored in the ME; or

5) if the credentials holder is:

- an SNPN, the subscribed SNPN signalled default URSP rule stored in the ME; or

- a PLMN, the HPLMN signalled default URSP rule stored in the ME;

NOTE X: If no matching URSP rule is found, the UE informs the upper layers of the failure.

b) otherwise, if the UE has

- URSP pre-configured for the non-subscribed SNPN associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription;

- URSP pre-configured for the subscribed SNPN when the credentials holder is an SNPN or for the HPLMN when the credentials holder is a PLMN; or

- UE local configuration for the application;

then the UE shall evaluate URSP rules, if available, in accordance with the following order until a matching URSP rule is found:

1) the non-default URSP rules pre-configured for the non-subscribed SNPN and associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription stored in the ME;

2) if the credentials holder is:

- an SNPN, the subscribed SNPN pre-configured non-default URSP rules stored in the ME; or

- a PLMN:

- the HPLMN pre-configured non-default URSP rules stored in the in USIM; or

- the HPLMN pre-configured non-default URSP rules stored in the in ME;

3) UE local configuration for the application;

4) the default URSP rule pre-configured for the non-subscribed SNPN and associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription stored in the ME; or

5) if the credentials holder is:

- an SNPN, the subscribed SNPN pre-configured default URSP rule stored in the ME; or

- a PLMN:

- the HPLMN pre-configured default URSP rule stored in the in USIM; or

- the HPLMN pre-configured default URSP rule stored in the in ME.

NOTE Y: If no matching URSP rule is found, the UE informs the upper layers of the failure.

The HPLMN pre-configured URSP in the ME shall be stored until a new URSP is configured by HPLMN or the USIM is removed.

For a UE not operating in SNPN access operation mode, the signalled URSP may be modified by the procedures defined in annex D of 3GPP TS 24.501 [11] and shall be stored until USIM is removed. The URSP can only be used if the SUPI from the USIM matches the SUPI stored in the non-volatile memory of the ME. If the SUPI from the USIM does not match the SUPI stored in the non-volatile memory of the ME, the UE shall delete the URSP.

For a UE operating in SNPN access operation mode and registered to a subscribed SNPN, the subscribed SNPN signalled URSP may be modified by the procedures defined in annex D of 3GPP TS 24.501 [11] and shall be stored until the entry of the "list of subscriber data" with the corresponding SNPN identity is updated or considered as "invalid".

For a UE operating in SNPN access operation mode and registered to a non-subscribed SNPN, the non-subscribed SNPN signalled URSP may be modified by the procedures defined in annex D of 3GPP TS 24.501 [11].

The UE may re-evaluate the URSP rules, to check if the change of the association of an application to a PDU session is needed, when:

NOTE 11: The time when the UE performs the re-evaluation is up to UE implementation. It is recommended that the UE performs the re-evaluation in a timely manner.

a) the UE performs periodic URSP rules re-evaluation based on UE implementation;

b) the UE NAS layer indicates that an existing PDU session used for routing traffic of an application based on a URSP rule is released;

c) the URSP is updated by the PCF;

d) the UE NAS layer indicates that the UE performs inter-system change from S1 mode to N1 mode;

e) the UE NAS layer indicates that the UE is successfully registered in N1 mode over 3GPP access or non-3GPP access;

f) the UE establishes or releases a connection to a WLAN access and transmission of a PDU of the application via non-3GPP access outside of a PDU session becomes available/unavailable;

g) the allowed NSSAI or the configured NSSAI is changed;

h) the LADN information or the extended LADN information is changed; or

i) the UE NAS layer indicates that back-off timer T3396, T3584 or T3585 (see 3GPP TS 24.501 [11] clause 6.2.7 and clause 6.2.8) is stopped or expired.

If the re-evaluation leads to a change of the association of an application to a PDU session, the UE may enforce such change immediately or when UE returns to 5GMM-IDLE mode.

NOTE 12: The time when the UE enforces the change of the association of an application to a PDU Session is up to UE implementation. It is recommended that the UE performs the enforcement in a timely manner.

The URSP handling layer may request the UE NAS layer to release an existing PDU session after the re-evaluation.

\*\*\* Next change \*\*\*

### 4.4.2 Use of URSP in EPS

If the UE:

- supports both S1 mode and N1 mode;

- does not have preconfigured rules for associating an application to a PDN connection, a non-seamless non-3GPP offload or a 5G ProSe layer-3 UE-to-network relay offload (i.e. there are no rules in UE local configuration and no ANDSF rules applicable for the application); and

- is provisioned with URSP,

when in S1 mode, the UE should use a matching URSP rule, if available, to derive the parameters, e.g. APN, using the mapping between the parameters in the URSP rules and the parameters used for PDN connection establishment specified in table 4.4.2.1 and table 4.4.2.2. The URSP rule with the derived EPS parameters are used for associating the application to a PDN connection, non-seamless non-3GPP offload or a 5G ProSe layer-3 UE-to-network relay offload, as specified in clause 4.2.2. The precedence of URSP rule is reused in EPS.

If a route selection descriptor for the matching URSP rule includes:

- at least one parameter not applicable in EPS, the UE shall not use the route selection descriptor and shall proceed to evaluate the route selection descriptor with the next lowest precedence value; and

- one or more parameters ignored in EPS, the UE shall evaluate the route selection descriptor without considering the one or more parameters ignored in EPS.

Table 4.4.2.1: Mapping table for traffic descriptor parameters

|  |  |  |
| --- | --- | --- |
| Traffic descriptor parameter name | Description | Mapped EPS parameter description |
| Application descriptors | It consists of OSId and OSAppId(s) | OSId and OSAppId(s) |
| IP descriptors | Destination IP 3 tuple(s) (IP address or IPv6 network prefix, port number, protocol ID of the protocol above IP) | Destination IP 3 tuple(s) (IP address or IPv6 network prefix, port number, protocol ID of the protocol above IP) |
| Domain descriptors | Destination FQDN(s) or a regular expression as a domain name matching criteria | Destination FQDN(s) or a regular expression as a domain name matching criteria |
| Non-IP descriptors | Descriptor(s) for destination information of non-IP traffic | Descriptor(s) for destination information of non-IP traffic |
| DNN | This is matched against the DNN information provided by the application | APN |
| Connection Capabilities | This is matched against the information provided by a UE application when it requests a network connection with certain capabilities | This is matched against the information provided by a UE application when it requests a network connection with certain capabilities |

Table 4.4.2.2: Mapping table for route selection descriptor parameters

|  |  |  |
| --- | --- | --- |
| Route selection descriptor parameter name | Description | Mapped EPS parameter description |
| Route selection descriptor precedence | Determines the order in which the route selection descriptors are to be applied | Determines the order in which the route selection descriptors are to be applied |
| SSC Mode Selection | One single value of SSC mode | Ignored in EPS if set to SSC mode 1  Not applicable in EPS if set to SSC mode 2 or 3 |
| Network Slice Selection | Either a single value or a list of values of S-NSSAI(s) | Not applicable in EPS |
| DNN Selection | Either a single value or a list of values of DNN(s) | Either a single value or a list of values of APN(s).  Not applicable in EPS if it contains at least one LADN DNN |
| PDU Session Type Selection | One single value of PDU Session Type | PDN type:  - PDU session type "Unstructured" is mapped to PDN type "non-IP".  - PDU session type "Ethernet" is mapped to PDN type "Ethernet", if supported by the UE. Otherwise PDU session type "Ethernet" is mapped to PDN type "non-IP" |
| 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 | Indicates if the traffic of the matching application is to be offloaded to non-3GPP access outside of a PDN connection |
| 5G ProSe layer-3 UE-to-network relay offload indication | Indicates if the traffic of the matching application is to be offloaded to 5G ProSe layer-3 UE-to-network relay outside of a PDU session | Not applicable in EPS |
| Access Type preference | Indicates the preferred Access Type (3GPP or non-3GPP) when the UE establishes a PDU Session for the matching application | preferred Access Type (3GPP or non-3GPP) |
| Multi-Access preference | Indicates that the PDU session should be established as a multi-access PDU session, using both 3GPP access and non-3GPP access. | Indicates that the PDN connection should be established as a user-plane resource of a multi-access PDU session, if the UE supports MA PDU session and procedures for PDN connection establishment.  Otherwise, not applicable in EPS |
| Time window | The time window when the matching traffic is allowed. | Not applicable in EPS |
| Location criteria | The UE location where the matching traffic is allowed. | Not applicable in EPS |
| PDU session pair ID | One single value of PDU session pair ID for redundant PDU session establishment. | Ignored in EPS |
| RSN | One single value of RSN for redundant PDU session establishment. | Ignored in EPS |
| 5G 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. | Not applicable in EPS |

\*\*\* Next change \*\*\*

## 5.2 Encoding of UE policy part type URSP

The UE policy part type URSP contains one or more URSP rules which may be included in the UE policy part contents as defined in annex D.6.2 of 3GPP TS 24.501 [11].

If the UE policy part contents includes one or more URSP rules (i.e. the UE policy part type field is set to "URSP"), the UE policy part contents including URSP rules is encoded as shown in figures 5.2.1 to 5.2.4 and table 5.2.1.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| URSP rule 1 | | | | | | | | octet q+3  octet s |
| URSP rule 2 | | | | | | | | octet s+1\*  octet t\* |
| … | | | | | | | | octet t+1\*  octet u\* |
| URSP rule n | | | | | | | | octet u+1\*  octet r\* |

Figure 5.2.1: UE policy part contents including one or more URSP rules

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of URSP rule | | | | | | | | octet v  octet v+1 |
| Precedence value of URSP rule | | | | | | | | octet v+2 |
| Length of traffic descriptor | | | | | | | | octet v+3  octet v+4 |
| Traffic descriptor | | | | | | | | octet v+5  octet w |
| Length of route selection descriptor list | | | | | | | | octet w+1  octet w+2 |
| Route selection descriptor list | | | | | | | | octet w+3  octet x |

Figure 5.2.2: URSP rule

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Route selection descriptor 1 | | | | | | | | octet w+3  octet y |
| Route selection descriptor 2 | | | | | | | | octet y+1\*  octet z\* |
| … | | | | | | | | octet z+1\*  octet a\* |
| Route selection descriptor m | | | | | | | | octet a+1\*  octet x\* |

Figure 5.2.3: Route selection descriptor list

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of route selection descriptor | | | | | | | | octet b  octet b+1 |
| Precedence value of route selection descriptor | | | | | | | | octet b+2 |
| Length of route selection descriptor contents | | | | | | | | octet b+3  octet b+4 |
| Route selection descriptor contents | | | | | | | | octet b+5  octet c |

Figure 5.2.4: Route selection descriptor

Table 5.2.1: UE policy part contents including a URSP rule

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Precedence value of URSP rule (octet v+2)  The precedence value of URSP rule field is used to specify the precedence of the URSP rule among all URSP rules in the URSP. This field includes the binary encoded value of the precedence value in the range from 0 to 255 (decimal). The higher the value of the precedence value field, the lower the precedence of the URP rule is. Multiple URSP rules in the URSP shall not have the same precedence value. | | | | | | | | | | |
| Traffic descriptor (octets v+5 to w)  The traffic descriptor field is of variable size and contains a variable number (at least one) of traffic descriptor components. Each traffic descriptor component shall be encoded as a sequence of one octet traffic descriptor component type identifier and a traffic descriptor component value field. The traffic descriptor component type identifier shall be transmitted first. | | | | | | | | | | |
| Traffic descriptor component type identifier  Bits 8 7 6 5 4 3 2 1  0 0 0 0 0 0 0 1 Match-all type 0 0 0 0 1 0 0 0 OS Id + OS App Id type (NOTE 1)(NOTE 3) 0 0 0 1 0 0 0 0 IPv4 remote address type 0 0 1 0 0 0 0 1 IPv6 remote address/prefix length type 0 0 1 1 0 0 0 0 Protocol identifier/next header type 0 1 0 1 0 0 0 0 Single remote port type (NOTE 6) 0 1 0 1 0 0 0 1 Remote port range type (NOTE 6) 0 1 0 1 0 0 1 0 IP 3 tuple type 0 1 1 0 0 0 0 0 Security parameter index type 0 1 1 1 0 0 0 0 Type of service/traffic class type 1 0 0 0 0 0 0 0 Flow label type  1 0 0 0 0 0 0 1 Destination MAC address type (NOTE 7) 1 0 0 0 0 0 1 1 802.1Q C-TAG VID type (NOTE 4) 1 0 0 0 0 1 0 0 802.1Q S-TAG VID type (NOTE 4) 1 0 0 0 0 1 0 1 802.1Q C-TAG PCP/DEI type (NOTE 4) 1 0 0 0 0 1 1 0 802.1Q S-TAG PCP/DEI type (NOTE 4) 1 0 0 0 0 1 1 1 Ethertype type  1 0 0 0 1 0 0 0 DNN type (NOTE 3) 1 0 0 1 0 0 0 0 Connection capabilities type (NOTE 3) 1 0 0 1 0 0 0 1 Destination FQDN  1 0 0 1 0 0 1 0 Regular expression 1 0 1 0 0 0 0 0 OS App Id type (NOTE 3)  1 0 1 0 0 0 0 1 Destination MAC address range type (NOTE 7) All other values are spare. If received they shall be interpreted as unknown. | | | | | | | | | | |
| For "match-all type", the traffic descriptor component shall not include the traffic descriptor component value field. The "match-all type" traffic descriptor component shall not appear more than once among all traffic descriptors of the whole URSP rules in the URSP. If the "match-all type" traffic descriptor component is included in a traffic descriptor, there shall be no traffic descriptor component with a type other than "match-all type" in the traffic descriptor. | | | | | | | | | | |
| For "OS Id + OS App Id type", the traffic descriptor component value field shall be encoded as a sequence of a sixteen octet OS Id field, a one octet OS App Id length field, and an OS App Id field. The OS Id field shall be transmitted first. The OS Id field contains a Universally Unique IDentifier (UUID) as specified in IETF RFC 4122 [16]. | | | | | | | | | | |
| For "IPv4 remote address type", the traffic descriptor component value field shall be encoded as a sequence of a four octet IPv4 address field and a four octet IPv4 address mask field. The IPv4 address field shall be transmitted first. | | | | | | | | | | |
| For "IPv6 remote address/prefix length type", the traffic descriptor component value field shall be encoded as a sequence of a sixteen octet IPv6 address field and one octet prefix length field. The IPv6 address field shall be transmitted first. | | | | | | | | | | |
|  | | | | | | | | | | |
| For "protocol identifier/next header type", the traffic descriptor component value field shall be encoded as one octet which specifies the IPv4 protocol identifier or IPv6 next header. | | | | | | | | | | |
| For "single remote port type", the traffic descriptor component value field shall be encoded as two octets which specify a port number. | | | | | | | | | | |
| For "remote port range type", the traffic descriptor component value field shall be encoded as a sequence of a two octet port range low limit field and a two octet port range high limit field. The port range low limit field shall be transmitted first. | | | | | | | | | | |
| For "IP 3 tuple type", the traffic descriptor component value field shall be encoded as a sequence of a one octet IP 3 tuple information bitmap field where:  - bit 1 set to zero indicates that the IPv4 address field is absent;  - bit 1 set to one indicates that the IPv4 address field is present;  - bit 2 set to zero indicates that the IPv6 remote address/prefix length field is absent;  - bit 2 set to one indicates that the IPv6 remote address/prefix length field is present;  - bit 3 set to zero indicates that the protocol identifier/next header field is absent;  - bit 3 set to one indicates that the protocol identifier/next header field is present;  - bit 4 set to zero indicates that the single remote port field is absent;  - bit 4 set to one indicates that the single remote port field is present;  - bit 5 set to zero indicates that the remote port range field is absent;  - bit 5 set to one indicates that the remote port range field is present; and  - bits 6,7, and 8 are spare bits;  followed by a four octet IPv4 address field and a four octet IPv4 address mask field, if the IPv4 address field is present;  followed by a sixteen octet IPv6 address field and one octet prefix length field, if the IPv6 remote address/prefix length field is present;  followed by one octet which specifies the IPv4 protocol identifier or IPv6 next header, if the protocol identifier/next header field is present;  followed by two octets which specify a port number, if the single remote port field is present;  followed by a two octet port range low limit field and a two octet port range high limit field, if the remote port range field is present.  The IP 3 tuple information bitmap field shall be transmitted first.  The traffic descriptor component value field shall not contain both the IPv4 address field and the IPv6 remote address/prefix length field. If the traffic descriptor component value field contains both the IPv4 address field and the IPv6 remote address/prefix length field, the receiving entity shall ignore the URSP rule.  The traffic descriptor component value field shall not contain both the single remote port field and the remote port range field. If the traffic descriptor component value field contains both the single remote port field and the remote port range field, the receiving entity shall ignore the URSP rule.  The traffic descriptor component value field shall contain at least one of the IPv4 address field, IPv6 remote address/prefix length field, the protocol identifier/next header field, the single remote port field and the remote port range field, otherwise the receiving entity shall ignore the URSP rule. | | | | | | | | | | |
| For "security parameter index type", the traffic descriptor component value field shall be encoded as four octets which specify the IPsec security parameter index. | | | | | | | | | | |
| For "type of service/traffic class type", the traffic descriptor component value field shall be encoded as a sequence of a one octet type-of-service/traffic class field and a one octet type-of-service/traffic class mask field. The type-of-service/traffic class field shall be transmitted first. | | | | | | | | | | |
| For "flow label type", the traffic descriptor component value field shall be encoded as three octets which specify the IPv6 flow label. The bits 8 through 5 of the first octet shall be spare whereas the remaining 20 bits shall contain the IPv6 flow label. | | | | | | | | | | |
| For "destination MAC address type", the traffic descriptor component value field shall be encoded as 6 octets which specify a MAC address. | | | | | | | | | | |
| For "802.1Q C-TAG VID type", the traffic descriptor component value field shall be encoded as two octets which specify the VID of the customer-VLAN tag (C-TAG) as specified in IEEE Std 802.1Q-2018 [20]. The bits 8 through 5 of the first octet shall be spare whereas the remaining 12 bits shall contain the VID. | | | | | | | | | | |
| For "802.1Q S-TAG VID type", the traffic descriptor component value field shall be encoded as two octets which specify the VID of the service-VLAN tag (S-TAG) as specified in IEEE Std 802.1Q-2018 [20]. The bits 8 through 5 of the first octet shall be spare whereas the remaining 12 bits shall contain the VID. | | | | | | | | | | |
| For "802.1Q C-TAG PCP/DEI type", the traffic descriptor component value field shall be encoded as one octet which specifies the 802.1Q C-TAG PCP and DEI as specified in IEEE Std 802.1Q-2018 [20]. The bits 8 through 5 of the octet shall be spare, and the bits 4 through 2 contain the PCP and bit 1 contains the DEI. | | | | | | | | | | |
| For "802.1Q S-TAG PCP/DEI type", the traffic descriptor component value field shall be encoded as one octet which specifies the 802.1Q S-TAG PCP as specified in IEEE Std 802.1Q-2018 [20]. The bits 8 through 5 of the octet shall be spare, and the bits 4 through 2 contain the PCP and bit 1 contains the DEI. | | | | | | | | | | |
| For "ethertype type", the traffic descriptor component value field shall be encoded as two octets which specify an ethertype. | | | | | | | | | | |
| For "DNN type", the traffic descriptor component value field shall be encoded as a sequence of a one octet DNN length field and a DNN value field of a variable size. The DNN value contains an APN as defined in 3GPP TS 23.003 [4]. | | | | | | | | | | |
| For "connection capabilities" type, the traffic descriptor component value field shall be encoded as a sequence of one octet for number of network capabilities followed by one or more octets, each containing a connection capability identifier encoded as follows: | | | | | | | | | | |
| Bits | | | | | | | | | | |
| 8 | | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |  |
| 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 1 |  | IMS |
| 0 | | 0 | 0 | 0 | 0 | 0 | 1 | 0 |  | MMS |
| 0 | | 0 | 0 | 0 | 0 | 1 | 0 | 0 |  | SUPL |
| 0 | | 0 | 0 | 0 | 1 | 0 | 0 | 0 |  | Internet |
| 0 | | 0 | 1 | 0 | 0 | 0 | 0 | 0 |  |  |
| to | | | | | | | | |  | Operator specific connection capabilities |
| 0 | | 0 | 1 | 1 | 1 | 1 | 1 | 1 |  |  |
| All other values are spare. If received, they shall be interpreted as unknown. | | | | | | | | | | |
|  | | | | | | | | | | |
| For "destination FQDN" type, the traffic descriptor component value field shall be encoded as a sequence of one octet destination FQDN length field and a destination FQDN value of variable size. The destination FQDN value field shall be encoded as defined in clause 28.3.2.1 in 3GPP TS 23.003 [4].  For "regular expression" type, the traffic descriptor component value field shall be encoded as a sequence of one octet regular expression length field and a regular expression value of variable size. The regular expression value field shall take the form of Extended Regular Expressions (ERE) as defined in chapter 9 in IEEE 1003.1-2004 Part 1 [19]. | | | | | | | | | | |
| For "OS App Id type", the traffic descriptor component value field shall be encoded as a one octet OS App Id length field and an OS App Id field.  For "destination MAC address range type", the traffic descriptor component value field shall be encoded as a sequence of a 6 octet destination MAC address range low limit field and a 6 octet destination MAC address range high limit field. The destination MAC address range low limit field shall be transmitted first. | | | | | | | | | | |
| Precedence value of route selection descriptor (octet b+2)  The precedence value of route selection descriptor field is used to specify the precedence of the route selection descriptor among all route selection descriptors in the URSP rule. This field includes the binary encoded value of the precedence value in the range from 0 to 255 (decimal). The higher the value of the precedence value field, the lower the precedence of the route selection descriptor is. | | | | | | | | | | |
| Route selection descriptor contents (octets b+5 to c)  The route selection descriptor contents field is of variable size and contains a variable number (at least one) of route selection descriptor components. Each route selection descriptor component shall be encoded as a sequence of a one octet route selection descriptor component type identifier and a route selection descriptor component value field. The route selection descriptor component type identifier shall be transmitted first. | | | | | | | | | | |
| Route selection descriptor component type identifier  Bits 8 7 6 5 4 3 2 1  0 0 0 0 0 0 0 1 SSC mode type 0 0 0 0 0 0 1 0 S-NSSAI type 0 0 0 0 0 1 0 0 DNN type 0 0 0 0 1 0 0 0 PDU session type type 0 0 0 1 0 0 0 0 Preferred access type type (NOTE 2) 0 0 0 1 0 0 0 1 Multi-access preference type (NOTE 2) 0 0 1 0 0 0 0 0 Non-seamless non-3GPP offload indication type 0 1 0 0 0 0 0 0 Location criteria type 1 0 0 0 0 0 0 0 Time window type 1 0 0 0 0 0 0 1 5G ProSe layer-3 UE-to-network relay offload indication type  1 0 0 0 0 0 1 0 PDU session pair ID type (NOTE 5)  1 0 0 0 0 0 1 1 RSN type (NOTE 5)  1 0 0 0 0 1 0 0 5G ProSe multi-path preference All other values are spare. If received they shall be interpreted as unknown. | | | | | | | | | | |
| For "SSC mode type", the route selection descriptor component value field shall be encoded as a one octet SSC mode field. The bits 8 through 4 of the octet shall be spare, and the bits 3 through 1 shall be encoded as the value part of the SSC mode information element defined in clause 9.11.4.16 of 3GPP TS 24.501 [11]. The "SSC mode type" route selection descriptor component shall not appear more than once in the route selection descriptor. | | | | | | | | | | |
| For "S-NSSAI type", the route selection descriptor component value field shall be encoded as a sequence of a one octet S-NSSAI length field and an S-NSSAI value field of a variable size. The S-NSSAI value shall be encoded as the value part of the S-NSSAI information element defined in clause 9.11.2.8 of 3GPP TS 24.501 [11], without the mapped HPLMN SST field and without the mapped HPLMN SD field. | | | | | | | | | | |
| For "DNN type", the route selection descriptor component value field shall be encoded as a sequence of a one octet DNN length field and a DNN value field of a variable size. The DNN value contains an APN as defined in 3GPP TS 23.003 [4]. | | | | | | | | | | |
| For "PDU session type type", the route selection descriptor component value field shall be encoded as a one octet PDU session type field. The bits 8 through 4 of the octet shall be spare, and the bits 3 through 1 shall be encoded as the value part of the PDU session type information element defined in clause 9.11.4.11 of 3GPP TS 24.501 [11]. The "PDU session type type" route selection descriptor component shall not appear more than once in the route selection descriptor. | | | | | | | | | | |
| For "preferred access type type", the route selection descriptor component value field shall be encoded as a one octet preferred access type field. The bits 8 through 3 shall be spare, and the bits 2 and 1 shall be encoded as the value part of the access type information element defined in clause 9.11.2.1A of 3GPP TS 24.501 [11]. The "preferred access type type" route selection descriptor component shall not appear more than once in the route selection descriptor. | | | | | | | | | | |
| For "multi-access preference type", the route selection descriptor component value field shall be of zero length. The "multi-access preference type" route selection descriptor component shall not appear more than once in the route selection descriptor. The "multi-access preference type" route selection descriptor component in the route selection descriptor indicates the multi-access preference. | | | | | | | | | | |
| For "non-seamless non-3GPP offload indication type", the route selection descriptor component shall not include the route selection descriptor component value field. The "non-seamless non-3GPP offload indication type" route selection descriptor component shall not appear more than once in the route selection descriptor. If the "non-seamless non-3GPP offload indication type" route selection descriptor component is included in a route selection descriptor, there shall be no route selection descriptor component with a type other than "non-seamless non-3GPP offload indication type" in the route selection descriptor. | | | | | | | | | | |
|  | | | | | | | | | | |
| For "location criteria type", the route selection descriptor component value field may contain one or more types of location area and is encoded as shown in Figure 5.2.5 and Table 5.2.2. | | | | | | | | | | |
| For "time window type", the route selection descriptor component value field shall be encoded as a sequence of a Starttime field and a Stoptime field. The Starttime field is represented by the number of seconds since 00:00:00 on 1 January 1970 and is encoded as the 64-bit NTP timestamp format defined in IETF RFC 5905 [17], where binary encoding of the integer part is in the first 32 bits and binary encoding of the fraction part in the last 32 bits. The encoding of the Stoptime field is the same as the Starttime field. | | | | | | | | | | |
|  | | | | | | | | | | |
| For "5G ProSe layer-3 UE-to-network relay offload indication type", the route selection descriptor component shall not include the route selection descriptor component value field. The "5G ProSe layer-3 UE-to-network relay offload indication type" route selection descriptor component shall not appear more than once in the route selection descriptor. If the "5G ProSe layer-3 UE-to-network relay offload indication type" route selection descriptor component is included in a route selection descriptor, there shall be no route selection descriptor component with a type other than "5G ProSe layer-3 UE-to-network relay offload indication type" in the route selection descriptor. If neither "5G ProSe layer-3 UE-to-network relay offload indication type" nor "5G ProSe multi-path preference” is present the traffic shall not be routed via a 5G ProSe layer-3 UE-to-network relay outside of a PDU Session. | | | | | | | | | | |
| For "PDU session pair ID type", the route selection descriptor component value field shall be encoded as a one octet PDU session pair ID field. The PDU session pair ID value shall be encoded as defined in clause 9.11.4.32 of 3GPP TS 24.501 [11]. | | | | | | | | | | | |
| For "RSN type", the route selection descriptor component value field shall be encoded as a one octet RSN field. The RSN value shall be encoded as the value part of the RSN information element defined in clause 9.11.4.33 of 3GPP TS 24.501 [11]. | | | | | | | | | | | |
| For "5G ProSe multi-path preference type", the route selection descriptor component shall not include the route selection descriptor component value field. The "5G ProSe multi-path preference" route selection descriptor component shall not appear more than once in the route selection descriptor. If the "5G ProSe multi-path preference" route selection descriptor component is included in a route selection descriptor, there shall be no route selection descriptor component with type "5G ProSe layer-3 UE-to-network relay offload indication type" in the route selection descriptor. If neither "5G ProSe layer-3 UE-to-network relay offload indication type" nor "5G ProSe multi-path preference type” is present the traffic shall not be routed via a 5G ProSe layer-3 UE-to-network relay outside of a PDU Session. | | | | | | | | | | | |
| NOTE 1: For "OS Id + OS App Id type", the traffic descriptor component value field does not specify the OS version number or the version number of the application.  NOTE 2: The PCF does not include both the "preferred access type type" and the "multi-access preference type" route selection descriptor components in a single route selection descriptor. If there are both "preferred access type type" and "multi-access preference type" route selection descriptor components in a single route selection descriptor, the UE ignores the "preferred access type type" route selection descriptor component.  NOTE 3: The W-AGF acting on behalf of the FN-RG shall interpret the value as unknown.  NOTE 4: The traffic descriptor of a URSP rule cannot include more than one instance of this traffic component type.  NOTE 5: Redundant PDU session is not applicable over non-3GPP access. The UE ignores any route selection descriptor which includes "PDU session pair ID type" or "RSN type" route selection descriptor component and also includes a "preferred access type type" route selection descriptor component set to "non-3GPP access" or a "multi-access preference type" route selection descriptor component.  NOTE 6: The traffic descriptor of a URSP rule shall not contain both the “Single remote port type” and the “Remote port range type” traffic descriptor components. If the traffic descriptor of a URSP rule contains both the “Single remote port type” and the “Remote port range type” traffic descriptor components, the receiving entity shall ignore the URSP rule.  NOTE 7: The traffic descriptor of a URSP rule shall not contain both the “Destination MAC address type” and the “Destination MAC address range type” traffic descriptor components. If the traffic descriptor of a URSP rule contains both the “Destination MAC address type” and the “Destination MAC address range type” traffic descriptor components, the receiving entity shall ignore the URSP rule. | | | | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of location criteria  Location area 1 | | | | | | | | octet d  octet e=(d+1)  octet f |
| Location area 2 | | | | | | | | octet f+1\*  octet g\* |
| … | | | | | | | | octet g+1\*  octet h\* |
| Location area m | | | | | | | | octet h+1\*  octet i\* |

Figure 5.2.5: Location criteria

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Type of location area | | | | | | | | octet e |
| Location area contents | | | | | | | | octet e+1\*  octet f\* |

Figure 5.2.6: Location area

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Number of E-UTRA cell identities | | | | | | | | octet e+1 |
| E-UTRA cell id 1 | | | | | | | | octet e+2  octet e+8 |
| E-UTRA cell id 2 | | | | | | | | octet e+9  octet e+15 |
| … | | | | | | | | octet e+16  octet j-1\* |
| E-UTRA cell id n | | | | | | | | octet j\*  octet f=(j+6)\* |

Figure 5.2.7: Location area contents {Type of location area = E-UTRA cell identities list}

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Number of NR cell identities | | | | | | | | octet e+1 |
| NR cell id 1 | | | | | | | | octet e+2  octet e+9 |
| NR cell id 2 | | | | | | | | octet e+10  octet e+17 |
| … | | | | | | | | octet e+18  octet k-1\* |
| NR cell id n | | | | | | | | octet k\*  octet f=(k+7)\* |

Figure 5.2.8: Location area contents {Type of location area = NR cell identities list}

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Number of Global gNB identities | | | | | | | | octet e+1 |
| Global gNB id 1 | | | | | | | | octet e+2  octet e+8 |
| Global gNB id 2 | | | | | | | | octet e+9  octet e+15 |
| … | | | | | | | | octet e+16  octet l-1\* |
| Global gNB id n | | | | | | | | octet l\*  octet f=(l+6)\* |

Figure 5.2.9: Location area contents {Type of location area = Global RAN node identities list}

Table 5.2.2: Location criteria

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Length of location criteria (octect d)  This field indicates the length of the included Location criteria contents.  Type of location area is coded as follows. | | | | | | | | | |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |  |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |  | E-UTRA cell identities list |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |  | NR cell identities list |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |  | Global RAN node identities list |
| 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |  | TAI list |
| All other values are spare. | | | | | | | | | |
|  | | | | | | | | | |
| When the type of location area is "E-UTRA cell identities list", the location area contents shall be encoded as in Figure 5.2.7. Each E-UTRA cell id field is of 7 octet size and shall be encoded as specified in clause 9.3.1.9 of 3GPP TS 38.413 [14]. | | | | | | | | | |
|  | | | | | | | | | |
| When the type of location area is "NR cell identities list", the location area contents shall be encoded as in Figure 5.2.8. Each NR cell id field is of 8 octet size shall be encoded as specified in clause 9.3.1.7 of 3GPP TS 38.413 [14]. | | | | | | | | | |
|  | | | | | | | | | |
| When the type of location area is "Global RAN node identities list", the location area contents shall be encoded as in Figure 5.2.8. Each Global gNB id field is of 7 octet size shall be encoded as specified in clause 9.3.1.6 of 3GPP TS 38.413 [14]. | | | | | | | | | |
|  | | | | | | | | | |
| When the type of location area is "TAI list", the location area contents shall be encoded as the 5GS tracking area identity list information element (starting with octet 2) defined in clause 9.11.3.9 of 3GPP TS 24.501 [11]. | | | | | | | | | |
|  | | | | | | | | | |

\*\*\* End change \*\*\*