**3GPP TSG-CT WG1 Meeting #121C1-202541**

**Reno (NV), USA, 11-15 November 2019**

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **24.526** | **CR** | **0068** | **rev** | **2** | **Current version:** | **16.3.0** |  |
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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:*** | Correction to the URSP encoding | | | | | | | | | |
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| ***Source to WG:*** | MediaTek Inc., ZTE | | | | | | | | | |
| ***Source to TSG:*** | C1 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | 5GProtoc16 | | | | |  | ***Date:*** | | | 2020-04-09 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *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-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
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| ***Reason for change:*** | | 1. Based on the current requirement, if the traffic descriptor contains more than one component, all of them shall be matched.  However, there may be multiple traffic descriptor components of the same type included in a single traffic descriptor (e.g., multiple DNNs in a single traffic descriptor). It makes no sense to match all the components. 2. An IP 3 tuple is composed by 3 traffic descriptor components:   - IPv4 remote address type or IPv6 remote address/prefix length type; - Protocol identifier/next header type; and - Single remote port type or Remote port range type. A signle traffice descriptor can include multiple IP 3 tuples, however, how multiple IP 3 tuples are tramsmitted is not well defined. | | | | | | | | |
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| ***Summary of change:*** | | 1. Clarify that:  * If the traffic descriptor contains more than one traffic descriptor component 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.  1. Add a note to describe how to transmit the traffic descriptor components for an IP 3 tuple, and also clarify that if multiple IP 3 tuples are to be transmitted, the next IP 3 tuple shall be transmitted after all the three traffic descriptor components of the previous IP 3 tuple are transmitted. 2. Since part of the 3 components of an IP 3 tuple can have match-all value, the following values are proposed:    * IP address: all bits set to “0” (IP address of the local machine which is not used for remote address)    * Protocol: all bits set to “0” (reserved value)    * Port: all bits set to “0” (reserved value) | | | | | | | | |
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| ***Consequences if not approved:*** | | 1. It is not defined how to match a traffic descriptor with multiple traffic descriptor components of the same traffic descriptor component type. 2. It is not defined how to transmit the traffic descriptor components for IP 3 tuples. | | | | | | | | |
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| ***Clauses affected:*** | | 4.2.2.2, 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:*** | |  | | | | | | | | |

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

#### 4.2.2.2 Association between an application and either a PDU session or non-seamless non-3GPP offload by a UE

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. 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, all of them shall be matched. If the traffic descriptor contains more than one traffic descriptor component of the same traffic descriptor component type other than IP 3 tuple (i.e., IPv4 remote address type, IPv6 remote address/prefix length type, Protocol identifier/next header type, Single remote port type and Remote port range type), at least one of the traffic descriptor components of the same traffic descriptor component type shall be matched with the application information. If there are more than one IP 3 tuple included in the traffic descriptor, at least one of the IP 3 tuples 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 subclause 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 one or more PDU sessions:

1) matching at least one of 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, and a 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; and

2) 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:

i) the preferred access type;

ii) the multi-access preference; and

iii) the DNN, if one or more DNNs are included in the traffic descriptor, and the DNN provided by the application is the same as the DNN requested by the UE during the PDU session establishment.

the UE shall provide information on the PDU session that matches the route selection descriptor of the lowest precedence value 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);

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

vi) the selected route selection descriptor does not contain a non-seamless non-3GPP 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. 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 there is no DNN in the matched traffic 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 of a URSP rule and one or more DNNs are included in the route selection descriptor, the route selection descriptor is ignored and the UE proceeds to step 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 is no DNN in the traffic descriptor and 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; and

NOTE 6: If a preferred access type or a multi-access preference is included in the traffic 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.

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 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.

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 or to non-seamless non-3GPP 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 8: If one or more DNNs are included in the route selection descriptor of the default URSP rule and a DNN was provided by the application, 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 and no DNN is provided by the application, 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.

The HPLMN may pre-configure the UE with URSP in the ME or in the USIM, or may provide URSP to the UE by signalling as described in annex D of 3GPP TS 24.501 [11]. The pre-configured URSP in the ME and the signalled URSP shall be stored in a non-volatile memory in the ME together with the SUPI from the USIM. If the UE has both pre-configured URSP(s) and signalled URSP, the UE shall only use the signalled URSP. If the UE has no signalled URSP, and the UE has pre-configured URSPs configured in both the USIM and the ME, then the UE shall use the pre-configured URSP in the USIM. The pre-configured URSP in the ME shall be stored until a new URSP is configured by HPLMN or the USIM is removed.

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.

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 9: 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 is changed; or

h) the LADN information is changed.

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 10: 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 \*\*\*\*\*

## 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 (NOTE 4)  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  0 1 0 1 0 0 0 1 Remote port range 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 1 0 0 0 0 0 1 1 802.1Q C-TAG VID type 1 0 0 0 0 1 0 0 802.1Q S-TAG VID type 1 0 0 0 0 1 0 1 802.1Q C-TAG PCP/DEI type 1 0 0 0 0 1 1 0 802.1Q S-TAG PCP/DEI type 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 1 0 0 0 0 0 OS App Id type (NOTE 3) 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. If all the bits in the IPv4 address mask field are set to 0, the "IPv4 remote address type" traffic descriptor component can match any IPv4 remote address. | |
| 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. If all the bits in the prefix length field are set to 0, the "IPv6 remote address/prefix length type" traffic descriptor component can match any IPv6 remote address. | |
|  | |
| 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. If all the bits are set to 0, the "protocol identifier/next header type" traffic descriptor component can match any protocol/next header. | |
| For "single remote port type", the traffic descriptor component value field shall be encoded as two octets which specify a port number. If all the bits are set to 0, the "single remote port type" traffic descriptor component can match any 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 "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). 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). 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. 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. 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  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 IETF RFC 1035 [12]. | |
| 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. | |
| 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) 1 0 0 0 0 0 0 0 Time window type 0 1 0 0 0 0 0 0 Location criteria type 0 0 1 0 0 0 0 0 Non-seamless non-3GPP offload indication type 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 subclause 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 subclause 9.11.2.8 of 3GPP TS 24.501 [11]. | |
| 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 subclause 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 subclause 9.11.2.10 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 "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 filed is the same as the Starttime field. | |
|  | |
| 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. | |
|  | |
| 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 interpreted the value as unknown.  NOTE 4: An IP 3 tuple is composed by three traffic descriptor components which is transmitted in the following order: - IPv4 remote address type or IPv6 remote address/prefix length type;  - Protocol identifier/next header type; and - Single remote port type or remote port range type. If a traffic descriptor component of IP 3 tuple is not received in the oder above, the UE ignores the corresponding traffic descriptor component. If more than one IP 3 tuple are to be transmitted, the next IP 3 tuple is transmitted after all the three traffic descriptor components of the previous IP 3 tuple are transmitted. | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Location area 1 | | | | | | | | octet d  octet e |
| Location area 2 | | | | | | | | octet e+1\*  octet f\* |
| … | | | | | | | | octet f+1\*  octet g\* |
| Location area m | | | | | | | | octet g+1\*  octet h\* |

Figure 5.2.5: Location criteria

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

Figure 5.2.6: Location area

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Number of E-UTRA cell identities | | | | | | | | octet d+1 |
| E-UTRA cell id 1 | | | | | | | | octet d+2  octet d+8 |
| E-UTRA cell id 2 | | | | | | | | octet d+9  octet d+15 |
| … | | | | | | | | octet d+16  octet e-1\* |
| E-UTRA cell id n | | | | | | | | octet e\*  octet e+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 d+1 |
| NR cell id 1 | | | | | | | | octet d+2  octet d+9 |
| NR cell id 2 | | | | | | | | octet d+10  octet d+17 |
| … | | | | | | | | octet d+18  octet e-1\* |
| NR cell id n | | | | | | | | octet e\*  octet e+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 d+1 |
| Global gNB id 1 | | | | | | | | octet d+2  octet d+8 |
| Global gNB id 2 | | | | | | | | octet d+9  octet d+15 |
| … | | | | | | | | octet d+16  octet e-1\* |
| Global gNB id n | | | | | | | | octet e\*  octet e+6\* |

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

Table 5.2.2: Location criteria

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 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 subclause 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 subclause 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 subclause 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 subclause 9.11.3.9 of 3GPP TS 24.501 [11]. | | | | | | | | | |
|  | | | | | | | | | |