**3GPP TSG-CT WG3 Meeting #116e C3-213228**

**E-Meeting, 19th – 28th May 2021 (Revision of C3-21xxxx)**

|  |
| --- |
| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  | **29.061** | **CR** | **0540** | **rev** |  | **Current version:** | **17.2.0** |  |
|  |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **X** |

|  |
| --- |
|  |
| ***Title:***  | Reporting UE local IP to RADIUS DN-AAA server |
|  |  |
| ***Source to WG:*** | Ericsson |
| ***Source to TSG:*** | CT3 |
|  |  |
| ***Work item code:*** | TEI17, 5GS\_Ph1-CT, SAES-St3-intwk |  | ***Date:*** | 2021-04-28 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** |  Rel-17 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
|  |  |
| ***Reason for change:*** | When the UE is in WLAN access, the UE local IP address, UE UDP source port number or TCP source port number can be reported from ePDG to PGW via S2b interface. The UE local IP address and port number have been included in Gx, Gy interface and PGW CDR, while these information is still missing in the SGi interface RADIUS message, PGW or PGW-C cannot report UE local IP information to the DN-AAA server. |
|  |  |
| ***Summary of change:*** | Adding 3GPP VSA for the UE local IP address and port number in RADIUS messages. |
|  |  |
| ***Consequences if not approved:*** | Missing the UE local IP information when the UE is accessing via WLAN, cannot report UE local IP for authentication and/or authorization by ther DN-AAA server, DN AAA server also cannot handle user location based policy control, charging and/or accounting statistics for the UE with WLAN access. |
|  |  |
| ***Clauses affected:*** | 16.4.7.1, 16.4.7.2 |
|  |  |
|  | **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:*** |  |

**Additional discussion(if needed):**

**Proposed changes:**

\*\*\* 1st Change \*\*\*

#### 16.4.7.1 Presence of the 3GPP Vendor-Specific attribute in RADIUS messages.

Table 7: List of the 3GPP Vendor-Specific sub-attributes

| Sub-attr # | Sub-attribute Name | Description | Presence Requirement | Associated attribute(Location of Sub-attr) | Applicable Reference Points |
| --- | --- | --- | --- | --- | --- |
| 1 | 3GPP-IMSI | IMSI for this user | Optional | Access-Request, Accounting-Request START, Accounting-Request STOP, Accounting-Request Interim-Update | Gi,Sgi |
| 2 | 3GPP-Charging-Id | For GGSN, Charging ID for this PDP Context (this together with the GGSN IP Address constitutes a unique identifier for the PDP context).For P-GW, Charging ID for this IP-CAN bearer (this together with the P-GW IP address constitutes a unique identifier for the IP-CAN bearer). | Optional | Access-Request, Accounting-Request START, Accounting-Request STOP, Accounting-Request Interim-Update  | Gi,Sgi |
| 3 | 3GPP-PDP-Type | For GGSN, it indicates the type of PDP context, e.g. IP or PPP.For P-GW, it indicates the PDN Type, e.g. IPv4, IPv6, IPv4v6. | Conditional(mandatory if attribute 7 is present) | Access-Request Accounting-Request START, Accounting-Request STOP, Accounting-Request Interim-Update | GiSgi |
| 4 | 3GPP-CG-Address | Charging Gateway IP address | Optional | Access-Request, Accounting-Request START, Accounting-Request STOP, Accounting-Request Interim-Update  | Gi,Sgi |
| 5 | 3GPP-GPRS-Negotiated-QoS-Profile | For GGSN, it represents the QoS profile for the PDP context.For P-GW, it represents the QoS profile for the EPS bearer and the authorized APN-AMBR. | Optional | Access-Request, Accounting-Request START, Accounting-Request STOP, Accounting-Request Interim-Update  | GiSgi |
| 6 | 3GPP-SGSN-Address | For GGSN, it represents the SGSN IPv4 address that is used by the GTP control plane for the handling of control messages. For P-GW, it represents the IPv4 address of the S-GW, trusted non-3GPP IP access or ePDG that is used on S5/S8, S2a or S2b, or the SGSN IPv4 address for GnGp SGSN accesses to the PGW for the handling of control messages. The address may be used to identify the PLMN to which the user is attached. | Optional | Access-Request, Accounting-Request START, Accounting-Request STOP, Accounting-Request Interim-Update  | Gi, Sgi |
| 7 | 3GPP-GGSN-Address | For GGSN, it represents the GGSN IPv4 address that is used by the GTP control plane for the context establishment.For P-GW, it representsthe P-GW IPv4 address that is used on S5/S8, S2a, S2b or S2c control plane for the IP-CAN session establishment. The address is the same as the GGSN/P-GW IPv4 address used in the CDRs generated by the GGSN/P-GW. | Optional | Access-Request, Accounting-Request START, Accounting-Request STOP, Accounting-Request Interim-Update  | Gi, Sgi |
| 8 | 3GPP-IMSI-MCC-MNC | MCC and MNC extracted from the user’s IMSI (first 5 or 6 digits, as applicable from the presented IMSI). | Optional | Access-Request, Accounting-Request START, Accounting-Request STOP, Accounting-Request Interim-Update | Gi,Sgi |
| 9 | 3GPP-GGSN- MCC-MNC | MCC-MNC of the network the GGSN or the P-GW belongs to. | Optional | Access-Request, Accounting-Request START, Accounting-Request STOP, Accounting-Request Interim-Update  | Gi, Sgi |
| 10 | 3GPP-NSAPI | For GGSN, it identifies a particular PDP context for the associated PDN and MSISDN/IMSI from creation to deletion.For P-GW, it identifies the EPS Bearer ID if it is known to the P-GW (i.e. GTP-based S5/S8 is in use).  | Optional | Access-Request, Accounting-Request START, Accounting-Request STOP Accounting-Request Interim-Update | Gi, Sgi |
| 11 | 3GPP-Session-Stop-Indicator | Indicates to the AAA server that the last PDP context or EPS Bearer of a session is released and that the IP-CAN session has been terminated. | Optional | Accounting Request STOP | Gi,Sgi |
| 12 | 3GPP-Selection-Mode | For GGSN it contains the Selection mode for this PDP Context received in the Create PDP Context Request message For P-GW it contains the Selection mode for this EPS Bearer received in the Create Session Request message. | Optional | Access-Request, Accounting-Request START, Accounting-Request STOP, Accounting-Request Interim-Update | Gi,Sgi |
| 13 | 3GPP-Charging-Characteristics | For GGSN, it contains the charging characteristics for this PDP Context received in the Create PDP Context Request Message (only available in R99 and later releases).For P-GW, it contains the charging characteristics for the IP-CAN bearer. | Optional | Access-Request, Accounting-Request START, Accounting-Request STOP, Accounting-Request Interim-Update  | Gi,Sgi |
| 14 | 3GPP-CG-IPv6-Address | Charging Gateway IPv6 address | Optional | Access-Request, Accounting-Request START, Accounting-Request STOP, Accounting-Request Interim-Update  | Gi,Sgi |
| 15 | 3GPP-SGSN-IPv6-Address | For GGSN, it represents the SGSN IPv6 address that is used by the GTP control plane for the handling of control messages.For P-GW, it represents the IPv6 address of the S-GW, trusted non-3GPP IP access or ePDG that is used on S5/S8, S2a or S2b, or the SGSN IPv6 address for GnGp SGSN accesses to the PGW for the handling of control messages. The address may be used to identify the PLMN to which the user is attached. | Optional | Access-Request, Accounting-Request START, Accounting-Request STOP, Accounting-Request Interim-Update  | Gi, Sgi |
| 16 | 3GPP-GGSN-IPv6-Address | For GGSN, it represents the GGSN IPv6 address that is used by the GTP control plane for the context establishment.For P-GW, it represents the P-GW IPv6 address that is used on S5/S8, S2a, S2b or S2c control plane for the IP-CAN session establishment. | Optional | Access-Request, Accounting-Request START, Accounting-Request STOP, Accounting-Request Interim-Update  | Gi, Sgi |
| 17 | 3GPP-IPv6-DNS-Servers | List of IPv6 addresses of DNS servers for an APN | Optional | Access-Accept  | Gi,Sgi |
| 18 | 3GPP-SGSN-MCC-MNC | For GGSN and PGW connected to a Gn/Gp SGSN, it represents theMCC and MNC extracted from the RAI within the Create PDP Context Request or Update PDP Context Request message.For P-GW in GTP/PMIP S5/S8 it represents the MCC and MNC extracted from the Serving Network.For PGW connected to S2a, it represents the MCC and MNC extracted from the Serving Network.For PGW connected to S2b, it represents the MCC and MNC extracted from the Serving Network. | Optional | Access-Request, Accounting-Request START, Accounting-Request STOP, Accounting-Request Interim-Update | Gi,Sgi |
| 19 | 3GPP-Teardown-Indicator | Indicate to the GGSN/P-GW that all IP-CAN bearers for this particular user and sharing the same user session need to be deleted. | Optional | Disconnect Request | GiSgi |
| 20  | 3GPP-IMEISV | International Mobile Equipment Id and its Software Version  | Optional | Accounting-Request START, Accounting-Request STOP, Access-Request  | Gi,Sgi |
| 21 | 3GPP-RAT-Type | Indicate which Radio Access Technology is currently serving the UE | Optional | Access-Request, Accounting-Request START, Accounting-Request STOP, Accounting-Request Interim-Update | Gi,Sgi |
| 22 | 3GPP-User-Location-Info | Indicate details of where the UE is currently located (e.g. SAI or CGI). | Optional | Accounting-Request START, Access-Request, Accounting-Request STOP, Accounting-Request Interim-Update | Gi,Sgi  |
| 23 | 3GPP-MS-TimeZone | Indicate the offset between universal time and local time in steps of 15 minutes of where the MS/UE currently resides. | Optional | Accounting-Request START, Access-Request, Accounting-Request STOP, Accounting-Request Interim-Update | Gi,Sgi |
| 24 | 3GPP-CAMEL-Charging-Info | Used to copy any CAMEL Information present in S‑CDR(s). | Optional | Accounting-Request START, Access-Request | Gi |
| 25 | 3GPP-Packet-Filter | Packet Filter used for this PDP context or EPS bearer. | Optional  | Accounting-Request START, Accounting-Request STOP, Accounting-Request Interim-Update | Gi,Sgi |
| 26 | 3GPP-Negotiated-DSCP | DSCP used to mark the IP packets of this PDP context on the Gi interface or EPS Bearer context on the Sgi interface | Optional | Access-Request, Accounting-Request START, Accounting-Request STOP, Accounting-Request Interim-Update | Gi,Sgi |
| 27 | 3GPP-Allocate-IP-Type | Indicates whether the Access-Request is sent for user authentication only and/or for allocation of an IPv4 address and/or of an IPv6 prefix | Conditional (see subclause 16.4.7.2 for conditions) | Access-Request | Gi,Sgi |
| 28 | External-Identifier | A globally unique identifier of a UE used towards external servers instead of IMSI and MSISDN, refer to 3GPP TS 23.682 [100] and 3GPP TS 23.003 [40]. | Optional | Access-Request, Access-Accept, Accounting-Request START, Accounting-Request STOP, Accounting-Request Interim-Update | Gi,Sgi |
| 29 | TWAN-Identifier | Indicates the UE location in a Trusted WLAN Access Network. | Optional | Accounting-Request START, Access-Request, Accounting-Request STOP, Accounting-Request Interim-Update | Sgi |
| 30 | 3GPP-User-Location-Info-Time | Indicate the time at which the UE was last known to be in the location which is reported during bearer deactivation or PDN disconnection procedure. | Optional | Accounting-Request STOP | Gi,Sgi |
| 31 | 3GPP-Secondary-RAT-Usage | Indicates the data usage in the secondary RAT. | Optional | Accounting-Request STOP, Accounting-Request Interim-Update | Sgi |
| 32 | 3GPP-UE-Local-IP-Address | Indicates the UE local IP address in an untrusted WLAN Access Network. | Optional | Access-Request, Accounting-Request START, Accounting-Request STOP, Accounting-Request Interim-Update | Sgi |
| 33 | 3GPP-UE-Source-Port | Indicates the UE UDP or TCP source port number. | Optional | Access-Request, Accounting-Request START, Accounting-Request STOP, Accounting-Request Interim-Update | Sgi |

The information represented by some of the Sgi sub-attributes may not be available to the P-GW depending on the UE’s radio access and the S5/S8 protocol type (GTP or PMIP). For example, the P-GW will be aware of the User Location Info (e.g. TAI) if the user is in LTE access and GTP based S5/S8 is used. However, such information is not passed to the P-GW when PMIP based S5/S8 is utilised. In such scenarios, if a sub-attribute is configured in the P-GW to be transferred to the RADIUS AAA server, but the information in the P-GW is not up to date or not available; the P-GW shall not send the corresponding sub-attribute, unless otherwise stated in the following subclause where the encoding of each sub-attribute is specified.

\*\*\* 2nd Change \*\*\*

#### 16.4.7.2 Coding 3GPP Vendor-Specific RADIUS attributes

In this subclause the provisions of IETF RFC 2865 [38] apply, which in particular specify the following:

- the Length field of an attribute is one octet, and it indicates the length of this Attribute including the Type, Length and Value fields.

- type String may be 1-253 octets long and it contains binary data (values 0 through 255 decimal, inclusive). Strings of length zero (0) shall not be sent, but the entire attribute shall be omitted. A NULL terminating character shall not be appended to an attribute of type String.

- type Text may be 1-253 octets long and it contains UTF-8 encoded characters. Text of length zero (0) shall not be sent, but the entire attribute shall be omitted. A NULL terminating character shall not be appended to an attribute of type Text.

- type Address is 32 bit value and most significant octet is the first one.

- type Integer is 32 bit unsigned value and most significant octet is the first one.

The RADIUS vendor Attribute is encoded as follows (as per IETF RFC 2865 [38])

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  |  Type = 26 |
| 2 |  | Length = n |
| 3  |  | Vendor id octet 1 |
| 4 |  | Vendor id octet 2 |
| 5 |  | Vendor id octet 3 |
| 6 |  | Vendor id octet 4 |
| 7-n |  | String |

n ≥ 7

3GPP Vendor Id = 10415

The string part is encoded as follows:

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type =  |
| 2 |  | 3GPP Length = m |
| 3 –m |  | 3GPP value |

m ≥ 2 and m ≤ 248

The 3GPP specific attributes encoding is clarified below.

NOTE: Unless otherwise stated, the encoding of the value field of a 3GPP vendor-specific attribute is identical for Gi and Sgi.

***1 –*** 3GPP-***IMSI***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 1 |
| 2 |  | 3GPP Length= m |
| 3-m |  | IMSI digits 1-n (UTF-8 encoded characters) |

3GPP Type: 1

n ≤15

Length: m ≤ 17

IMSI value: Text type:

A GGSN (or a P-GW) receives IMSI that is encoded according to 3GPP TS 29.060 [24] (or 3GPP TS 29.274 [81]) and converts IMSI into the UTF-8 characters, which are encoded as defined in 3GPP TS 23.003 [40]. There shall be no padding characters between the MCC and MNC, and between the MNC and MSIN. If the IMSI is less than 15 digits, the padding in the GTP information element shall be removed by the GGSN (or the P-GW) and not encoded in this sub-attribute.

***2 –*** 3GPP-***Charging ID***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 2 |
| 2 |  | 3GPP Length= 6 |
| 3 |  | Charging ID value Octet 1 |
| 4 |  | Charging ID value Octet 2 |
| 5 |  | Charging ID value Octet 3 |
| 6 |  | Charging ID value Octet 4 |

3GPP Type: 2

Length: 6

Charging ID value: 32 bits unsigned integer

***3 –*** 3GPP-***PDP type***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 3 |
| 2 |  | 3GPP Length= 6 |
| 3 |  | PDP type octet 1 |
| 4 |  | PDP type octet 2 |
| 5 |  | PDP type octet 3 |
| 6 |  | PDP type octet 4 |

3GPP Type: 3

Length: 6

PDP type value: Unsigned 32 bits integer type

PDP type may have the following values:

0 = IPv4

1 = PPP

2 = IPv6

3 = IPv4v6

4 = Non-IP

5 = Unstructured

6 = Ethernet

For P-GW, this sub-attribute represents PDN Type and therefore only the values "0", "2", "3" and "4" are applicable.

The value 5 Unstructured and 6 Ethernet of PDP type does not apply for the present specification. For specifications referencing the present RADIUS VSA, those values shall only apply if it is explicitely endorsed within the referencing specification.

***4 –*** 3GPP-***Charging Gateway address***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 4 |
| 2 |  | 3GPP Length= 6 |
| 3 |  | Charging GW addr Octet 1 |
| 4 |  | Charging GW addr Octet 2 |
| 5 |  | Charging GW addr Octet 3 |
| 6 |  | Charging GW addr Octet 4 |

3GPP Type: 4

Length: 6

Charging GW address value: Address type.

***5 –*** 3GPP-***GPRS Negotiated QoS profile***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 5 |
| 2 |  | 3GPP Length= L |
| 3 – L |  | UTF-8 encoded QoS profile |

3GPP Type: 5

Length: For GGSN, L ≤ 37 (release 7 or higher) or L ≤ 33 (release 6 or release 5) or L ≤ 27 (release 4 or release 99) or L = 11 (release 98). For P-GW, the length varies depending on the value of QCI. See below for details.

QoS profile value: Text type

UTF-8 encoded QoS profile syntax:

"<Release indicator> – <release specific QoS IE UTF-8 encoding>"

<Release indicator> = UTF-8 encoded number (two characters) :

 For GGSN:

"98" = Release 98

"99"= Release 99 or release 4

"05"= Release 5 or release 6

"07"= Release 7 or higher

For P-GW:

"08"= Release 8 or higher

For SMF:

"15"= Release 15 or higher

 <release specific QoS profile UTF-8 encoding> = UTF-8 encoded QoS profile for the release indicated by the release indicator.

 The UTF-8 encoding of a QoS IE is defined as follows: each octet is described by 2 UTF-8 encoded characters, defining its hexadecimal representation.

 For GGSN:

 The QoS profile definition is in 3GPP TS 24.008 [54].

 The release 98 QoS profile data is 3 octets long, which then results in a 6 octets UTF-8 encoded string.

 The release 99 and release 4 QoS profile data is 11 octets long, which results in a 22 octets UTF-8 encoded string.

 The release 5 and release 6 QoS profile data is 14 octets long, which results in a 28 octets UTF-8 encoded string.

 The release 7 (and higher) QoS profile data is 16 octets long, which results in a 32 octets UTF-8 encoded string.

 For P-GW:

 It contains the following QoS parameters associated with the EPS bearer:

- QCI

- ARP

- GBR QoS information (UL/DL MBR, UL/DL GBR) or UL/DL APN-AMBR. In other words if the value of QCI indicates a GBR bearer, the GBR QoS information shall be present. If the value of QCI indicates a non-GBR bearer, the APN-AMBR information shall be present.

 The encoding of the EPS bearer QoS profile parameters is specified in 3GPP TS 29.274 [81]: ARP is specified in Bearer QoS IE; QCI, UL MBR, DL MBR, UL MBR and DL MBR are specified in Flow QoS IE; UL APN-AMBR and DL APN-AMBR are specified in AMBR IE.

 For GBR QCIs, the encoding of UTF-8 encoded QoS Profile field shall be as follows:

|  |  |  |
| --- | --- | --- |
| 1-2 |  | <Release indicator> = " 08" (UTF-8 encoded) |
| 3 |  | "-" (UTF-8 encoded) |
| 4-5 |  | ARP (UTF-8 encoded) |
| 6-7 |  | QCI (UTF-8 encoded) |
| 8-m |  | UL MBR (UTF-8 encoded) |
| (m+1)-n |  | DL MBR (UTF-8 encoded) |
| (n+1)-o |  | UL GBR (UTF-8 encoded) |
| (o+1)-p |  | DL GBR (UTF-8 encoded) |

 For non-GBR QCIs, the UL/DL MBR and UL/DL GBR fields shall not be present; UL APN-AMBR and DL APN-AMBR fields shall be encoded (in UTF-8 encoded format) respectively after the QCI field.

For SMF:

 It contains the following QoS parameters associated with the QoS flow:

- 5QI

- ARP

- GBR QoS information (UL/DL MFBR, UL/DL GFBR) or UL/DL Session-AMBR. In other words if the value of 5QI indicates a GBR QoS flow, the GBR QoS information shall be present. If the value of 5QI indicates a non-GBR QoS flow, the Session-AMBR information shall be present.

 5QI value range is 0-255. ARP shall be encoded as Allocation/Retention Priority IE defined in 3GPP TS 29.274 [81]. The UTF-8 encoded UL/DL MFBR, UL/DL GFBR and UL/DL Session-AMBR has the following pattern:

'^\d+(\.\d+)? (bps|Kbps|Mbps|Gbps|Tbps)$'

Examples:

"125 Mbps", "0.125 Gbps", "125000 Kbps"

 For GBR 5QIs, the encoding of UTF-8 encoded QoS Profile field shall be as follows:

|  |  |  |
| --- | --- | --- |
| 1-2 |  | <Release indicator> = "15" (UTF-8 encoded) |
| 3 |  | "-" (UTF-8 encoded) |
| 4-5 |  | ARP (UTF-8 encoded) |
| 6-7 |  | 5QI (UTF-8 encoded) |
| 8-9 |  | UL MFBR length (UTF-8 encoded) |
| 10-m |  | UL MFBR (UTF-8 encoded) |
| (m+1)-(m+2) |  | DL MFBR length (UTF-8 encoded) |
| (m+3)-n |  | DL MFBR (UTF-8 encoded) |
| (n+1)-(n+2) |  | UL GFBR length (UTF-8 encoded) |
| (n+3)-o |  | UL GFBR (UTF-8 encoded) |
| (o+1)-(o+2) |  | UL GFBR length (UTF-8 encoded) |
| (o+3)-p |  | DL GFBR (UTF-8 encoded) |

 For non-GBR 5QIs, the encoding of UTF-8 encoded QoS Profile field shall be as follows:

|  |  |  |
| --- | --- | --- |
| 1-2 |  | <Release indicator>- = "15" (UTF-8 encoded) |
| 3 |  | "-" (UTF-8 encoded) |
| 4-5 |  | ARP (UTF-8 encoded) |
| 6-7 |  | 5QI (UTF-8 encoded) |
| 8-9 |  | UL Session-AMBR length (UTF-8 encoded) |
| 10-m |  | UL Session-AMBR (UTF-8 encoded) |
| (m+1)-(m+2) |  | DL Session-AMBR length (UTF-8 encoded) |
| (m+3)-n |  | DL Session-AMBR (UTF-8 encoded) |

The above structures for encoding the QoS profile of Release indicator "15" do not apply for the present specification. For specifications referencing the present VSA, those formats shall only apply if it is explicitely endorsed within the referencing specification.

***6 –*** 3GPP-***SGSN address***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 6 |
| 2 |  | 3GPP Length= 6 |
| 3 |  | SGSN addr Octet 1 |
| 4 |  | SGSN addr Octet 2 |
| 5 |  | SGSN addr Octet 3 |
| 6 |  | SGSN addr Octet 4 |

3GPP Type: 6

Length: 6

SGSN address value: Address type.

***7 –*** 3GPP-***GGSN address***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 7 |
| 2 |  | 3GPP Length= 6 |
| 3 |  | GGSN addr Octet 1 |
| 4 |  | GGSN addr Octet 2 |
| 5 |  | GGSN addr Octet 3 |
| 6 |  | GGSN addr Octet 4 |

3GPP Type: 7

Length: 6

GGSN address value: Address type.

***8 –*** 3GPP-***IMSI MCC-MNC***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 8 |
| 2 |  | 3GPP Length= n |
| 3 |  | MCC digit1 (UTF-8 encoded character) |
| 4 |  | MCC digit2 (UTF-8 encoded character) |
| 5 |  | MCC digit3 (UTF-8 encoded character) |
| 6 |  | MNC digit1 (UTF-8 encoded character) |
| 7 |  | MNC digit2 (UTF-8 encoded character) |
| 8 |  | MNC digit3 if present (UTF-8 encoded character) |

3GPP Type: 8

Length: n shall be 7 or 8 octets depending on the presence of MNC digit 3

IMSI MCC-MNC address value: Text type.

This is the UTF-8 encoded characters representing the IMSI MCC-MNC numerical values. In accordance with 3GPP TS 29.060 [24] (for GGSN), 3GPP TS 29.274 [81] (for P-GW) and 3GPP TS 23.003 [40], the MCC shall be 3 digits and the MNC shall be either 2 or 3 digits. There shall be no padding characters between the MCC and MNC.

***9 –*** 3GPP-***GGSN MCC-MNC***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 9 |
| 2 |  | 3GPP Length= n |
| 3 |  | MCC digit1 (UTF-8 encoded character) |
| 4 |  | MCC digit2 (UTF-8 encoded character) |
| 5 |  | MCC digit3 (UTF-8 encoded character) |
| 6 |  | MNC digit1 (UTF-8 encoded character) |
| 7 |  | MNC digit2 (UTF-8 encoded character) |
| 8 |  | MNC digit3 if present (UTF-8 encoded character) |

3GPP Type: 9

Length: n shall be 7 or 8 octets depending on the presence of MNC digit 3

GGSN address value: Text type.

This is the UTF-8 encoding of the GGSN MCC-MNC values. In accordance with 3GPP TS 23.003 [40] and 3GPP TS 29.060 [24] the MCC shall be 3 digits and the MNC shall be either 2 or 3 digits. There shall be no padding characters between the MCC and MNC.

***10 –*** 3GPP-***NSAPI***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 10 |
| 2 |  | 3GPP Length= 3 |
| 3 |  | NSAPI (UTF-8 encoded character) |

3GPP Type: 10

Length: 3

NSAPI value: Text Type.

It is the value of the NSAPI of the PDP context the RADIUS message is related to. It is encoded as its hexadecimal representation, using one UTF-8 encoded character. The GGSN should receive NSAPI values in the following hexadecimal range 05 – 0F. The GGSN shall discard digit 0 and convert the remaining digit into one UTF-8 coded character.

For P-GW, the value of this sub-attribute represents the EPS Bearer ID as specified in 3GPP TS 29.274 [81].

***11 –*** 3GPP-***Session Stop Indicator***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 11 |
| 2 |  | 3GPP Length= 3 |
| 3 |  | 1 1 1 1 1 1 1 1 (bit string) |

3GPP Type: 11

Length: 3

Value is set to all 1.

3GPP-Session Stop Indicator value: Bit String type.

***12 –*** 3GPP-***Selection-Mode***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 12 |
| 2 |  | 3GPP Length= 3 |
| 3 |  | UTF-8 encoded Selection mode character  |

3GPP Type: 12

Length: 3

Selection mode value: Text type.

The format of this sub-attribute shall be a character that represents a single digit, mapping from the binary value of the selection mode in the Create PDP Context message (3GPP TS 29.060 [24]) for the GGSN, and the Create Session Request message (3GPP TS 29.274 [81]) for the P-GW. Where 3GPP TS 29.060 [24] provides for interpretation of the value, e.g. map ‘3’ to ‘2’, this shall be done by the GGSN.

***13 –*** 3GPP-***Charging-Characteristics***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 13 |
| 2 |  | 3GPP Length= 6 |
| 3-6 |  | UTF-8 encoded Charging Characteristics value  |

3GPP Type: 13

Length: 6

Charging characteristics value: Text type.

 The charging characteristics is value of the 2 octets. The value field is taken from the GTP IE described in 3GPP TS 29.060 [24], subclause 7.7.23 for the GGSN and 3GPP TS 29.274 [81] for the P-GW.

Each octet of this IE field value is represented via 2 UTF-8 encoded character, defining its hexadecimal representation.

***14 –*** 3GPP-***Charging Gateway IPv6 address***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 14 |
| 2 |  | 3GPP Length= 18 |
| 3 |  | Charging GW IPv6 addr Octet 1 |
| 4 |  | Charging GW IPv6 addr Octet 2 |
| 5-18 |  | Charging GW IPv6 addr Octet 3-16 |

3GPP Type: 14

Length: 18

Charging GW IPv6 address value: IPv6 Address.

Charging GW IPv6 address is Octet String type.

***15 –*** 3GPP-***SGSN IPv6 address***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 15 |
| 2 |  | 3GPP Length= 18 |
| 3 |  | SGSN IPv6 addr Octet 1 |
| 4 |  | SGSN IPv6 addr Octet 2 |
| 5-18 |  | SGSN IPv6 addr Octet 3-16 |

3GPP Type: 15

Length: 18

SGSN IPv6 address value: IPv6 Address.

SGSN IPv6 address is Octet String type.

***16 –*** 3GPP-***GGSN IPv6 address***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 16 |
| 2 |  | 3GPP Length= 18 |
| 3 |  | GGSN IPv6 addr Octet 1 |
| 4 |  | GGSN IPv6 addr Octet 2 |
| 5-18 |  | GGSN IPv6 addr Octet 3-16 |

3GPP Type: 16

Length: 18

GGSN IPv6 address value: IPv6 Address.

SGSN IPv6 address is Octet String type.

***17 –*** 3GPP-***IPv6-DNS-Servers***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 17 |
| 2 |  | 3GPP Length= m |
| 3-18 |  | (1st) DNS IPv6 addr Octet 1-16 |
| 19-34 |  | (2nd) DNS IPv6 addr Octet 1-16 |
| k-m |  | (n-th) DNS IPv6 addr Octet 1-16 |

3GPP Type: 17

Length: m = n × 16 + 2; n ≥ 1 and n ≤ 15; k = m-15

IPv6 DNS Server value: IPv6 Address.

IPv6 DNS Server address is Octet String type.

The 3GPP- IPv6-DNS-Servers sub-attribute provides a list of one or more (‘n’) IPv6 addresses of Domain Name Server (DNS) servers for an APN. The DNS servers are listed in the order of preference for use by a client resolver, i.e. the first is ‘Primary DNS Server’, the second is ‘Secondary DNS Server’ etc. The sub-attribute may be included in Access-Accept packets.

***18 –*** 3GPP-***SGSN MCC-MNC***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 18 |
| 2 |  | 3GPP Length= n |
| 3 |  | MCC digit1 (UTF-8 encoded character) |
| 4 |  | MCC digit2 (UTF-8 encoded character) |
| 5 |  | MCC digit3 (UTF-8 encoded character) |
| 6 |  | MNC digit1 (UTF-8 encoded character) |
| 7 |  | MNC digit2 (UTF-8 encoded character) |
| 8 |  | MNC digit3 if present (UTF-8 encoded character) |

3GPP Type: 18

Length: n shall be 7 or 8 octets depending on the presence of MNC digit 3

SGSN MCC-MNC address value: Text type.

This is the UTF-8 encoding of the MCC-MNC values extracted from the RAI or from the Serving Network. In accordance with 3GPP TS 23.003 [40] and 3GPP TS 29.060 [24] (for the GGSN and P-GW connected to a Gn/Gp SGSN) and 3GPP TS 29.274 [81] (for the P-GW in GTP/PMIP S5/S8, S2a, S2b), the MCC shall be 3 digits and the MNC shall be either 2 or 3 digits. There shall be no padding characters between the MCC and MNC.

***19 –*** 3GPP-***Teardown Indicator***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 19 |
| 2 |  | 3GPP Length= 3 |
| 3 |  | spare | TI |

3GPP Type: 19

Length: 3

Octet 3 is Octet String type.

For GGSN, if the value of TI is set to "1", then all PDP contexts that share the same user session with the PDP context identified by the Acct-Session-Id shall be torn down. Only the PDP context identified by the Acct-Session-Id shall be torn down if the value of TI is "0" (see subclause 16.3.4 "AAA-Initiated PDP context termination"), or if TI is missing.

For P-GW, the usage of Teardown-Indicator is as follows (see subclause 16.3a.3 for more deails):

- if the value of TI is set to "1", then all IP-CAN bearers that share the same user session with the IP-CAN bearer identified by the Acct-Session-Id shall be torn down.

- if the value of TI is "0", or if TI is missing, only the IP-CAN bearer identified by the Acct-Session-Id shall be torn down. If the Acct-Session-Id identifies the default bearer, the P-GW shall tear down all the IP-CAN bearers that share the same user session identified by the Acct-Session-Id.

***20* -**3GGP**- *IMEISV***

|  |
| --- |
| Bits |
| Octets | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 | 3GPP Type = 20 |
| 2 | 3GPP Length = 2+n |
| 3 – (2+n) | IMEI(SV) digits 1 – n (UTF-8 encoded characters) |

3GPP Type: 20

IMEISV value: Text type.

A GGSN receives IMEI(SV) that is encoded according to 3GPP TS 29.060 [24]. A P-GW receives IMEI(SV) that is encoded in *ME Identity* IE specified in 3GPP TS 29.274 [81]. The GGSN or the P-GW converts IMEI(SV) into a sequence of UTF-8 characters.IMEI(SV) shall be encoded as defined in 3GPP TS 23.003 [40].

14 ≤ n ≤ 16

n = 16 for IMEISV, where TAC = 8 digits SNR = 6 digits & SVN = 2 digits;

n = 15 for IMEI, where TAC = 8 digits SNR = 6 digits & Spare = 1 digit;

n = 14 for IMEI, where TAC = 8 digits SNR = 6 digits (Spare digit is not sent)

***21 –*** 3GPP-***RAT-Type***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 21 |
| 2 |  | 3GPP Length= 3 |
| 3 |  | RAT (octet string) |

3GPP Type: 21

The 3GPP-RAT-Type sub-attribute indicates which Radio Access Technology is currently serving the UE.

RAT field: Radio Access Technology type values. RAT field is Octet String type. For GGSN, it shall be coded as specified in 3GPP TS 29.060 [24]. For P-GW, it shall be coded as follows:

0-9 As specified in 3GPP TS 29.274 [81]
10-50 Spare for future use
51 NR
52 NR in unlicensed bands

53 Trusted WLAN

54 Trusted Non-3GPP access

55 Wireline access

56 Wireline Cable access

57 Wireline BBF access

58-100 Spare for future use
101 IEEE 802.16e
102 3GPP2 eHRPD
103 3GPP2 HRPD
104 3GPP2 1xRTT
105 3GPP2 UMB
106-255 Spare for future use

The value 51-57 does not apply for the present specification. For specifications referencing the present RADIUS VSA, the value shall only apply if it is explicitely endorsed within the referencing specification.

***22 –*** 3GPP-***User-Location-Info***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 22 |
| 2 |  | 3GPP Length= m |
| 3 |  | Geographic Location Type  |
| 4-m |  | Geographic Location (octet string) |

3GPP Type: 22

Length=m, where m depends on the Geographic Location Type

 For example, m= 10 in the CGI and SAI types.

Geographic Location Type field is used to convey what type of location information is present in the ‘Geographic Location’ field. For GGSN, the Geographic Location Type values and coding are as defined in 3GPP TS 29.060 [24]. For P-GW, the Geographic Location Type values and coding are defined as follows:

0 CGI
1 SAI
2 RAI
3-127 Spare for future use
128 TAI
129 ECGI
130 TAI and ECGI
131 eNodeB ID
132 TAI and eNodeB ID
133 extended eNodeB ID
134 TAI and extended eNodeB ID
135 NCGI

136 5GS TAI
137 5GS TAI and NCGI
138 NG-RAN Node ID
139 5GS TAI and NG-RAN Node ID
140-255 Spare for future use

Geographic Location field is used to convey the actual geographic information as indicated in the Geographic Location Type. For GGSN, the coding of this field is as specified in 3GPP TS 29.060 [24]. For P-GW, the coding of this field shall be as follows:

- If the Geographic Location Type has a value indicating CGI, SAI, RAI, TAI or ECGI (i.e. the value field is equal to 0, 1, 2, 128, or 129), the coding of the Geographic Location field shall be as per clauses 8.21.1 to 8.21.5, respectively, in 3GPP TS 29.274 [81],

- If the Geographic Location Type has a value indicating TAI and ECGI (i.e. the value field is equal to 130), in Geographic Location field both TAI and ECGI shall be encoded one after another as per clauses 8.21.4 and 8.21.5 in 3GPP TS 29.274 [81]. TAI information shall be encoded first starting with Octet 4 of 3GPP-User-Location-Info.

- If the Geographic Location Type has a value indicating eNodeB ID (i.e. the value field is equal to 131), the coding of the Geographic Location field shall be as defined in subclause 8.21.7 in 3GPP TS 29.274 [81].

- If the Geographic Location Type has a value indicating TAI and eNodeB ID (i.e. the value field is equal to 132), in Geographic Location field both TAI and eNodeB ID shall be encoded one after another as per subclauses 8.21.4 and 8.21.7 in 3GPP TS 29.274 [81].

- If the Geographic Location Type has a value indicating extended eNodeB ID (i.e. the value field is equal to 133), the coding of the Geographic Location field shall be as defined in subclause 8.21.8 in 3GPP TS 29.274 [81].

- If the Geographic Location Type has a value indicating TAI and extended eNodeB ID (i.e. the value field is equal to 134), in Geographic Location field both TAI and extended eNodeB ID shall be encoded one after another as per subclauses 8.21.4 and 8.21.8 in 3GPP TS 29.274 [81].

The Geographic Location Type values "NCGI", "5GS TAI", "5GS TAI and NCGI", "NG-RAN Node ID" and "5GS TAI and NG-RAN Node ID" are only introduced to extend the 3GPP-User-Location-Info AVP derived from the 3GPP Vendor-Specific RADIUS attributes and shall not apply for the present specification. For specifications referencing the present data type, those values shall only apply if they are explicitely endorsed within the referencing specification. For those values, the Geographic Location field shall be coded as follows:

- If the Geographic Location Type has a value indicating NCGI (i.e. the value field is equal to 135), the coding of the Geographic Location field shall be as per subclause 9.3.1.7 in 3GPP TS 38.413 [115] . Spare bits shall be set to zero.

- If the Geographic Location Type has a value indicating 5GS TAI (i.e. the value field is equal to 136), the coding of the Geographic Location field shall be as per subclause 9.3.3.11 in 3GPP TS 38.413 [115].

- If the Geographic Location Type has a value indicating 5GS TAI (i.e. the value field is equal to 136), the coding of the Geographic Location field shall be as per subclause 9.3.3.11 in 3GPP TS 38.413 [115].

- If the Geographic Location Type has a value indicating 5GS TAI and NCGI (i.e. the value field is equal to 137), in Geographic Location field both 5GS TAI and NCGI shall be encoded one after another as per subclause 9.3.3.11 in 3GPP TS 38.413 [115] and per subclause 9.3.1.7 in 3GPP TS 38.413 [115].. Spare bits shall be set to zero.

- If the Geographic Location Type has a value indicating NG-RAN Node ID (i.e. the value field is equal to 138), the first octet of the Geographic Location field shall be length of the NG-RAN Node ID in unit of bit, and it also indicates the type of NG-RAN node as follows:

1. length value = 18, short ng-eNodeB ID

2. length value = 20, ng-eNodeB ID

3. length value = 21, long ng-eNodeB ID

4. length value = 22-32, gNodeB ID

Starting from the second octet of the Geographic Location field, the coding shall be as per subclause 9.3.1.5 in 3GPP TS 38.413 [115], i.e. first PLMN information then NG-RAN Node ID. Spare bits shall be set to zero.

- If the Geographic Location Type has a value indicating 5GS TAI and NG-RAN Node ID (i.e. the value field is equal to 139), in Geographic Location field both 5GS TAI and NG-RAN Node ID shall be encoded one after another as per subclause 9.3.3.11 in 3GPP TS 38.413 [115] and as described for NG-RAN Node ID (i.e. the value field is equal to 138). Spare bits shall be set to zero.

Geographic Location Type and Geographic Location fields are Octet String type.

***23 –*** 3GPP-***MS-TimeZone***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 23 |
| 2 |  | 3GPP Length= 4 |
| 3 |  | Time Zone  |
| 4 |  | Daylight Saving Time (octet string) |

3GPP Type: 23

Length=4

The Time Zone field and the Daylight Saving Time fields are used to indicate the offset between universal time and local time in steps of 15 minutes of where the MS/UE currently resides.

For GGSN, both fields are coded as specified in 3GPP TS 29.060 [24] and represented as Octet String type. For, P-GW, both fields are coded as specified in 3GPP TS 29.274 [81] in UE-Time Zone IE and represented as Octet String type.

***24 –*** 3GPP-***Camel-Charging-Info***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 24 |
| 2 |  | 3GPP Length= m |
| 3-m |  | CAMEL Charging Information Container (octet string) |

3GPP Type: 24

Length=m

m depends on the size of the CAMELInformationPDP IE.

The CAMEL Charging Information Container field is used to copy the CAMELInformationPDP IE including Tag and Length from the SGSN’s CDR (S‑CDR).

The coding of this field is as specified in 3GPP TS 29.060 [24] and represented as Octet String type.

***25 –*** 3GPP-***Packet-Filter***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 25 |
| 2 |  | 3GPP Length= n |
| 3-z |  | Packet Filter |

3GPP Type: 25

Length: n

Each 3GPP-Packet-Filter sub-attribute contains only one packet filter. Multiple 3GPP-Packet-Filter sub-attributes can be sent in one RADIUS Accounting Request message.

When the GGSN/P-GW sends the packet filter information, the RADIUS message shall carry ALL (or none) of the packet filters.

Packet Filter Value:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
|  | Packet filter identifier  | Octet 1 |
|  | Packet filter evaluation precedence  | Octet 2 |
|  | Length of Packet filter contents  | Octet 3 |
|  | Direction of Packet Filter | Octet 4 |
|  | Packet filter contents  | Octet 5Octet m |

Direction Value:

00000000: Downlink

00000001: Uplink

The packet filter content is represented as Octet String type. The packet filter content is defined below:

|  |  |
| --- | --- |
| Type | Value |
| 1: IPv4 address type | Contains the source address if the direction value is set to Downlink, and the destination address if the direction value is set to Uplink.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 |
| 2: IPv6 address type | Contains the source address if the direction value is set to Downlink, and the destination address if the direction value is set to Uplink.Shall be encoded as a sequence of a sixteen octet *IPv6 address* field and a sixteen octet *IPv6 address mask* field. The *IPv6 address* field shall be transmitted first |
| 3: Protocol identifier/Next header type | shall be encoded as one octet which specifies the IPv4 protocol identifier or IPv6 next header |
| 4 : Single destination port type | shall be encoded as two octet which specifies a port number |
| 5 : Destination port range type | 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 |
| 6 : Single source port type  | shall be encoded as two octet which specifies a port number |
| 7 : Source port range type | 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 |
| 8: Security parameter index type (IPv6) | shall be encoded as four octet which specifies the IPSec security parameter index |
| 9: Type of service/Traffic class type | 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 |
| 10: Flow label type (IPv6) | 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 |

Note: The sending of this sub-attribute is not recommended for an inter-operator interface for security reason

***26 –*** 3GPP-***Negotiated-DSCP***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 26 |
| 2 |  | 3GPP Length= 3 |
| 3 |  | Negotiated DSCP (octet string) |

3GPP Type: 26

Length: 3

Negotiated DSCP value: Octet String

DSCP value: Octet String type.

***27 –*** 3GPP-***Allocate-IP-Type***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 27 |
| 2 |  | 3GPP Length= 3 |
| 3 |  | IP Type (octet string) |

3GPP Type: 27

If multiple Access-Request signalling towards a AAA server is needed during the lifetime of a PDN connection (e.g. for PDN/PDP type IPv4v6 and deferred IPv4 addressing), this sub-attribute shall be included in the Access-Request message to indicate how the AAA server needs to treat the request. The P-GW/GGSN may also use this sub-attribute if the AAA server is configured to allocate both IPv4 address and IPv6 prefix but the P-GW/GGSN requires assignment of only one IP type or both IP types (e.g. because the UE supports single IP stack and it has requested PDN/PDP type of IPv4 or IPv6).

If this sub-attribute does not exist in Access-Request from P-GW/GGSN to the AAA server, the IP address allocation shall be based on the IP address allocation policy configured in the the AAA server.

IP Type field: It is encoded in Octet String type and the following decimal equivalent values apply:

0 Do not allocate IPv4 address or IPv6 prefix.
The typical use case is for PDN/PDP type IPv4v6 and deferred IPv4 addressing and only IPv4 address is allocated by the AAA server but IPv6 prefix is allocated by some other means, e.g. local pool in the P-GW/GGSN. The Access-Request from the P-GW/GGSN to the AAA server during the UE’s initial access to the network shall set the value of this sub-attribute to 0.

1 Allocate IPv4 address
The typical use case is for PDN/PDP type IPv4v6 and deferred IPv4 addressing and the IPv4 address (and/or IPv6 prefix) is allocated by the AAA server. The Access-Request from the P-GW/GGSN to the AAA server when the P-GW/GGSN receives UE-initiated IPv4 address allocation signalling (e.g. DHCPv4) after UE’s successful initial access to the PDN shall set the value of this attribute to 1. In this case, if the AAA server had allocated an IPv6 prefix earlier during UE’s initial access to the network, same IPv6 prefix shall be kept allocated.

2 Allocate IPv6 prefix
The typical use case is for PDN/PDP type IPv4v6 and deferred IPv4 addressing and both IPv4 address and IPv6 prefix are allocated by the AAA server. The Access-Request from the P-GW/GGSN to the AAA server during the UE’s initial access to the network shall set the value of this sub-attribute to 2.

3 Allocate IPv4 address and IPv6 prefix
Currently there is no use case identified to use this specific value for PDN/PDP tpe IPv4v6 and deferred IPv4 addressing. One potential use case is for PDN/PDP type IPv4v6 and non-deferred IPv4 addressing and both IPv4 address and IPv6 prefix are allocated by the AAA server. The Accesss-Request from the P-GW/GGSN to the AAA server may use this value to have both IPv4 address and IPv6 prefix assigned to the UE.

4-255 Reserved for future use

***28 – External-Identifier***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 28 |
| 2 |  | 3GPP Length= m |
| 3-m |  | Identifier characters 1-n (UTF-8 encoded characters) |

3GPP Type: 28

n ≤ 72 / 253 (n ≤ 72 octets shall be supported, n ≤ 253 octets recommended, refer to 3GPP TS 29.336 [101] and IETF RFC 4282 [102])

Length: m ≤ 74 / 255 (m ≤ 74 octets shall be supported, m ≤ 255 octets recommended, refer to 3GPP TS 29.336 [101] and IETF RFC 4282 [102])

External-Identifier value: Text type.

A globally unique identifier of a UE used towards external server instead of IMSI and MSISDN, refer to 3GPP TS 23.682 [100] and 3GPP TS 23.003 [40].

***29 – TWAN-Identifier***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 29 |
| 2 |  | 3GPP Length= m |
| 3-m |  | TWAN Identifier (octet string) |

3GPP Type: 29

Length=m, where m depends on the type of location that is present as described in 3GPP TS 29.274 [81].

TWAN Identifier field is used to convey the location information in a Trusted WLAN Access Network (TWAN). The coding of this field shall be the same as for the GTP TWAN Identifier starting with Octet 5, as per clause 8.100 in 3GPP TS 29.274 [81].

TWAN Identifier field is Octet String type.

***30 – 3GPP***-***User-Location-Info-Time***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 30 |
| 2 |  | 3GPP Length= 6 |
| 3-6 |  | User Location Info time |

3GPP Type: 30

Length=6

User Location Info time field is Unsigned32 type, it indicates the NTP time at which the UE was last known to be in the location which is reported during bearer deactivation or UE detach procedure.

***31 – 3GPP***-***Secondary-RAT-Usage***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 31 |
| 2 |  | 3GPP Length= 28 |
| 3 |  | spare | SESS | RAT |
| 4-7 |  | RAN Start timestamp |
| 8-11 |  | RAN End timestamp |
| 12-19 |  | Usage Data DL |
| 20-28 |  | Usage Data UL |

3GPP Type: 31

Length=28

Multiple 3GPP-Secondary-RAT-Usage sub-attributes can be sent in one RADIUS Accounting Request Interim-Update/STOP message.

Octet 3 is Octet String type. The encoding of RAT field (bit 1 to bit 4) is:

0 – NR

1 – NR-U

2 – EUTRA

3 – EUTRA-U

4 – Unlicensed Spectrum

5-15 – spare, reserved for future use

SESS (bit 5): If it is set to 1, it indicates the secondary RAT usage of the PDU session.

The values 1, 2 and 3 of RAT field and SESS field do not apply for the present specification. For specifications referencing the present RADIUS VSA, they shall only apply if it is explicitely endorsed within the referencing specification. Bit 6 to bit 8 of octet 3 is spare and reserved for future use.

The encoding of octets 4 to 28 is specified in Secondary RAT Usage Data Report IE of 3GPP TS 29.274 [81].

***32 – 3GPP***-***UE-Local-IP-Address***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 32 |
| 2 |  | 3GPP Length= 7 or 19 |
| 3 |  | IP Type (octet string) |
| 4-m |  | UE local IP address |

3GPP Type: 32

Length=7 or 19

IP Type field: It is encoded in Octet String type and the following decimal equivalent values apply:

1 UE local IPv4 address
2 UE local IPv6 address

UE local IP address field: It is encoded in Octet String type, with 4 octets when the IP Type is UE local IPv4 address, or with 16 octets when the IP Type is UE local IPv6 address.

***33 – 3GPP-UE-Source-Port***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 33 |
| 2 |  | 3GPP Length= 5 |
| 3 |  | Source Port Type (octet string) |
| 4-5 |  | Port Number (octet string) |

3GPP Type: 33

Length=5

Source Port Type field: It is encoded in Octet String type and the following decimal equivalent values apply:

1 UDP Source Port
2 TCP Source Port

Port Number field: It is encoded in Octet String type, with bit 8 of Octet 4 represents the most significant bit of the port number and bit 1 of Octet 5 represents the least significant bit.

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