**3GPP TSG-CT WG3 Meeting #115e C3-213214**

**E-Meeting, 19th – 28th May 2021 (Revision of C3-212349)**

|  |
| --- |
| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  | **29.561** | **CR** | **0108** | **rev** | **1** | **Current version:** | **17.1.0** |  |
|  |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **X** |

|  |
| --- |
|  |
| ***Title:***  | Updates to support L2TP in RADIUS message flow |
|  |  |
| ***Source to WG:*** | Ericsson |
| ***Source to TSG:*** | CT3 |
|  |  |
| ***Work item code:*** | BEPoP |  | ***Date:*** | 2021-05-06 |
|  |  |  |  |  |
| ***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:*** | CT4 has been studied and agreed L2TP supporting for CUPS in WI BEPoP,TR 29.820 has also concluded to support L2TP tunneling over N6/SGi for 5GC/EPS is to be standardized based on the solution#8 as described in 6.8 in Rel-17, and CT3 scope has been added in WI BEPoP.Meanwhile, SA2 LS Reply on the support of L2TP with CUPS in rel-17 to support L2TP tunnelling over N6/SGi for 5GS and EPS with TS 23.501 CR 2691 and TS 23.502 CR 2602 approved.Hence the related L2TP support and attributes for RADIUS messages need to be added. |
|  |  |
| ***Summary of change:*** | Adding RADIUS attributes RFC 2868 and adding the differences to refer to the basic attributes in RADIUS messages to support L2TP for CUPS across N6 interface. |
|  |  |
| ***Consequences if not approved:*** | Missing the RADIUS attributes in the related RADIUS messages to support L2TP in this specification. |
|  |  |
| ***Clauses affected:*** | 2, 11.3.1 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications  | TS 23.501 CR 2691TS 23.502 CR 2602 |
| ***affected:*** |  | **X** |  Test specifications |  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications |  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

**Additional discussion(if needed):**

**Proposed changes:**

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

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 23.501: "System Architecture for the 5G System; Stage 2".

[3] 3GPP TS 23.502: "Procedures for the 5G System; Stage 2".

[4] 3GPP TS 29.281: "General Packet Radio System (GPRS) Tunnelling Protocol User Plane (GTPv1-U)".

[5] 3GPP TS 29.061: "Interworking between the Public Land Mobile Network (PLMN) supporting packet based services and Packet Data Networks (PDN)".

[6] IETF RFC 3748: "Extensible Authentication Protocol (EAP)".

[7] IETF RFC 3579: "RADIUS (Remote Authentication Dial In User Service) Support For Extensible Authentication Protocol (EAP)".

[8] IETF RFC 2865: "Remote Authentication Dial In User Service (RADIUS)".

[9] IETF RFC 3162: "RADIUS and IPv6".

[10] IETF RFC 4818: "RADIUS Delegated-IPv6-Prefix Attribute".

[11] IETF RFC 5216: "The EAP-TLS Authentication Protocol".

[12] 3GPP TS 23.228: "IP Multimedia Subsystem (IMS); Stage 2".

[13] 3GPP TS 24.229: "IP Multimedia Call Control Protocol based on SIP and SDP; Stage 3".

[14] IETF RFC 2132: "DHCP Options and BOOTP Vendor Extensions".

[15] IETF RFC 3361: "Dynamic Host Configuration Protocol (DHCP-for-IPv4) Option for Session Initiation Protocol (SIP) Servers".

[16] IETF RFC 3646: "DNS Configuration options for Dynamic Host Configuration Protocol for IPv6 (DHCPv6)".

[17] IETF RFC 3319: "Dynamic Host Configuration Protocol (DHCPv6) Options for Session Initiation Protocol (SIP) Servers".

[18] IETF RFC 2131: "Dynamic Host Configuration Protocol".

[19] IETF RFC 1542: "Clarification and Extensions for the Bootstrap Protocol".

[20] IETF RFC 4039: "Rapid Commit Option for the Dynamic Host Configuration Protocol version 4 (DHCPv4)".

[21] IETF RFC 3315: "Dynamic Host Configuration Protocol for IPv6 (DHCPv6)".

[22] IETF RFC 3736: "Stateless Dynamic Host Configuration Protocol (DHCP) Service for IPv6".

[23] IETF RFC 7155: "Diameter Network Access Server Application".

[24] IETF RFC 6733: "Diameter Base Protocol".

[25] IETF RFC 4072: "Diameter Extensible Authentication Protocol (EAP) Application".

[26] IETF RFC 2866: "RADIUS Accounting".

[27] IETF RFC 5176: "Dynamic Authorization Extensions to Remote Authentication Dial In User Service (RADIUS)".

[28] 3GPP TS 23.003: "Numbering, addressing and identification".

[29] IETF RFC 1825: "Security Architecture for the Internet Protocol".

[30] IETF RFC 1826: "IP Authentication Header".

[31] IETF RFC 1827: "IP Encapsulating Security Payload (ESP)".

[32] IETF RFC 4291: "IP Version 6 Addressing Architecture".

[33] IETF RFC 4861: "Neighbor Discovery for IP Version 6 (IPv6)".

[34] IETF RFC 4862: "IPv6 Stateless Address Autoconfiguration".

[35] IETF RFC 1027: "Using ARP to Implement Transparent Subnet Gateways".

[36] 802.3-2015 - IEEE Standard for Ethernet.

[37] IETF RFC 5281: "Extensible Authentication Protocol Tunneled Transport Layer Security Authenticated Protocol Version 0 (EAP-TTLSv0)".

[38] 3GPP TS 23.380: "IMS Restoration Procedures".

[39] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces; Stage 3".

[40] 3GPP TS 29.502: "5G System; Session Management Services; Stage 3".

[41] 3GPP TS 29.229: "Cx and Dx interfaces based on Diameter protocol; Protocol details".

[42] 3GPP TS 24.501: "Non-Access-Stratum (NAS) protocol for 5G System (5GS); Stage 3".

[43] 3GPP TS 23.316: "Wireless and wireline convergence access support for the 5G System (5GS)".

[44] IETF RFC 7761: "Protocol Independent Multicast - Sparse Mode (PIM-SM): Protocol Specification (Revised)".

[45] IETF RFC 3973: "Protocol Independent Multicast - Dense Mode (PIM-DM): Protocol Specification (Revised)".

[46] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces Stage 3".

[47] IETF RFC 2132: "DHCP Options and BOOTP Vendor Extensions".

[48] IETF RFC 3925: "Vendor-Identifying Vendor Options for Dynamic Host Configuration Protocol version 4 (DHCPv4)".

[49] IETF RFC 8415: "Dynamic Host Configuration Protocol for IPv6 (DHCPv6)".

[50] 3GPP TS 29.274: "3GPP Evolved Packet System. Evolved GPRS Tunnelling Protocol for EPS (GTPv2)".

[51] CableLabs WR-TR-5WWC-ARCH: "5G Wireless Wireline Converged Core Architecture".

[52] BBF WT-470: "5G FMC Architecture".

[53] 3GPP TS 23.401: "General Packet Radio Service (GPRS) enhancements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access".

[54] BBF TR-456: "AGF Functional Requirements".

[55] CableLabs DOCSIS MULPI: "Data-Over-Cable Service Interface Specifications DOCSIS 3.1, MAC and Upper Layer Protocols Interface Specification".

[56] IETF RFC 7542: "The Network Access Identifier".

[m] IETF RFC 2868: "RADIUS Attributes for Tunnel Protocol Support".

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

### 11.3.1 General

RADIUS attributes as defined in subclause 16.4 of 3GPP TS 29.061 [5] are re-used in 5G with the following differences:

- SMF or SMF+PGW-C replaces P-GW. GGSN and PPP PDP type related description are not applicable for 5G.

- 5G QoS flow replaces IP-CAN bearer and PDU session replaces IP-CAN session.

- N6 replaces Gi/Sgi and UE replaces MS.

- DNN replaces APN.

- Detailed information needed for 5G compared to 3GPP TS 29.061 [5] is described below.

Table 11.3-1: Additional information needed for 5G compared to the RADIUS attributes defined in 3GPP TS 29.061 [5]

| Attr # | Attribute Name | Description | Content | Presence Requirement | Applicable message |
| --- | --- | --- | --- | --- | --- |
| 79 | EAP-Message | This attribute encapsulates EAP message (as defined in IETF RFC 3748 [6]) exchanged between the SMF and DN-AAA, see IETF RFC 3579 [7] for details. | String | ConditionalNOTE | Access-Request,Access-Accept,Access-Reject,CoA-Request,CoA-ACK,Disconnect-Request,Disconnect-ACK |
| Mandatory | Access-Challenge |
| 80 | Message-Authenticator | This attribute includes the message authenticator, see IETF RFC 3579 [7] for details. | String | ConditionalNOTE | Access-Request,Access-Accept,Access-Reject,CoA-Request,CoA-ACK,CoA-NAKDisconnect-Request,Disconnect-ACK,Disconnect-NAK |
| Mandatory | Access-Challenge |
| NOTE: Shall be present if EAP is used. |

Table 11.3-2: Different information needed for 5G compared to the RADIUS VSA defined in subclause 16.4.7 of 3GPP TS 29.061 [5]

| Sub-attr # | Sub-attribute Name | Differences |
| --- | --- | --- |
| 1 | 3GPP-IMSI | Re-used. |
| 2 | 3GPP-Charging-Id | Charging ID for this PDU Session. |
| 3 | 3GPP-PDP-Type | Re-used. For SMF, this sub-attribute represents PDU session type and only the values "0", "2", "3", "5" and "6" are applicable. |
| 4 | 3GPP-CG-Address | Re-used. IPv4 address of CHF. |
| 5 | 3GPP-GPRS-Negotiated-QoS-Profile | Re-used. For SMF, it uses the format for Release indicator value "15" as defined in 3GPP TS 29.061 [5]. |
| 6 | 3GPP-SGSN-Address | Re-used. It includes AMF, I-SMF or V-SMF control plane IPv4 address. |
| 7 | 3GPP-GGSN-Address | Re-used. It includes (home) SMF control plane IPv4 address providing the Nsmf\_PDUSession service. |
| 8 | 3GPP-IMSI-MCC-MNC | Re-used. |
| 9 | 3GPP-GGSN-MCC-MNC | Re-used. MCC and MNC of the network the (home) SMF belongs to. |
| 10 | 3GPP-NSAPI | Re-used. It identifies QFI with value range 0-255. |
| 11 | 3GPP-Session-Stop-Indicator | Re-used. |
| 12 | 3GPP-Selection-Mode | Re-used. SMF maps the selection mode value from the enumeration value of DnnSelectionMode in 3GPP TS 29.502 [40]. |
| 13 | 3GPP-Charging-Characteristics | Re-used. |
| 14 | 3GPP-CG-IPv6-Address | Re-used. IPv6 address of CHF. |
| 15 | 3GPP-SGSN-IPv6-Address | Re-used. It includes AMF, I-SMF or V-SMF control plane IPv6 address. |
| 16 | 3GPP-GGSN-IPv6-Address | Re-used. It includes (home) SMF control plane IPv6 address providing the Nsmf\_PDUSession service. |
| 17 | 3GPP-IPv6-DNS-Servers | Re-used. |
| 18 | 3GPP-SGSN-MCC-MNC | Re-used. MCC and MNC of the network the AMF belongs to |
| 19 | 3GPP-Teardown-Indicator | Re-used. |
| 20 | 3GPP-IMEISV | Re-used. |
| 21 | 3GPP-RAT-Type | Re-used. For SMF, it uses the sub-attribute definition for P-GW and only the values "3", "6" - "9", and "51" - "57" are applicable. |
| 22 | 3GPP-User-Location-Info | Re-used. For SMF, only the values "128", "129", "130", "135" and "136" of Geographic Location Type are applicable. |
| 23 | 3GPP-MS-TimeZone | Re-used. |
| 24 | 3GPP-CAMEL-Charging-Info | Not applicable. |
| 25 | 3GPP-Packet-Filter | Re-used. |
| 26 | 3GPP-Negotiated-DSCP | Re-used. |
| 27 | 3GPP-Allocate-IP-Type | Re-used. |
| 28 | External-Identifier | Re-used. |
| 29 | TWAN-Identifier | Re-used by TWAP Identifier field, supporting ssid, bssid and/or civicAddress. |
| 30 | 3GPP-User-Location-Info-Time | Re-used. |
| 31 | 3GPP-Secondary-RAT-Usage | Re-used. For SMF, the RAT values "0", "1", "2" and "3" are applicable, and the SESS field is used to indicate secondary RAT usage of the PDU session. |
| 110 | 3GPP-Notification | Added. |
| 111 | 3GPP-UE-MAC-Address | Added. |
| 112 | 3GPP-Authorization-Reference | Added. |
| 113 | 3GPP-Policy-Reference | Added. It is not used in this release. |
| 114 | 3GPP-Session-AMBR | Added. |
| 115 | 3GPP-NAI | Added. |
| 116 | 3GPP-Session-AMBR-v2 | Added. |
| 117 | 3GPP-Supported-Features | Added. |
| 118 | 3GPP-IP-Address-Pool-Info | Added. |
| 119 | 3GPP-VLAN-Id | Added. |
| 120 | 3GPP-TNAP-Identifier | Added. |
| 121 | 3GPP-HFC-NodeId | Added. |
| 122 | 3GPP-GLI | Added. |
| 123 | 3GPP-Line-Type | Added. |
| 124 | 3GPP-NID | Added. |
| 125 | 3GPP-Session-S-NSSAI | Added. |
| 126 | 3GPP-CHF-FQDN | Added. FQDN of CHF. |
| 127 | 3GPP-Serving-NF-FQDN | Added. It includes AMF, I-SMF or V-SMF FQDN address. |
| 128 | 3GPP-Session-Id | Added. |
| 129 | 3GPP-GCI | Added. |
| NOTE: 5G specific RADIUS VSAs are numbered from 110. |

***110 – 3GPP***-***Notification***

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 |  | 2 | 1 |
| 1 |  | 3GPP type = 110 |
| 2 |  | 3GPP Length= 3 |
| 3 |  | Spare | ACC | AUTH |

3GPP Type: 110

Length: 3

Octet 3 is Octet String type.

For bit 1 AUTH,

- if the value of AUTH is set to "1", and there is IPv4 address and/or IPv6 prefix change (not allocated/de-allocated by the DN-AAA itself) and the PDU session is not terminated, the SMF shall send Access-Request message to the DN-AAA with GPSI in Calling-Station-Id or External-Identifier attribute and IP address in:

1) Framed-IP-Address and Framed-IPv6-Prefix, if both IPv4 address and IPv6 prefix(es) exist for the PDU session; or

2) Framed-IP-Address, if only IPv4 address exists for the PDU session; or

3) Framed-IPv6-Prefix, if only IPv6 prefix(es) exists for the PDU session.

For Ethernet PDU session, if there is UE MAC address change, the SMF shall send Access-Request message to the DN-AAA with GPSI in Calling-Station-Id or External-Identifier attribute and the complete list of used UE MAC addresses in the 3GPP-UE-MAC-Address attribute.

- if the value is set to "0", the SMF may notify authentication DN-AAA with the UE address and GPSI based on local configuration.

For bit 2 ACC,

- if the value is set to "1", and there is IPv4 address and/or IPv6 prefix change (not allocated/de-allocated by the DN-AAA itself) and the PDU session is not terminated, the SMF shall send Accounting-Request Interim-Update message to the DN-AAA with GPSI in Calling-Station-Id or External-Identifier attribute and IP address in:

1) Framed-IP-Address and Framed-IPv6-Prefix, if both IPv4 address and IPv6 prefix(es) exist for the PDU session; or

2) Framed-IP-Address, if only IPv4 address exists for the PDU session; or

3) Framed-IPv6-Prefix, if only IPv6 prefix(es) exists for the PDU session.

For Ethernet PDU session, if there is UE MAC address change, the SMF shall send Accounting-Request Interim-Update message to the DN-AAA with GPSI in Calling-Station-Id or External-Identifier attribute and the complete list of used UE MAC addresses in the 3GPP-UE-MAC-Address attribute.

- if the value is set to "0", the SMF may notify accounting DN-AAA with the UE address and GPSI based on local configuration.

***111 – 3GPP-UE-MAC-Address***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 111 |
| 2 |  | 3GPP Length= 8 |
| 3-8 |  | MAC Address (octet string) |

3GPP Type: 111

Length: 8

It is sent from the DN-AAA to authorize UE MAC addresses. Multiple 3GPP-MAC-Address sub-attributes (maximum 16) may be sent in one RADIUS CoA or Access-Accept message. The DN-AAA shall always provide the full list of allowed MAC addresses, and SMF shall replace the existing list with the newly received one. When omitted, there is no restriction and all UE MAC addresses are permitted for the Ethernet PDU session.

When sending from the SMF to the DN-AAA, it indicates UE MAC addresses in use. Multiple 3GPP-MAC-Address sub-attributes may be sent in one RADIUS Access-Request or Accounting-Request Interim-Update message.

MAC address is Octet String type. The encoding is defined as MacAddr48 in 3GPP TS 29.571 [39] without dashes as delimiter, encoded as 12-digit hexadecimal numbers.

***112 – 3GPP-Authorization-Reference***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 112 |
| 2 |  | 3GPP Length= m |
| 3-m |  | Authorization Data Reference (octet string) |

3GPP Type: 112

Length: m

Authorization Data Reference: Octet String. It is sent from the DN-AAA to refer to the local authorization data in the SMF or PCF.

***113 – 3GPP-Policy-Reference***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 113 |
| 2 |  | 3GPP Length= m |
| 3-m |  | Policy Data Reference (octet string) |

3GPP Type: 113

Length: m

Policy Data Reference: Octet String. It is sent from the DN-AAA and used by the SMF to retrieve the SM or QoS policy data from the PCF. It is not used in this release.

***114 – 3GPP-Session-AMBR***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 114 |
| 2 |  | 3GPP Length= m |
| 3-m |  | Session AMBR (octet string) |

3GPP Type: 114

Length: m

Session AMBR: Octet String. It is sent from the DN-AAA to authorize the PDU Session AMBR in the downlink and uplink direction. The encoding is defined as BitRate in 3GPP TS 29.571 [39]. Same value is applied to downlink and uplink via this VSA.

***115 – 3GPP-NAI***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 115 |
| 2 |  | 3GPP Length= m |
| 3-m |  | NAI (octet string) |

3GPP Type: 115

Length: m

NAI: Octet String. It shall be formatted according to subclause 14.3 of 3GPP TS 23.003 [28] that describes an NAI.

***116 – 3GPP-Session-AMBR-v2***

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 |  | 2 | 1 |
| 1 |  | 3GPP type = 116 |
| 2 |  | 3GPP Length= m |
| 3 |  | Spare | DL | UL |
| 4-5 |  | UL Session-AMBR length (octet string) |
| 6-m |  | UL Session-AMBR (octet string) |
| (m+1)-(m+2) |  | DL Session-AMBR length (octet string) |
| (m+3)-n |  | DL Session-AMBR (octet string) |

3GPP Type: 116

Length: m

Octet 3 is Octet String type.

Bit 1 UL and bit 2 DL indicate if the corresponding UL and DL Session-AMBR shall be present in a respective field or not. If one of these bits is set to "0", the corresponding field shall not be present at all.

UL/DL Session AMBR: Octet String. It is sent from the DN-AAA to authorize the PDU Session AMBR. The encoding is defined as BitRate in 3GPP TS 29.571 [39].

If the feature eSessionAMBR is supported and if applicable, the DN-AAA shall send this VSA; otherwise, the DN-AAA shall send the VSA 3GPP-Session-AMBR.

***117 – 3GPP-Supported-Features***

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 |  | 2 | 1 |
| 1 |  | 3GPP type = 117 |
| 2 |  | 3GPP Length= m |
| 3-6 |  | Vendor ID (octet string) |
| 7-10 |  | Feature List ID (octet string) |
| 11-14 |  | Feature List (octet string) |

3GPP Type: 117

Length: m

This VSA may be present in the Access-Request (initial one) message and either the Access-Challenge (initial one) or the Access-Accept message. If present, this VSA informs the destination entity about the features that the origin entity requires to successfully complete the message exchange. The Vendor ID, Feature List ID and Feature List are encoded according to 3GPP TS 29.229 [41]. See clause 12.4.1 for more detailed information regarding the general principle of the feature negotiation with the difference that RADIUS terms replace Diameter terms. The table 12.4.1-1 defines the features applicable to the RADIUS N6 interfaces for the feature lists with a Feature-List-ID of 1.

***118 – 3GPP-IP-Address-Pool-Info***

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 |  | 2 | 1 |
| 1 |  | 3GPP type = 118 |
| 2 |  | 3GPP Length= m |
| 3 |  | Spare | IP version |
| 4-5 |  | IP address pool id length (octet string) |
| 6-m |  | IP address pool id (octet string) |

3GPP Type: 118

Length: m

Octet 3 is Octet String type.

For bit 1 and bit 2 IP version:- if the value is set to "0", it indicates the IP address pool id is applicable for both IPv4 and IPv6;

- if the value is set to "1", it indicates the IP address pool id is applicable for IPv4;

- if the value is set to "2", it indicates the IP address pool id is applicable for IPv6; and

- value "3" is reserved.

The SMF may determine an IP address pool ID based on UPF ID, S-NSSAI, DNN, and IP version as described in subclause 5.8.2.2.1 in 3GPP TS 23.501 [2] and includes the IP address pool ID within 3GPP-IP-Address-Pool-Info and send it to the DN-AAA. The DN-AAA assigns IPv6 prefix or IPv4 address from the requested IP address pool. Multiple 3GPP-IP-Address-Pool-Info sub-attributes may be sent in the RADIUS Access-Request message. The DN-AAA shall include the selected IP address pool in the 3GPP-IP-Address-Pool-Info sub-attribute of the RADIUS Access-Accept message. For accounting, if Framed-IP-Address or Framed-IPv6-Prefix attribute is included in RADIUS Accounting-Request (START/Interim-Update/STOP), the SMF shall also include the 3GPP-IP-Address-Pool-Info sub-attribute.

***119 – 3GPP-VLAN-Id***

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 |  | 2 | 1 |
| 1 |  | 3GPP type = 119 |
| 2 |  | 3GPP Length= 4 |
| 3 |  | VID value | Spare |
| 4 |  | VID value |

3GPP Type: 119

Length: 4

VLAN Id: Octet String. Octet 3/ Bit 1 to Bit 4 shall be zero, Octet 3 / Bit 8 shall be the most significant bit of the VLAN Id and Octet 4 / Bit 1 shall be the least significant bit.

It is sent from the DN-AAA to authorize the allowed VLAN Ids for the Ethernet PDU session. Multiple 3GPP-VLAN-Id sub-attributes (maximum 16) may be sent in one RADIUS CoA or Access-Accept message. The DN-AAA shall always provide the full list of allowed VLAN Ids, and SMF shall replace the existing list with the newly received one. When omitted, there is no restriction and all VLAN Ids are permitted for the Ethernet PDU session.

***120 – 3GPP-TNAP-Identifier***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| **Octets** |  | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** |
| 1 |  | 3GPP type = 120 |
| 2 |  | 3GPP Length= m |
| 3-m |  | TNAP Identifier (octet string) |

3GPP Type: 120

Length=m, where m depends on the type of location that is present as described in 3GPP TS 29.274 [50].

TNAP Identifier field is used to convey the location information in a Trusted Non-3GPP Access Network. The coding of this field shall be the same as for the GTP TWAN Identifier starting with Octet 5, till Octet (q+r) +2 as per clause 8.100 in 3GPP TS 29.274 [50], with LAII flag, OPNAI flag and PLMNI flag in Octet 5 shall be set as zero.

TNAP Identifier field is Octet String type.

The SMF may indicate the UE location in a Trusted Non-3GPP Access Network, in Access-Request, Accounting-Request START, Accounting-Request STOP, or Accounting-Request Interim-Update messages.

***121 – 3GPP-HFC-NodeId***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| **Octets** |  | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** |
| 1 |  | 3GPP type = 121 |
| 2 |  | 3GPP Length= n |
| 3-n |  | HFCNodeId (octet string) |

3GPP Type: 121

Length: n≤6+2

HFCNodeId field is the identifier of the HFC node Id as specified in CableLabs WR-TR-5WWC-ARCH [51]. It is provisioned by the wireline operator as part of wireline operations and may contain up to six characters.

HFCNodeId field is Octet String type.

The SMF may indicate the HFC Node Identifier received over NGAP. Present for a 5G-CRG accessing the 5GC via wireline access network, in Access-Request, Accounting-Request START, Accounting-Request STOP, or Accounting-Request Interim-Update messages. Present for a FN-CRG accessing the 5GC via wireline access network, in Accounting-Request START, Accounting-Request STOP, or Accounting-Request Interim-Update messages.

***122 – 3GPP-GLI***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| **Octets** |  | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** |
| 1 |  | 3GPP type = 122 |
| 2 |  | 3GPP Length= n |
| 3-n |  | GLI (octet string) |

3GPP Type: 122

Length: n≤150+2

GLI field is the Global Line Identifier uniquely identifying the line connecting the 5G-BRG or FN-BRG to the 5GS. See clause 28.16.3 of 3GPP TS 23.003 [28]. Shall be encoded as a string with format "byte", i.e. base64-encoded characters, representing the GLI value (up to 150 bytes) encoded as specified in BBF WT-470 [52].

GLI field is Octet String type.

The SMF may indicate the Global Line Identifier. Present for a 5G-BRG accessing the 5GC via wireline access network, in Access-Request, Accounting-Request START, Accounting-Request STOP, or Accounting-Request Interim-Update messages. Present for a 5G-BRG accessing the 5GC via wireline access network, in Accounting-Request START, Accounting-Request STOP, or Accounting-Request Interim-Update messages.

***123 – 3GPP-Line-Type***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| **Octets** |  | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** |
| 1 |  | 3GPP type = 123 |
| 2 |  | 3GPP Length= 3 |
| 3 |  | Line-Type (octet string) |

3GPP Type: 123

The Line-Type sub-attribute may be present for a 5G-BRG/FN-BRG accessing the 5GC via wireline access network.

When present, it shall indicate the type of the wireline (DSL or PON).

Line-Type field is Octet String type. It shall be coded as follows:

0 (DSL):

 This value shall be used to indicate DSL line.

1 (PON):

 This value shall be used to indicate PON line.

The SMF may indicate the type of the wireline (DLS or PON). Present for a 5G-BRG accessing the 5GC via wireline access network, in Access-Request, Accounting-Request START, Accounting-Request STOP, or Accounting-Request Interim-Update messages. Present for a FN-BRG accessing the 5GC via wireline access network, in Accounting-Request START, Accounting-Request STOP, or Accounting-Request Interim-Update messages.

***124 – 3GPP-NID***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| **Octets** |  | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** |
| 1 |  | 3GPP type = 124 |
| 2 |  | 3GPP Length= 13 |
| 3-13 |  | Network ID (octet string) |

3GPP Type: 124

Length: 13

The Network ID field is Octet String type. The encoding is defined as Nid in 3GPP TS 29.571 [39].

Table 11.3-3 describes the sub-attributes of the 3GPP Vendor-Specific attribute described above in different RADIUS messages.

***125 – 3GPP-Session-S-NSSAI***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 125 |
| 2 |  | 3GPP Length= m |
| 3 |  | SST |
| 4-6 |  | SD (octet string) |

3GPP Type: 125

Length: 3 or 6

SST: the Slice/Service Type with value range 0 to 255.

SD: 3-octet string, representing the Slice Differentiator, the encoding follows sd attribute specified in subclause 5.4.4.2 of 3GPP TS 29.571 [46]. Its presence depends on the Length field.

It is sent from the SMF to the DN-AAA server to indicate the S-NSSAI that is associated with the PDU Session.

***126 – 3GPP-CHF-FQDN***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 126 |
| 2 |  | 3GPP Length= m |
| 3-m |  | CHF FQDN |

3GPP Type: 126

Length: m

CHF FQDN: string, indicates the FQDN of the CHF.

It is sent from the SMF to the DN-AAA server to indicate the FQDN of the CHF.

***127 – 3GPP-Serving-NF-FQDN***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 127 |
| 2 |  | 3GPP Length= m |
| 3-m |  | Serving NF FQDN |

3GPP Type: 127

Length: m

Serving NF FQDN: string, indicates the FQDN of the Serving NF (including AMF, I-SMF or V-SMF).

It is sent from the SMF to the DN-AAA server to indicate the Serving NF FQDN address.

***128 – 3GPP-Session-Id***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 125 |
| 2 |  | 3GPP Length= m |
| 3 |  | PduSessionId |

3GPP Type: 128

Length: 3

PduSessionId: 1-octet integer, Unsigned integer identifying a PDU session, within the range 0 to 255, as specified in subclause 5.4.2 of 3GPP TS 29.571 [46].

It is sent from the SMF to the DN-AAA server to indicate the PDU Session Identifier.

***129 – 3GPP-GCI***

|  |  |  |
| --- | --- | --- |
|  |  | Bits |
| Octets |  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 |  | 3GPP type = 129 |
| 2 |  | 3GPP Length= m |
| 3-m |  | GCI (octet string) |

3GPP Type: 129

Length: m

GCI field is Octet String type.

The GCI is the Global Cable Identifier uniquely identifies the line connecting the 5G-CRG or FN-CRG to the 5GS. See clause 28.15.4 of 3GPP TS 23.003 [28].

The GCI is a variable length opaque identifier, shall be encoded as specified in CableLabs WR‑TR‑5WWC‑ARCH [51] and CableLabs DOCSIS MULPI [55]. It shall comply with the syntax specified in clause 2.2 of IETF RFC 7542 [56] for the username part of a NAI.

The SMF may indicate the Global Cable Identifier. Present for a 5G-CRG accessing the 5GC via wireline access network, in Access-Request, Accounting-Request START, Accounting-Request STOP, or Accounting-Request Interim-Update messages. Present for a FN-CRG accessing the 5GC via wireline access network, in Accounting-Request START, Accounting-Request STOP, or Accounting-Request Interim-Update messages.

Table 11.3-3: List of the 3GPP Vendor-Specific sub-attributes for N6

| Sub-attr # | Sub-attribute Name | Description | Presence Requirement | Associated attribute(Location of Sub-attr) | Applicability |
| --- | --- | --- | --- | --- | --- |
| 110 | 3GPP-Notification | It includes all notifications that the DN-AAA wants to receive from the SMF. | Optional | Access-Accept |  |
| 111 | 3GPP-UE-MAC-Address | It is sent from the DN-AAA to authorize UE MAC addresses, or it indicates UE MAC addresses in use when sending from the SMF to the DN-AAA. | Optional | Access-Request,Access-Response,Accounting-Request Interim-Update,Change-of-Authorization |  |
| 112 | 3GPP-Authorization-Reference | It is sent from the DN-AAA to refer to the local authorization data in the SMF. | Optional | Access-Accept,Change-of-Authorization |  |
| 113 | 3GPP-Policy-Reference | It is sent from the DN-AAA and used by the SMF to retrieve the SM or QoS policy data from the PCF. It is not used in this release. | Optional | Access-Accept,Change-of-Authorization |  |
| 114 | 3GPP-Session-AMBR | It is sent from the DN-AAA to authorize the PDU Session AMBR in the downlink and uplink. | Optional | Access-Accept,Change-of-Authorization |  |
| 115 | 3GPP-NAI | The Network Access Identifier identifying the UE. | Optional | Access-Request,Accounting-Request START,Accounting-Request STOP,Accounting-Request Interim-Update |  |
| 116 | 3GPP-Session-AMBR-v2 | It is sent from the DN-AAA to authorize the PDU Session AMBR, it includes separate session AMBR for UL and DL. | Optional | Access-Accept,Change-of-Authorization | eSessionAMBR |
| 117 | 3GPP-Supported-Features | It indicates the supported features as specified in clause 12.4.1. | Optional | Access-Request,Access-Accept,Access-Challenge,Accounting-Request START,Accounting-Response START |  |
| 118 | 3GPP-IP-Address-Pool-Info | It indicates the IP address pool identifier. | Optional | Access-Request,Access-Accept,Accounting-Request START,Accounting-Request STOP,Accounting-Request Interim-Update |  |
| 119 | 3GPP-VLAN-Id | It is sent from the DN-AAA to authorize the allowed VLAN Id for the Ethernet PDU session. | Optional | Access-Accept,Change-of-Authorization |  |
| 120 | 3GPP-TNAP-Identifier | Indicates the UE location in a Trusted Non-3GPP Access Network. | Optional | Access-Request,Accounting-Request START, Accounting-Request STOP, Accounting-Request Interim-Update |  |
| 121 | 3GPP-HFC-NodeId | Indicates the HFC Node Identifier received over NGAP. Present for a 5G-CRG/FN-CRG accessing the 5GC via wireline access network | Optional | Access-Request (NOTE 1), Accounting-Request START, Accounting-Request STOP, Accounting-Request Interim-Update |  |
| 122 | 3GPP-GLI | Indicates the Global Line Identifier. Present for a 5G-BRG/FN-BRG accessing the 5GC via wireline access network. | Optional | Access-Request (NOTE 1), Accounting-Request START, Accounting-Request STOP, Accounting-Request Interim-Update |  |
| 123 | 3GPP-Line-Type | Indicates the type of the wireline (DLS or PON). Present for a 5G-BRG/FN-BRG accessing the 5GC via wireline access network. | Optional | Access-Request (NOTE 1), Accounting-Request START, Accounting-Request STOP, Accounting-Request Interim-Update |  |
| 124 | 3GPP-NID | Indicates the network identifier. It shall only be present together with 3GPP-SGSN-MCC-MNC to identify an SNPN. | Optional | Access-Request, Accounting-Request START, Accounting-Request STOP, Accounting-Request Interim-Update |  |
| 125 | 3GPP-Session-S-NSSAI | Indicates the S-NSSAI that is associated with the PDU Session. | Optional  | Access-RequestAccounting-Request START,Accounting-Request STOP,Accounting-Request Interim-Update (NOTE 2) |  |
| 126 | 3GPP-CHF-FQDN | Indicates the FQDN of the CHF. | Optional | Access-RequestAccounting-Request START,Accounting-Request STOP,Accounting-Request Interim-Update |  |
| 127 | 3GPP-Serving NF-FQDN | Indicates the FQDN of the Serving NF (includes AMF, I-SMF or V-SMF). | Optional | Access-RequestAccounting-Request START,Accounting-Request STOP,Accounting-Request Interim-Update |  |
| 128 | 3GPP-Session-Id | Indicates the PDU Session Identifier. | Optional | Access-RequestAccounting-Request START,Accounting-Request STOP,Accounting-Request Interim-Update (NOTE 2) |  |
| 129 | 3GPP-GCI | Indicates the line connecting the 5G-CRG or FN-CRG to the 5GS | Optional | Access-Request (NOTE 1),Accounting-Request START,Accounting-Request STOP,Accounting-Request Interim-Update |  |
| NOTE 1: Access-Request is not applicable for FN-CRG or FN-BRG.NOTE 2: This VSA is optional in the Accounting-Request Interim-Update message. |

RADIUS attributes related to the DN-AAA initiated re-authorization and authentication challenge are described in the following subclauses.

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