

**3GPP TSG CN Plenary Meeting #13
Beijing, China, 19th – 21st September 2001**

Tdoc NP-010530

Source: TSG CN WG3
Title: CRs on R99 Work Item GPRS
Agenda item: 7.12
Document for: APPROVAL

Introduction:

This document contains 4 CRs on R99 Work Item "GPRS", that have been agreed by TSG CN WG3, and are forwarded to TSG CN Plenary meeting #13 for approval.

Spec	CR	Rev	Doc-2nd-	Phase	Subject	Cat	C_Ver
09.61	A017	2	N3-010349	R97	Standard method for information delivery (MSISDN; IP address...) between GPRS and	F	6.4.0
09.61	A018	2	N3-010350	R98	Standard method for information delivery (MSISDN; IP address...) between GPRS and	A	7.3.0
29.061	022	2	N3-010351	R99	Standard method for information delivery (MSISDN; IP address...) between GPRS and	A	3.6.0
29.061	021	5	N3-010352	Rel-4	Standard method for information delivery (MSISDN; IP address...) between GPRS and	A	4.1.0

CR-Form-v4

CHANGE REQUEST

⌘ **09.61 CR A017** ⌘ ev **2** ⌘ Current version: **6.4.0** ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

Proposed change affects: ⌘ (U)SIM ME/UE Radio Access Network Core Network

Title: ⌘ Standard method for information delivery (MSISDN; IP address...) between GPRS and external PDN using RADIUS

Source: ⌘ CN3

Work item code: ⌘ GPRS **Date:** ⌘ 20.09.2001

<p>Category: ⌘ F</p> <p>Use <u>one</u> of the following categories:</p> <ul style="list-style-type: none"> F (correction) A (corresponds to a correction in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification) <p>Detailed explanations of the above categories can be found in 3GPP TR 21.900.</p>	<p>Release: ⌘ R97</p> <p>Use <u>one</u> of the following releases:</p> <ul style="list-style-type: none"> 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) REL-4 (Release 4) REL-5 (Release 5)
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Reason for change: ⌘ The MMS group (3GPP TSG T2 SWG3) found out a problem described in a LS resulted from the T2 MMS adhoc meeting (T2M010093/N3-010310) that „there is no standardised solution for a GGSN to deliver a mobile user’s identity forward to e.g. a WAP Gateway or a MMS Relay/Server”. In addition, other application servers also need this mapping: for example to charge a WAP session, dynamic IP address is not enough and MSISDN (or IMSI) is needed.

This problem requires a simple solution to be quickly standardised to avoid the development of incompatible proprietary solutions. So this issue should be solved as soon as possible, in 3GPP REL4 and earlier releases specifications. This CR proposes a simple and generic solution to this problem based on existing IETF standards: Using RADIUS Accounting to provide this mapping to e.g. a WAP Gateway or a MMS Relay/Server.

The CR also takes the opportunity to clarify the use of RADIUS authentication already mentioned in 09.61, and add recommendations on how to carry other information with RADIUS.

Summary of change: ⌘ This CR proposes to use RADIUS Accounting to provide the MSISDN/IP address mapping on Gi interface (to e.g. a WAP Gateway or a MMS Relay/Server).

Consequences if not approved: ⌘ Mutually incompatible proprietary solutions will be developed.

Clauses affected: ⌘ 2; 16 (a new clause)

Other specs affected: ⌘ Other core specifications ⌘ Test specifications
 O&M Specifications

Other comments: ⌘

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

- 1) Fill out the above form. The symbols above marked ☹ contain pop-up help information about the field that they are closest to.
- 2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under <ftp://ftp.3gpp.org/specs/> For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.
- 3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

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.
 - A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.
- [1] GSM 01.04: "Digital cellular telecommunication system (Phase 2+); Abbreviations and acronyms".
 - [2] GSM 02.60: "Digital cellular telecommunication system (Phase 2+); General Packet Radio Service (GPRS): Stage 1 Service Description".
 - [3] GSM 03.60: "Digital cellular telecommunication system (Phase 2+); General Packet Radio Service (GPRS); Stage 2 Service Description".
 - [4] GSM 03.61: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Point to Multipoint Multicast Service Description; Stage 2".
 - [5] GSM 03.62: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Point to Multipoint Group Call Service Description; Stage 2".
 - [6] GSM 03.64: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Overall description of the Radio interface; Stage 2".
 - [7] GSM 04.60: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Mobile Station (MS) - Base Station System (BSS) interface; Radio Link Control / Medium Access Control (RLC/MAC) protocol".
 - [8] GSM 04.64: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Logical Link Control (LLC)".
 - [9] GSM 04.65: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Subnetwork Dependent Convergence Protocol (SNDTCP)".
 - [10] GSM 07.60: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Mobile Station (MS) supporting GPRS".
 - [11] CCITT Recommendation E.164: "Numbering plan for the ISDN era".
 - [12] CCITT Recommendation X.25: "Interface between data terminal equipment (DTE) and data circuit-terminating equipment (DCE) for terminals operating in the packet mode and connected to public data networks by dedicated circuit".
 - [13] CCITT Recommendation X.75: "Packet-switched signalling system between public networks providing data transmission services".
 - [14] CCITT Recommendation X.121: "International Numbering Plan for Public Data Networks".
 - [15] IETF RFC 768 (1980): "User Datagram Protocol" (STD 6).
 - [16] IETF RFC 791 (1981): "Internet Protocol" (STD 5).
 - [17] IETF RFC 792 (1981): "Internet Control Message Protocol" (STD 5).
 - [18] IETF RFC 793 (1981): "Transmission Control Protocol" (STD 7).

- [19] IETF RFC 1034 (1987): "Domain Names – Concepts and Facilities" (STD 7).
- [20] IETF RFC 1661 (1994): " The Point-to-Point Protocol (PPP)" (STD 51).
- [21] IETF RFC2865 (2000), C. Rigney, S. Willens, A. Rubens, W. Simpson: "Remote Authentication Dial In User Service (RADIUS)".
- [22] IETF RFC2866 (2000), C. Rigney, Livingston: " RADIUS Accounting ".
- [23] 3GPP TS 23.003: "3rd Generation Partnership Project; Technical Specification Group Core Network; Numbering, addressing and identification".

16 Usage of RADIUS on Gi interface

A GGSN may, on a per APN basis, use RADIUS authentication to authenticate a user and RADIUS accounting to provide information to an AAA (Authentication, Authorization and Accounting) server.

16.1 RADIUS Authentication

RADIUS Authentication shall be used according to RFC2865 [21].

The RADIUS client function may reside in a GGSN. When the GGSN receives a Create PDP Context request message the RADIUS client function may send the authentication information to an authentication server, which is identified during the APN provisioning.

The authentication server checks that the user can be accepted. The response (when positive) may contain network information, such as an IP address for the user.

The information delivered during the Radius authentication can be used to automatically correlate the users identity (the MSISDN or IMSI) to the IP-address, assigned/confirmed by the GGSN or the authentication server respectively. The same procedure applies, in case of sending the authentication to a 'proxy' authentication server.

RADIUS Authentication is only applicable to the primary PDP context. When the GGSN receives an Access-Accept message from the authentication server it shall complete the PDP context activation procedure. If Access-Reject or no response is received, the GGSN shall reject the PDP Context Activation attempt with a suitable cause code, e.g. User Authentication failed.

16.2 RADIUS Accounting

RADIUS Accounting shall be used according to RFC 2866 [22].

The RADIUS accounting client function may reside in a GGSN. The RADIUS accounting client may send information to an accounting server, which is identified during the APN provisioning. The accounting server may store this information and use it to automatically identify the user. This information can be trusted because the GPRS network has authenticated the subscriber (i.e. SIM card and possibly other authentication methods).

RADIUS Accounting-Request Start and Stop messages may be used during both primary and secondary PDP context activation and deactivation procedures respectively.

The use of Accounting-Request STOP and in addition the Accounting ON and Accounting OFF messages may be used to ensure that information stored in the accounting server is synchronised with the GGSN information.

If the AAA server is used for IP address assignment, then, upon reception of a RADIUS Accounting-Request STOP message for all PDP contexts associated to a session defined by APN and IMSI or MSISDN, the AAA server may make the associated IP address available for assignment.

In order to avoid race conditions, the GGSN shall include a 3GPP Vendor-Specific sub-attribute "Session Stop indicator" when it sends the Accounting-Request STOP for the last PDP context of a PDP session and the PDP session is terminated (i.e. the IP address and all GTP tunnels can be released). The AAA server shall not assume the PDP session terminated until an Accounting-Request STOP with the Session Stop indicator is received.

16.3 Authentication and accounting message flows

16.3.1 IP PDP type

The figure below-14 represents the RADIUS message flows between a GGSN and an Authentication, Authorization and Accounting (AAA) server.

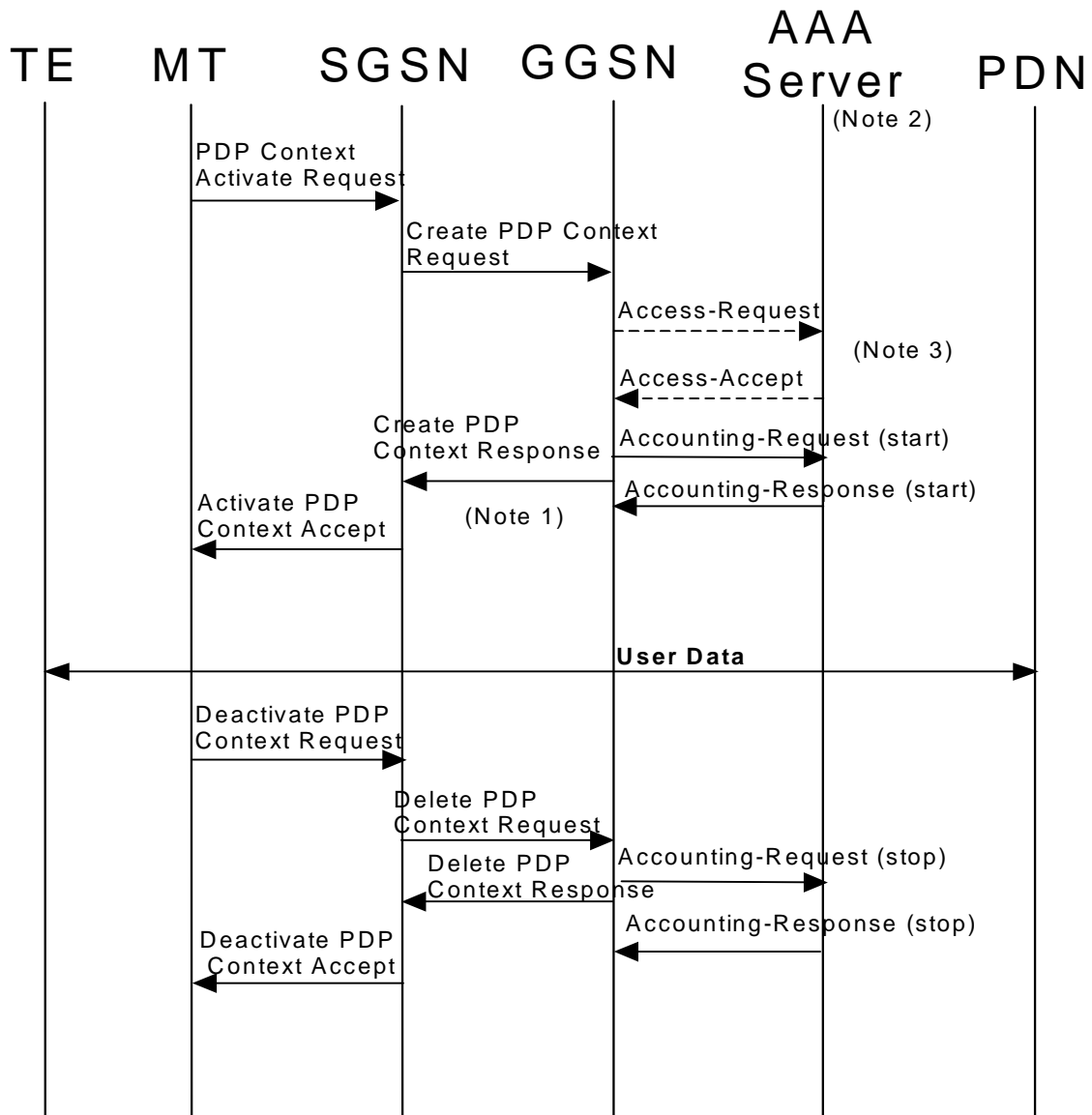


Figure 1: RADIUS message flow for PDP type IP (successful user authentication case)

NOTE 1: If some external applications require RADIUS Accounting request (Start) information before they can process user packets, then the selected APN (GGSN) may be configured in such a way that the GGSN drops user data until the Accounting Response (START) is received from the AAA server. Both Authentication and Accounting servers may be optional and separately configured for each APN.

NOTE 2: Separate accounting and authentication servers may be used.

NOTE 3: The Access-Request message shall be used for primary PDP context only.

Figure 14: RADIUS message flow for PDP type IP (successful user authentication case)

When a GGSN receives a Create PDP Context Request message for a given APN, the GGSN may (depending on the configuration for this APN) send a RADIUS Access-Request to an AAA server. The AAA server authenticates and authorizes the user. If RADIUS is also responsible for IP address allocation the AAA server shall return the allocated IP address in the Access-Accept message.

Even if the GGSN was not involved in user authentication (e.g. transparent network access mode), it may send a RADIUS Accounting-Request START message to an AAA server. This message contains parameters, e.g. the tuple which includes the user-id and IP address, to be used by application servers (e.g. WAP gateway) in order to identify the user. This message also indicates to the AAA server that the user session has started. User data forwarding at the GGSN may not be allowed before the Accounting Response START is received. If this is the case, the GGSN drops user data until the Accounting Response START is received. This is configurable per APN.

When the GGSN receives a Delete PDP Context Request message and providing a RADIUS Accounting-Request START message was sent previously, the GGSN shall send a RADIUS Accounting-Request STOP message to the AAA server, which indicates the termination of this particular user session. The GGSN shall immediately send a Delete PDP context response, without waiting for an Accounting-Response STOP message from the AAA server.

~~NOTE:~~ The AAA server shall deallocate the IP address (if any) initially allocated to the subscriber, if there is no session for the subscriber.

Accounting-Request ON and Accounting-Request OFF messages may be sent from the GGSN to the AAA server to ensure the correct synchronization of the session information in the GGSN and the AAA server.

The GGSN may send an Accounting-Request ON message to the AAA server to indicate that a restart has occurred. The AAA server may then release the associated resources.

Prior to a scheduled restart, the GGSN may send Accounting-Request OFF message to the AAA server. The AAA server may then release the associated resources.

If an Access-Challenge is sent to the GGSN when an Access-Request message is pending and when IP PDP type is used, the GGSN shall silently discard the Access-Challenge message and it shall treat an Access-Challenge as though it had received an Access-Reject instead [21].

16.3.2 Void

16.4 List of RADIUS attributes

The following tables describe the actual content of the RADIUS messages exchanged between the GGSN and the AAA server. Other RADIUS attributes may be used as defined in RADIUS RFC(s). Unless otherwise stated, when the encoding scheme of an attribute is specified as UTF-8 encoding, this shall be interpreted as UTF-8 hexadecimal encoding.

~~The following notes are applicable to the sub-clauses of section 16.4~~

~~NOTE 1: Must be present if PAP is used.~~

~~NOTE 2: Must be present if CHAP is used.~~

~~NOTE 3: Either NAS IP Address or NAS Identifier shall be present.~~

~~NOTE 4: The presence of this attribute is conditional upon this attribute being received in the Access-Accept message~~

16.4.1 Access-Request message (sent from the GGSN to AAA server)

The table below describes the attributes of the Access-Request message.

Table 1: The attributes of the Access-Request message

Attr #	Attribute Name	Description	Content	Presence Requirement
1	User-Name	Username is provided by the user (extracted from the Protocol Configuration Options (PCO) field of the Create PDP Context Request message). If no username is available a generic username, configurable on a per APN basis, shall be present.	String	Mandatory
2	User-Password	User password provided by the user if PAP is used (extracted from the PCO field of the Create PDP Context Request message). If no password is available a generic password, configurable on a per APN basis, shall be present.	String	Conditional Note 1
3	CHAP-Password	User password provided by the user if CHAP is used (extracted from the PCO field of the Create PDP Context Request message).	String	Conditional Note 2
4	NAS-IP-Address	IP address of the GGSN for communication with the AAA server.	IPv4	Conditional Note 3
32	NAS-Identifier	Hostname of the GGSN for communication with the AAA server.	String	Conditional Note 3
6	Service-Type	Indicates the type of service for this user	Framed	Optional
7	Framed-Protocol	Indicates the type of protocol for this user	7 (GPRS PDP Context)	Optional
8	Framed-IP-Address	IP address allocated for this user	IPv4	Conditional
9	Framed-IP-Netmask	Netmask for the user IP address	IPv4	Conditional
30	Called-Station-Id	Identifier for the target network	APN (UTF-8 encoded)	Mandatory
31	Calling-Station-Id	Identifier for the MS	MSISDN in international format according to 3GPP TS 23.003, UTF-8 encoded decimal. Note that there are no leading characters in front of the country code.	Mandatory
60	CHAP-Challenge	Challenge if CHAP is used (extracted from the PCO field of the Create PDP Context Request message).	String	Conditional Note 2
61	NAS-Port-Type	Port type for the GGSN	As per RFC 2865	Optional
26/10415	3GPP Vendor-Specific	Sub-attributes according sub-clause 16.4.7	See sub-clause 16.4.7	Optional except sub-attribute 3 which is conditional
<p>NOTE 1: Shall be present if PAP is used.</p> <p>NOTE 2: Shall be present if CHAP is used.</p> <p>NOTE 3: Either NAS-IP-Address or NAS-Identifier shall be present.</p>				

16.4.2 Access-Accept (sent from AAA server to GGSN)

The table below describes the attributes of the Access-Accept message.

Table 2: The attributes of the Access-Accept message

Attr #	Attribute Name	Description	Content	Presence Requirement
1	User-Name	Username received in the Access-Request message or a substitute username provided by the AAA server. If the User-Name has been received in the Access-Accept message, this user-name shall be used in preference to the above	String	Optional
6	Service-Type	Indicates the type of service for this user	Framed	Optional
7	Framed-Protocol	Indicates the type of protocol for this user	7 (GPRS PDP Context)	Optional
8	Framed-IP-Address	IP address allocated for this user, if the AAA server is used to allocate IP address.	IPv4	Conditional
9	Framed-IP-Netmask	Netmask for the user IP address, if the AAA server is used to allocate IP netmask.	IPv4	Conditional
12	Framed-IP-MTU	MTU for the user towards this particular APN, MTU shall be less or equal to 1500	String	Optional
25	Class	Identifier to be used in all subsequent accounting messages.	String	Optional (NOTE 4)
27	Session-Timeout	Indicates the timeout value (in seconds) for the user session	32 bit unsigned Integer	Optional
28	Idle-Timeout	Indicates the timeout value (in seconds) for idle user session	32 bit unsigned Integer	Optional
26/311	MS- primary-DNS-server	Contains the primary DNS server address for this APN	Ipv4	Optional
26/311	MS-Secondary-DNS-Server	Contains the secondary DNS server address for this APN	IPv4	Optional
26/311	MS-Primary-NBNS-Server	Contains the primary NetBios name server address for this APN	IPv4	Optional
26/311	MS-Secondary-NBNS-Server	Contains the secondary NetBios server address for this APN	IPv4	Optional
NOTE 4: The presence of this attribute is conditional upon this attribute being received in the Access-Accept message				

16.4.3 Accounting-Request START (sent from GGSN to AAA server)

The table [below](#) describes the attributes of the Accounting-Request START message.

Table 3: The attributes of the Accounting-Request START message

Attr #	Attribute Name	Description	Content	Presence Requirement
1	User-Name	Username provided by the user (extracted from the PCO field of the Create PDP Context Request message). If no username is available a generic username, configurable on a per APN basis, shall be present. If the User-Name has been received in the Access-Accept message, this user-name shall be used in preference to the above	String	Optional
4	NAS-IP-Address	GGSN IP address for communication with the AAA server.	IPv4	Conditional Note 3
32	NAS-Identifier	Hostname of the GGSN for communication with the AAA server.	String	Conditional Note 3
6	Service-Type	Indicates the type of service for this user	Framed	Optional
7	Framed Protocol	Indicates the type of protocol for this user	7 (GPRS PDP Context)	Optional
8	Framed-IP-Address	User IP address	IPv4	Mandatory
25	Class	Received in the access accept	String	Conditional (NOTE 4)
30	Called-Station-Id	Identifier for the target network	APN (UTF-8 encoded)	Mandatory
31	Calling-Station-Id	Identifier for the MS	MSISDN in international format according to 3GPP TS 23.003, UTF-8 encoded decimal. Note that there are no leading characters in front of the country code.	Mandatory
40	Acct-Status-Type	Type of accounting message	START	Mandatory
41	Acct-Delay-Time	Indicates how many seconds the GGSN has been trying to send this record for, and can be subtracted from the time of arrival on the AAA server to find the approximate time (in seconds) of the event generating this Accounting-Request.	32 unsigned integer	Optional
44	Acct-Session-Id	User session identifier.	GGSN IP address and Charging-ID concatenated in a UTF-8 encoded hexadecimal. NOTE: The GGSN IP address is the same as that used in the GCDRs.	Mandatory
45	Acct-Authentic	Authentication method	RADIUS or LOCAL	Optional
61	NAS-Port-Type	Port type for the GGSN	As per RFC 2865	Optional
26/10415	3GPP Vendor-Specific	Sub-attributes according sub-clause 16.4.7.	See sub-clause 16.4.7	Optional except sub-attribute 3 which is conditional

NOTE 3: Either NAS-IP-Address or NAS-Identifier shall be present.

NOTE 4: The presence of this attribute is conditional upon this attribute being received in the Access-Accept message

16.4.4 Accounting Request STOP (sent from GGSN to AAA server)

The table below describes the attributes of the Accounting-Request STOP message.

Table 4: The attributes of the Accounting-Request STOP message

Attr #	Attribute Name	Description	Content	Presence Requirement
1	User-Name	Username provided by the user (extracted from the PCO field of the Create PDP Context Request message). If no username is available a generic username, configurable on a per APN basis, shall be present. If the User-Name has been received in the Access-Accept message, this user-name shall be used in preference to the above	String	Optional
4	NAS-IP-Address	IP address of the GGSN for communication with the AAA server.	IPv4	Conditional Note 3
32	NAS-Identifier	Hostname of the GGSN for communication with the AAA server.	String	Conditional Note 3
6	Service-Type	Indicates the type of service for this user	Framed	Optional
7	Framed Protocol	Indicates the type of protocol for this user	7 (GPRS PDP Context)	Optional
8	Framed-IP-Address	User IP address	IPv4	Mandatory
25	Class	Received in the access accept	String	Optional (NOTE 4)
30	Called-Station-Id	Identifier for the target network	APN (UTF-8 encoded)	Mandatory
31	Calling-Station-Id	Identifier for the MS	MSISDN in international format according to 3GPP TS 23.003, UTF-8 encoded. Note that there are no leading characters in front of the country code.	Mandatory
40	Acct-Status-Type	Indicates the type of accounting request	STOP	Mandatory
41	Acct-Delay-Time	Indicates how many seconds the GGSN has been trying to send this record for, and can be subtracted from the time of arrival on the AAA server to find the approximate time of the event generating this Accounting-Request	Second	Optional
42	Acct-Input-Octets	GGSN counted number of octets sent by the user for the PDP context	32 bit unsigned integer	Optional
43	Acct-Output-Octets	GGSN counted number of octets received by the user for the PDP context	32 bit unsigned integer	Optional
44	Acct-Session-Id	User session identifier.	GGSN IP address and Charging-ID concatenated in a UTF-8 encoded hexadecimal. NOTE: The GGSN IP address is the same as that used in the GCDRs.	Mandatory
45	Acct-Authentic	Authentication method	RADIUS or LOCAL	Optional
46	Acct-Session-Time	Duration of the session	Second	Optional
47	Acct-Input-Packets	GGSN counted number of packets sent by the user	Packet	Optional

48	Acct-Output-Packets	GGSN counted number of packets received by the user	Packet	Optional	
49	Acct-Terminate-Cause	Indicate how the session was terminated	See RFC 2866	Optional	
61	NAS-Port-Type	Port type for the GGSN	As per RFC 2865	Optional	
26/10415	3GPP Vendor-Specific	Sub-attributes according to sub-clause 16.4.7.	See sub-clause 16.4.7	Optional except sub-attribute 3 which is conditional	
NOTE 3: Either NAS-IP-Address or NAS-Identifier shall be present.					
NOTE 4: The presence of this attribute is conditional upon this attribute being received in the Access-Accept message					

16.4.5 Accounting Request ON (optionally sent from GGSN to AAA server)

The table below5 describes the attributes of the Accounting-Request ON message.

Table 5: The attributes of the Accounting-Request ON message

Attr #	Attribute Name	Description	Content	Presence Requirement	
4	NAS-IP-Address	IP address of the GGSN for communication with the AAA server.	IPv4	Conditional Note 3	
30	Called-Station-ID	Identifier for the target network.	APN (UTF-8 encoded)	Optional	
32	NAS-Identifier	Hostname of the GGSN for communication with the AAA server.	String	Conditional Note 3	
NOTE 3: Either NAS-IP-Address or NAS-Identifier shall be present.					

16.4.6 Accounting Request OFF (optionally sent from GGSN to AAA server)

The table below6 describes the attributes of the Accounting-Request OFF message.

Table 6: The attributes of the Accounting-Request OFF message

Attr #	Attribute Name	Description	Content	Presence Requirement	
4	NAS-IP-Address	IP address of the GGSN for communication with the AAA server.	IPv4	Conditional Note 3	
30	Called-Station-ID	Identifier for the target network.	APN (UTF-8 encoded)	Optional	
32	NAS-Identifier	Hostname of the GGSN for communication with the AAA server.	String	Conditional Note 3	
NOTE 3: Either NAS-IP-Address or NAS-Identifier shall be present.					

16.4.7 Sub-attributes of the 3GPP Vendor-Specific attribute

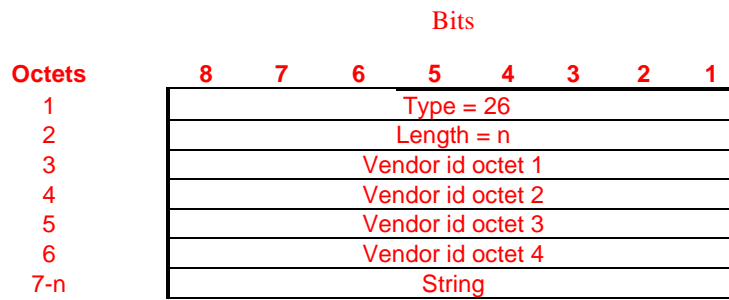
The table below7 describes the sub-attributes of the 3GPP Vendor-Specific attribute of the Access-Request, Accounting-Request START and Accounting-Request STOP message.

Table 7: The sub-attributes of the 3GPP Vendor-Specific attribute of the Access-Request, Accounting-Request START and Accounting-Request STOP message

Sub-attr #	Sub-attribute Name	Description	Presence Requirement	Associated attribute (Location of Sub-attr)
1	3GPP-IMSI	IMSI for this user	Optional	Access-Request, Accounting-Request START
2	3GPP-Charging-Id	Charging ID for this PDP Context (this together with the GGSN-Address constitutes a unique identifier for the PDP context).	Optional	Access-Request, Accounting-Request START
3	3GPP-PDP Type	Type of PDP context, i.e. IP	Conditional (mandatory if attribute 7 is present)	Access-Request
4	3GPP-CG-Address	Charging Gateway IP address	Optional	Access-Request, Accounting-Request START
5	3GPP-GPRS-QoS-Profile	QoS profile received	Optional	Access-Request, Accounting-Request START
6	3GPP-SGSN-Address	SGSN IP address that is used by the GTP control plane for the handling of control messages. It may be used to identify the PLMN to which the user is attached.	Optional	Access-Request, Accounting-Request START
7	3GPP-GGSN-Address	GGSN IP address that is used by the GTP control plane for the context establishment. It is the same as the GGSN IP address used in the GCDRs.	Optional	Access-Request, Accounting-Request START
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
9	3GPP-GGSN- MCC-MNC	MCC-MNC of the network the GGSN belongs to.	Optional	Access-Request, Accounting-Request START
10	3GPP-NSAPI	Identifies a particular PDP context for the associated PDN and MSISDN/IMSI from creation to deletion.	Optional	Access-Request, Accounting-Request START, Access-Request STOP
11	3GPP- Session-Stop-Indicator	Indicateds to the AAA server that the last PDP context of a session is released and that	Optional	Accounting Request STOP

		the PDP session has been terminated.		
12	3GPP- Selection-Mode	Contains the Selection mode for this PDP Context received in the Create PDP Context Request Message	Optional	Access-Request, Accounting-Request START

The RADIUS vendor Attribute is encoded as follows (as per RFC 2865)



n>=7

3GPP Vendor Id = 10415

The string part is encoded as follows:



m>=2 and m<= 248

The 3GPP specific attributes encoding is clarified below.

1 - 3GPP-IMSI

Bits

Octets	8	7	6	5	4	3	2	1
1	3GPP type = 1							
2	3GPP Length= 15							
3	IMSI digit1 (UTF-8 encoded)							
4	IMSI digit2 (UTF-8 encoded)							
5	IMSI digit3 (UTF-8 encoded)							
6	IMSI digit4 (UTF-8 encoded)							
7	IMSI digit5 (UTF-8 encoded)							
8	IMSI digit6 (UTF-8 encoded)							
9-15	IMSI digits 7-15 (UTF-8 encoded)							

3GPP Type: 1

Length: L =17

IMSI value: Text:

This is the UTF-8 encoded IMSI; If the MNC is only 2 digits (e.g. MNC = 78), its encoding shall be with a leading '0', (e.g. "078").

2 - 3GPP-Charging ID

Octets	Bits							
	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

Octets	Bits							
	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

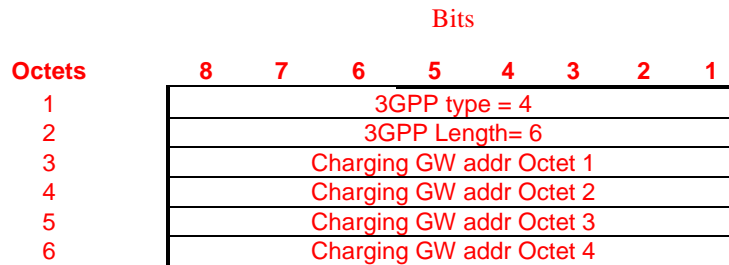
Length: 6

PDP type value: Unsigned 32 bits integer

PDP type octet possible values:

0 = IP

4 - 3GPP-Charging Gateway address

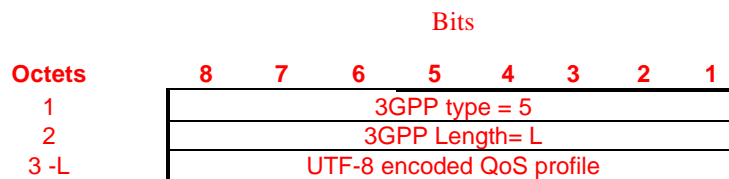


3GPP Type: 4

Length: 6

Charging GW address value: Address

5 - 3GPP-GPRS QoS profile



3GPP Type: 5

Length: 24 (release 99) or 8 (release 98)

QoS profile value: Text

UTF-8 encoded QoS profile syntax:

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

<Release indicator> = UTF-8 encoded number :

“98” = Release 98

“99”= Release 99

<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 digits, defining its hexadecimal representation. The QoS profile definition is in 3G TS 24.008

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

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

6 - 3GPP-SGSN address

Octets	Bits							
	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

7 - 3GPP-GGSN address

Octets	Bits							
	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

8 - 3GPP-IMSI MCC-MNC

Bits

Octets	8	7	6	5	4	3	2	1
1	3GPP type = 8							
2	3GPP Length= 8							
3	MCC digit1 (UTF-8 encoded)							
4	MCC digit2 (UTF-8 encoded)							
5	MCC digit3 (UTF-8 encoded)							
6	MNC digit1 (UTF-8 encoded)							
7	MNC digit2 (UTF-8 encoded)							
8	MNC digit3 (UTF-8 encoded)							

3GPP Type: 8

Length: 8

MS address value: text

This is the UTF-8 encoding of the MS MCC-MNC values. If the MNC is only 2 digits (e.g. MNC = 78), its encoding shall be with a leading '0', (e.g. "078").

9 - 3GPP-GGSN MCC-MNC

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

3GPP Type: 9

Length: 8

GGSN address value: text

This is the UTF-8 encoding of the GGSN MCC-MNC values. If the MNC is only 2 digits (e.g. MNC = 78), its encoding shall be with a leading '0', (e.g. "078").

10 - 3GPP-NSAPI

	Bits							
Octets	8	7	6	5	4	3	2	1
1	3GPP type = 10							
2	3GPP Length= 6							
3	NSAPI							

3GPP Type: 10

Length: 3

NSAPI value: text

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 UTF-8 encoded digit.

11 - 3GPP-Session Stop Indicator

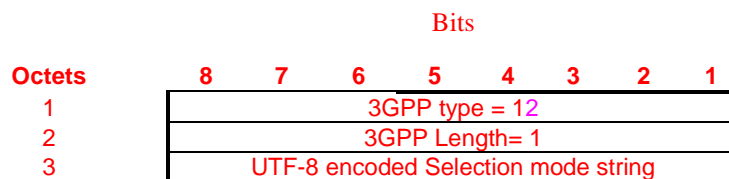


3GPP Type: 11

Length: 2

There is no value field for this Vendor Specific Attribute.

12 - 3GPP-Selection-Mode



3GPP Type: 12

Length: 3

Selection mode value: Text

The format of this attribute shall be a character string consisting of a single digit, mapping from the binary value of the selection mode in the Create PDP Context message [22]. Where TS 29.060 provides for interpretation of the value, e.g. map '3' to '2', this shall be done by the GGSN.

CR-Form-v4

CHANGE REQUEST

⌘ **09.61 CR A018** ⌘ ev **2** ⌘ Current version: **7.3.0** ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

Proposed change affects: ⌘ (U)SIM ME/UE Radio Access Network Core Network

Title: ⌘ Standard method for information delivery (MSISDN; IP address...) between GPRS and external PDN using RADIUS

Source: ⌘ CN3

Work item code: ⌘ GPRS **Date:** ⌘ 20.09.2001

<p>Category: ⌘ A</p> <p>Use <u>one</u> of the following categories:</p> <ul style="list-style-type: none"> F (correction) A (corresponds to a correction in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification) <p>Detailed explanations of the above categories can be found in 3GPP TR 21.900.</p>	<p>Release: ⌘ R98</p> <p>Use <u>one</u> of the following releases:</p> <ul style="list-style-type: none"> 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) REL-4 (Release 4) REL-5 (Release 5)
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Reason for change: ⌘ The MMS group (3GPP TSG T2 SWG3) found out a problem described in a LS resulted from the T2 MMS adhoc meeting (T2M010093/N3-010310) that „there is no standardised solution for a GGSN to deliver a mobile user’s identity forward to e.g. a WAP Gateway or a MMS Relay/Server”. In addition, other application servers also need this mapping: for example to charge a WAP session, dynamic IP address is not enough and MSISDN (or IMSI) is needed.

This problem requires a simple solution to be quickly standardised to avoid the development of incompatible proprietary solutions. So this issue should be solved as soon as possible, in 3GPP REL4 and earlier releases specifications. This CR proposes a simple and generic solution to this problem based on existing IETF standards: Using RADIUS Accounting to provide this mapping to e.g. a WAP Gateway or a MMS Relay/Server.

The CR also takes the opportunity to clarify the use of RADIUS authentication already mentioned in 09.61, and add recommendations on how to carry other information with RADIUS.

Summary of change: ⌘ This CR proposes to use RADIUS Accounting to provide the MSISDN/IP address mapping on Gi interface (to e.g. a WAP Gateway or a MMS Relay/Server).

Consequences if not approved: ⌘ Mutually incompatible proprietary solutions will be developed.

Clauses affected: ⌘ 2; 16 (a new clause)

Other specs affected: ⌘ Other core specifications ⌘ Test specifications
 O&M Specifications

Other comments: ⌘

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

- 1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.
- 2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under <ftp://ftp.3gpp.org/specs/> For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.
- 3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

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] GSM 01.04: "Digital cellular telecommunication system (Phase 2+); Abbreviations and acronyms".
- [2] GSM 02.60: "Digital cellular telecommunication system (Phase 2+); General Packet Radio Service (GPRS): Stage 1 Service Description".
- [3] GSM 03.60: "Digital cellular telecommunication system (Phase 2+); General Packet Radio Service (GPRS); Stage 2 Service Description".
- [4] GSM 03.61: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Point to Multipoint Multicast Service Description; Stage 2".
- [5] GSM 03.62: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Point to Multipoint Group Call Service Description; Stage 2".
- [6] GSM 03.64: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Overall description of the Radio interface; Stage 2".
- [7] GSM 04.60: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Mobile Station (MS) - Base Station System (BSS) interface; Radio Link Control / Medium Access Control (RLC/MAC) protocol".
- [8] GSM 04.64: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Logical Link Control (LLC)".
- [9] GSM 04.65: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Subnetwork Dependent Convergence Protocol (SNDTCP)".
- [10] GSM 07.60: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Mobile Station (MS) supporting GPRS".
- [11] CCITT Recommendation E.164: "Numbering plan for the ISDN era".
- [12] CCITT Recommendation X.25: "Interface between data terminal equipment (DTE) and data circuit-terminating equipment (DCE) for terminals operating in the packet mode and connected to public data networks by dedicated circuit".
- [13] CCITT Recommendation X.75: "Packet-switched signalling system between public networks providing data transmission services".
- [14] CCITT Recommendation X.121: "International Numbering Plan for Public Data Networks".
- [15] IETF RFC 768 (1980): "User Datagram Protocol" (STD 6).
- [16] IETF RFC 791 (1981): "Internet Protocol" (STD 5).
- [17] IETF RFC 792 (1981): "Internet Control Message Protocol" (STD 5).
- [18] IETF RFC 793 (1981): "Transmission Control Protocol" (STD 7).

- [19] IETF RFC 1034 (1987): "Domain Names – Concepts and Facilities" (STD 7).
- [20] Bellcore GR-000301 Issue 2 December 1997; "Public Packet Switched Network Generic Requirements (PPSNGR)".
- [21] IETF RFC 1661 and 1662 (1994): "The Point-to-Point Protocol (PPP)" (STD 51).
- [22] IETF RFC 1700 (1994): "Assigned Numbers" (STD 2).3
- [23] IETF RFC2865 (2000), C. Rigney, S. Willens, A. Rubens, W. Simpson: "Remote Authentication Dial In User Service (RADIUS)".
- [24] IETF RFC2866 (2000), C. Rigney, Livingston: " RADIUS Accounting " .
- [25] 3GPP TS 23.003: "3rd Generation Partnership Project; Technical Specification Group Core Network; Numbering, addressing and identification".

16 Usage of RADIUS on Gi interface

A GGSN may, on a per APN basis, use RADIUS authentication to authenticate a user and RADIUS accounting to provide information to an AAA (Authentication, Authorization and Accounting) server.

16.1 RADIUS Authentication

RADIUS Authentication shall be used according to RFC2865 [23].

The RADIUS client function may reside in a GGSN. When the GGSN receives a Create PDP Context request message the RADIUS client function may send the authentication information to an authentication server, which is identified during the APN provisioning.

The authentication server checks that the user can be accepted. The response (when positive) may contain network information, such as an IP address for the user.

The information delivered during the Radius authentication can be used to automatically correlate the users identity (the MSISDN or IMSI) to the IP-address, assigned/confirmed by the GGSN or the authentication server respectively. The same procedure applies, in case of sending the authentication to a 'proxy' authentication server.

RADIUS Authentication is only applicable to the primary PDP context. When the GGSN receives an Access-Accept message from the authentication server it shall complete the PDP context activation procedure. If Access-Reject or no response is received, the GGSN shall reject the PDP Context Activation attempt with a suitable cause code, e.g. User Authentication failed.

16.2 RADIUS Accounting

RADIUS Accounting shall be used according to RFC 2866 [24].

The RADIUS accounting client function may reside in a GGSN. The RADIUS accounting client may send information to an accounting server, which is identified during the APN provisioning. The accounting server may store this information and use it to automatically identify the user. This information can be trusted because the GPRS network has authenticated the subscriber (i.e. SIM card and possibly other authentication methods).

RADIUS Accounting-Request Start and Stop messages may be used during both primary and secondary PDP context activation and deactivation procedures respectively.

The use of Accounting-Request STOP and in addition the Accounting ON and Accounting OFF messages may be used to ensure that information stored in the accounting server is synchronised with the GGSN information.

If the AAA server is used for IP address assignment, then, upon reception of a RADIUS Accounting-Request STOP message for all PDP contexts associated to a session defined by APN and IMSI or MSISDN, the AAA server may make the associated IP address available for assignment.

In order to avoid race conditions, the GGSN shall include a 3GPP Vendor-Specific sub-attribute "Session Stop indicator" when it sends the Accounting-Request STOP for the last PDP context of a PDP session and the PDP session

is terminated (i.e. the IP address and all GTP tunnels can be released). The AAA server shall not assume the PDP session terminated until an Accounting-Request STOP with the Session Stop indicator is received.

16.3 Authentication and accounting message flows

16.3.1 IP PDP type

The figure below represents the RADIUS message flows between a GGSN and an Authentication, Authorization and Accounting (AAA) server.

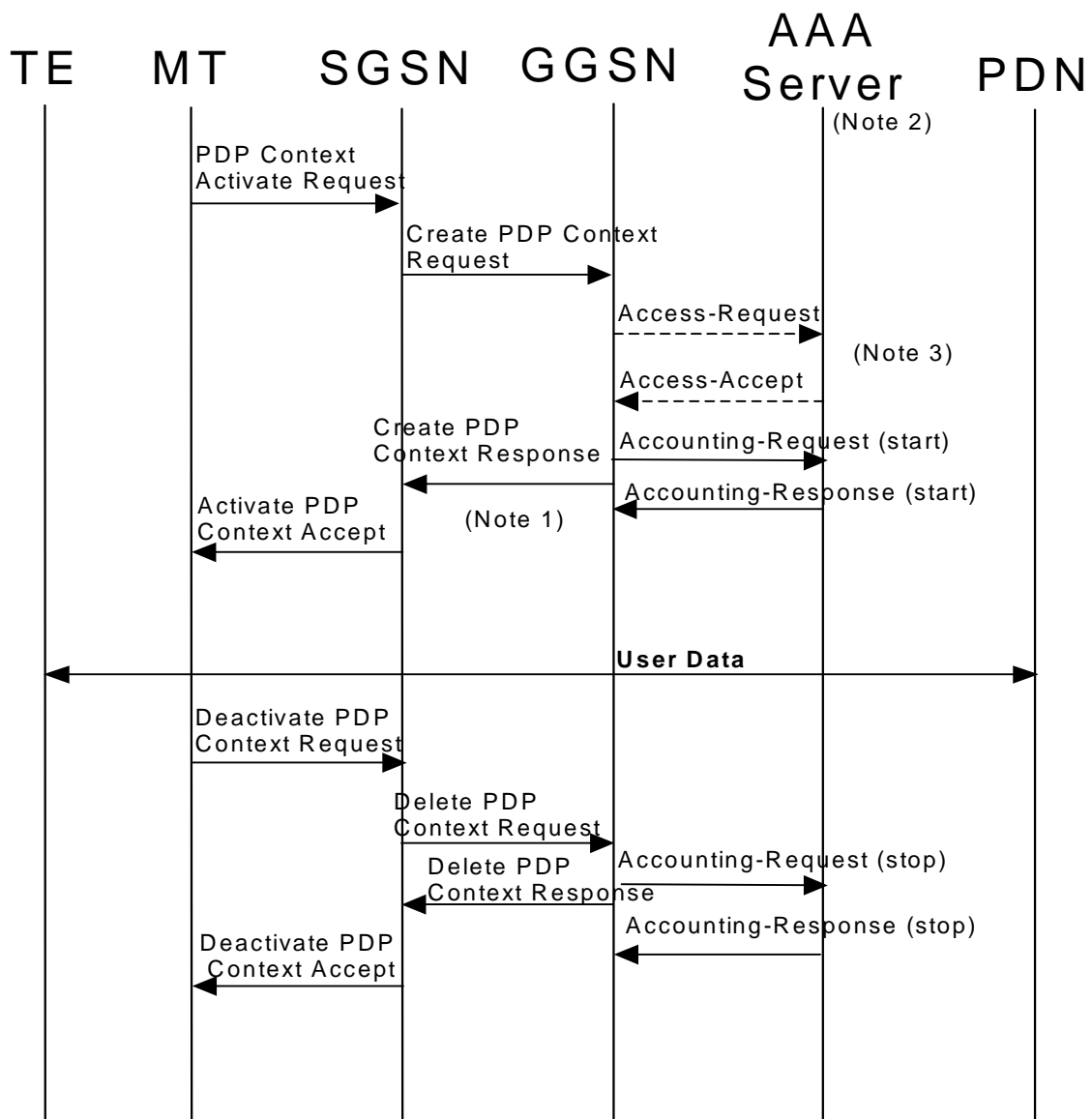


Figure 1: RADIUS message flow for PDP type IP (successful user authentication case)

NOTE 1: If some external applications require RADIUS Accounting request (Start) information before they can process user packets, then the selected APN (GGSN) may be configured in such a way that the GGSN drops user data until the Accounting Response (START) is received from the AAA server. Both Authentication and Accounting servers may be optional and separately configured for each APN.

NOTE 2: Separate accounting and authentication servers may be used.

NOTE 3: The Access-Request message shall be used for primary PDP context only.

Figure 14: RADIUS message flow for PDP type IP (successful user authentication case)

When a GGSN receives a Create PDP Context Request message for a given APN, the GGSN may (depending on the configuration for this APN) send a RADIUS Access-Request to an AAA server. The AAA server authenticates and authorizes the user. If RADIUS is also responsible for IP address allocation the AAA server shall return the allocated IP address in the Access-Accept message.

Even if the GGSN was not involved in user authentication (e.g. transparent network access mode), it may send a RADIUS Accounting-Request START message to an AAA server. This message contains parameters, e.g. the tuple which includes the user-id and IP address, to be used by application servers (e.g. WAP gateway) in order to identify the user. This message also indicates to the AAA server that the user session has started. User data forwarding at the GGSN may not be allowed before the Accounting Response START is received. If this is the case, the GGSN drops user data until the Accounting Response START is received. This is configurable per APN.

When the GGSN receives a Delete PDP Context Request message and providing a RADIUS Accounting-Request START message was sent previously, the GGSN shall send a RADIUS Accounting-Request STOP message to the AAA server, which indicates the termination of this particular user session. The GGSN shall immediately send a Delete PDP context response, without waiting for an Accounting-Response STOP message from the AAA server.

~~NOTE:~~ The AAA server shall deallocate the IP address (if any) initially allocated to the subscriber, if there is no session for the subscriber.

Accounting-Request ON and Accounting-Request OFF messages may be sent from the GGSN to the AAA server to ensure the correct synchronization of the session information in the GGSN and the AAA server.

The GGSN may send an Accounting-Request ON message to the AAA server to indicate that a restart has occurred. The AAA server may then release the associated resources.

Prior to a scheduled restart, the GGSN may send Accounting-Request OFF message to the AAA server. The AAA server may then release the associated resources.

If an Access-Challenge is sent to the GGSN when an Access-Request message is pending and when IP PDP type is used, the GGSN shall silently discard the Access-Challenge message and it shall treat an Access-Challenge as though it had received an Access-Reject instead [23].

16.3.2 PPP PDP type

The figure [below](#)15 describes the RADIUS message flows between a GGSN and an Authentication, Authorization and Accounting (AAA) server for the case where PPP is terminated at the GGSN. The case where PPP is relayed to an LNS is beyond the scope of this specification.

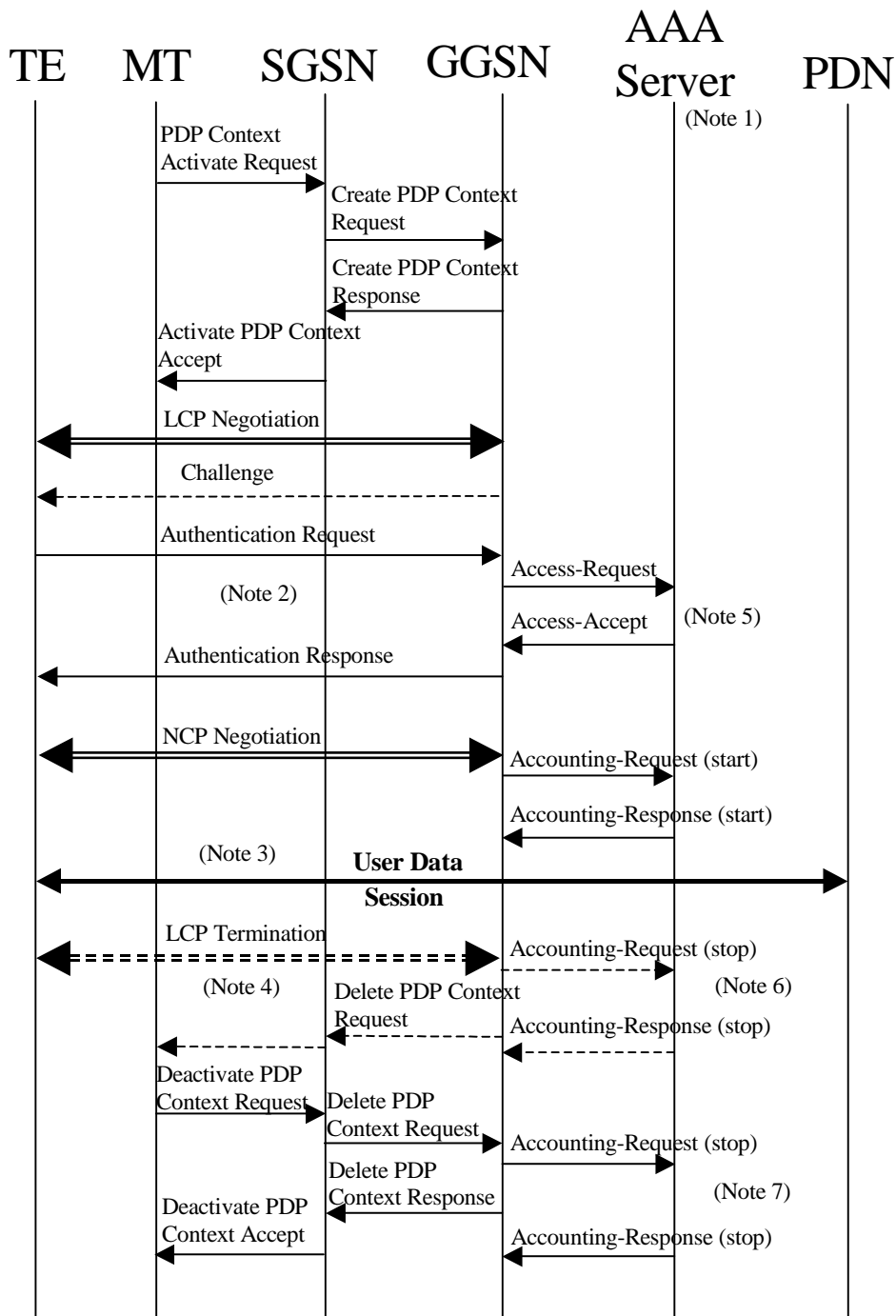


Figure 2: RADIUS message flow for PDP type PPP (successful user authentication case)

NOTE 1: Separate accounting and Authentication servers may be used.

NOTE 2: Actual messages depend on the used authentication protocol (e.g. PAP, CHAP)

NOTE 3: User data may not be allowed before the Accounting Response (START) is received. If this is the case, the GGSN drops user data until the Accounting Response (START) is received.

NOTE 4: An LCP termination procedure may be performed. Either the MS or the GGSN may initiate the context deactivation.

NOTE 5: The Access-Request message shall be used for primary PDP context only.

NOTE 6: Network Initiated deactivation

NOTE 7: User Initiated deactivation

Figure 15: RADIUS message flow for PDP type PPP (successful user authentication case)

When a GGSN receives a Create PDP Context Request message for a given APN, the GGSN shall immediately send a Create PDP context response back to the SGSN. After PPP link setup, the authentication phase may take place. During Authentication phase, the GGSN sends a RADIUS Access-Request to an AAA server. The AAA server authenticates and authorizes the user. If RADIUS is also responsible for IP address allocation the AAA server shall return the allocated IP address in the Access-Accept message (if the user was authenticated).

If the user is not authenticated, the GGSN shall send a Delete PDP context request to the SGSN.

Even if the GGSN was not involved in user authentication (e.g. for PPP no authentication may be selected), it may send a RADIUS Accounting-Request START message to an AAA server. This message contains parameters, e.g. a tuple which includes the user-id and IP address, to be used by application servers (e.g. WAP gateway) in order to identify the user. This message also indicates to the AAA server that the user session has started, and the QoS parameters associated to the session.

User data forwarding at the GGSN may not be allowed before the Accounting Response START is received. If this is the case, the GGSN drops user data until the Accounting Response START is received. This is configurable per APN.

When the GGSN receives a Delete PDP Context Request message and providing a RADIUS Accounting-Request START message was sent previously, the GGSN shall send a RADIUS Accounting-Request STOP message to the AAA server, which indicates the termination of this particular user session. The GGSN shall immediately send a Delete PDP context response, without waiting for an Accounting-Response STOP message from the AAA server.

~~NOTE:~~ The AAA server shall deallocate the IP address (if any) initially allocated to the subscriber.

Accounting-Request ON and Accounting-Request OFF messages may be sent from the GGSN to the AAA server to ensure the correct synchronization of the session information in the GGSN and the AAA server.

The GGSN may send an Accounting-Request ON message to the AAA server to indicate that a restart has occurred. The AAA server may then release the associated resources.

Prior to a scheduled restart, the GGSN may send Accounting-Request OFF message to the AAA server, the AAA server may then release the associated resources.

If an Access-Challenge is sent to the GGSN when using PPP PDP type, the GGSN shall handle it by PPP CHAP providing PPP CHAP was the selected Authentication protocol. If CHAP authentication was not selected, authentication shall fail [23].

16.4 List of RADIUS attributes

The following tables describe the actual content of the RADIUS messages exchanged between the GGSN and the AAA server. Other RADIUS attributes may be used as defined in RADIUS RFC(s). Unless otherwise stated, when the encoding scheme of an attribute is specified as UTF-8 encoding, this shall be interpreted as UTF-8 hexadecimal encoding.

~~The following notes are applicable to the sub-clauses of section 16.4~~

~~NOTE 1: Must be present if PAP is used.~~

~~NOTE 2: Must be present if CHAP is used.~~

~~NOTE 3: Either NAS-IP-Address or NAS-Identifier shall be present.~~

~~NOTE 4: The presence of this attribute is conditional upon this attribute being received in the Access-Accept message~~

16.4.1 Access-Request message (sent from the GGSN to AAA server)

The table below describes the attributes of the Access-Request message.

Table 1: The attributes of the Access-Request message

Attr #	Attribute Name	Description	Content	Presence Requirement
1	User-Name	Username is provided by the user (extracted from the Protocol Configuration Options (PCO) field of the Create PDP Context Request message) or PPP authentication phase (if PPP PDP type is used). If no username is available a generic username, configurable on a per APN basis, shall be present.	String	Mandatory
2	User-Password	User password provided by the user if PAP is used (extracted from the PCO field of the Create PDP Context Request message) or PPP authentication phase (if PPP PDP type is used). If no password is available a generic password, configurable on a per APN basis, shall be present.	String	Conditional Note 1
3	CHAP-Password	User password provided by the user if CHAP is used (extracted from the PCO field of the Create PDP Context Request message) or PPP authentication phase (if PPP PDP type is used).	String	Conditional Note 2
4	NAS-IP-Address	IP address of the GGSN for communication with the AAA server.	IPv4	Conditional Note 3
32	NAS-Identifier	Hostname of the GGSN for communication with the AAA server.	String	Conditional Note 3
6	Service-Type	Indicates the type of service for this user	Framed	Optional
7	Framed-Protocol	Indicates the type of protocol for this user	7 (GPRS PDP Context)	Optional
8	Framed-IP-Address	IP address allocated for this user	IPv4	Conditional
9	Framed-IP-Netmask	Netmask for the user IP address	IPv4	Conditional
30	Called-Station-Id	Identifier for the target network	APN (UTF-8 encoded)	Mandatory
31	Calling-Station-Id	Identifier for the MS	MSISDN in international format according to 3GPP TS 23.003, UTF-8 encoded decimal. Note that there are no leading characters in front of the country code.	Mandatory
60	CHAP-Challenge	Challenge if CHAP is used (extracted from the PCO field of the Create PDP Context Request message) or PPP authentication phase (if PPP PDP type is used).	String	Conditional Note 2
61	NAS-Port-Type	Port type for the GGSN	As per RFC 2865	Optional
26/10415	3GPP Vendor-Specific	Sub-attributes according sub-clause 16.4.7	See sub-clause 16.4.7	Optional except sub-attribute 3 which is conditional
<p>NOTE 1: Shall be present if PAP is used.</p> <p>NOTE 2: Shall be present if CHAP is used.</p> <p>NOTE 3: Either NAS-IP-Address or NAS-Identifier shall be present.</p>				

16.4.2 Access-Accept (sent from AAA server to GGSN)

The table below describes the attributes of the Access-Accept message.

Table 2: The attributes of the Access-Accept message

Attr #	Attribute Name	Description	Content	Presence Requirement
1	User-Name	Username received in the Access-Request message or a substitute username provided by the AAA server. If the User-Name has been received in the Access-Accept message, this user-name shall be used in preference to the above	String	Optional
6	Service-Type	Indicates the type of service for this user	Framed	Optional
7	Framed-Protocol	Indicates the type of protocol for this user	7 (GPRS PDP Context)	Optional
8	Framed-IP-Address	IP address allocated for this user, if the AAA server is used to allocate IP address.	IPv4	Conditional
9	Framed-IP-Netmask	Netmask for the user IP address, if the AAA server is used to allocate IP netmask.	IPv4	Conditional
12	Framed-IP-MTU	MTU for the user towards this particular APN, MTU shall be less or equal to 1500	String	Optional
25	Class	Identifier to be used in all subsequent accounting messages.	String	Optional (NOTE 4)
27	Session-Timeout	Indicates the timeout value (in seconds) for the user session	32 bit unsigned Integer	Optional
28	Idle-Timeout	Indicates the timeout value (in seconds) for idle user session	32 bit unsigned Integer	Optional
26/311	MS- primary-DNS-server	Contains the primary DNS server address for this APN	Ipv4	Optional
26/311	MS-Secondary-DNS-Server	Contains the secondary DNS server address for this APN	IPv4	Optional
26/311	MS-Primary-NBNS-Server	Contains the primary NetBios name server address for this APN	IPv4	Optional
26/311	MS-Secondary-NBNS-Server	Contains the secondary NetBios server address for this APN	IPv4	Optional
NOTE 4: The presence of this attribute is conditional upon this attribute being received in the Access-Accept message				

16.4.3 Accounting-Request START (sent from GGSN to AAA server)

The table [below](#) describes the attributes of the Accounting-Request START message.

Table 3: The attributes of the Accounting-Request START message

Attr #	Attribute Name	Description	Content	Presence Requirement
1	User-Name	Username provided by the user (extracted from the PCO field of the Create PDP Context Request message) or PPP authentication phase (if PPP PDP type is used). If no username is available a generic username, configurable on a per APN basis, shall be present. If the User-Name has been received in the Access-Accept message, this user-name shall be used in preference to the above	String	Optional
4	NAS-IP-Address	GGSN IP address for communication with the AAA server.	IPv4	Conditional Note 3
32	NAS-Identifier	Hostname of the GGSN for communication with the AAA server.	String	Conditional Note 3
6	Service-Type	Indicates the type of service for this user	Framed	Optional
7	Framed Protocol	Indicates the type of protocol for this user	7 (GPRS PDP Context)	Optional
8	Framed-IP-Address	User IP address	IPv4	Mandatory
25	Class	Received in the access accept	String	Conditional (NOTE 4)
30	Called-Station-Id	Identifier for the target network	APN (UTF-8 encoded)	Mandatory
31	Calling-Station-Id	Identifier for the MS	MSISDN in international format according to 3GPP TS 23.003, UTF-8 encoded decimal. Note that there are no leading characters in front of the country code.	Mandatory
40	Acct-Status-Type	Type of accounting message	START	Mandatory
41	Acct-Delay-Time	Indicates how many seconds the GGSN has been trying to send this record for, and can be subtracted from the time of arrival on the AAA server to find the approximate time (in seconds) of the event generating this Accounting-Request.	32 unsigned integer	Optional
44	Acct-Session-Id	User session identifier.	GGSN IP address and Charging-ID concatenated in a UTF-8 encoded hexadecimal. NOTE: The GGSN IP address is the same as that used in the GCDRs.	Mandatory
45	Acct-Authentic	Authentication method	RADIUS or LOCAL	Optional
61	NAS-Port-Type	Port type for the GGSN	As per RFC 2865	Optional
26/10415	3GPP Vendor-Specific	Sub-attributes according sub-clause 16.4.7.	See sub-clause 16.4.7	Optional except sub-attribute 3 which is conditional

NOTE 3: Either NAS-IP-Address or NAS-Identifier shall be present.

NOTE 4: The presence of this attribute is conditional upon this attribute being received in the Access-Accept message

16.4.4 Accounting Request STOP (sent from GGSN to AAA server)

The table [below](#) describes the attributes of the Accounting-Request STOP message.

Table 4: The attributes of the Accounting-Request STOP message

Attr #	Attribute Name	Description	Content	Presence Requirement
1	User-Name	Username provided by the user (extracted from the PCO field of the Create PDP Context Request message) or PPP authentication phase (if PPP PDP type is used). If no username is available a generic username, configurable on a per APN basis, shall be present. If the User-Name has been received in the Access-Accept message, this user-name shall be used in preference to the above	String	Optional
4	NAS-IP-Address	IP address of the GGSN for communication with the AAA server.	IPv4	Conditional Note 3
32	NAS-Identifier	Hostname of the GGSN for communication with the AAA server.	String	Conditional Note 3
6	Service-Type	Indicates the type of service for this user	Framed	Optional
7	Framed Protocol	Indicates the type of protocol for this user	7 (GPRS PDP Context)	Optional
8	Framed-IP-Address	User IP address	IPv4	Mandatory
25	Class	Received in the access accept	String	Optional (NOTE 4)
30	Called-Station-Id	Identifier for the target network	APN (UTF-8 encoded)	Mandatory
31	Calling-Station-Id	Identifier for the MS	MSISDN in international format according to 3GPP TS 23.003, UTF-8 encoded. Note that there are no leading characters in front of the country code.	Mandatory
40	Acct-Status-Type	Indicates the type of accounting request	STOP	Mandatory
41	Acct-Delay-Time	Indicates how many seconds the GGSN has been trying to send this record for, and can be subtracted from the time of arrival on the AAA server to find the approximate time of the event generating this Accounting-Request	Second	Optional
42	Acct-Input-Octets	GGSN counted number of octets sent by the user for the PDP context	32 bit unsigned integer	Optional
43	Acct-Output-Octets	GGSN counted number of octets received by the user for the PDP context	32 bit unsigned integer	Optional
44	Acct-Session-Id	User session identifier.	GGSN IP address and Charging-ID concatenated in a UTF-8 encoded hexadecimal. NOTE: The GGSN IP address is the same as that used in the GCDRs.	Mandatory
45	Acct-Authentic	Authentication method	RADIUS or LOCAL	Optional
46	Acct-Session-Time	Duration of the session	Second	Optional
47	Acct-Input-Packets	GGSN counted number of packets sent by the user	Packet	Optional
48	Acct-Output-Packets	GGSN counted number of packets received by the user	Packet	Optional
49	Acct-Terminate-	Indicate how the session was terminated	See RFC 2866	Optional

	Cause				
61	NAS-Port-Type	Port type for the GGSN	As per RFC 2865	Optional	
26/10415	3GPP Vendor-Specific	Sub-attributes according to sub-clause 16.4.7.	See sub-clause 16.4.7	Optional except sub-attribute 3 which is conditional	
<p>NOTE 3: Either NAS-IP-Address or NAS-Identifier shall be present.</p> <p>NOTE 4: The presence of this attribute is conditional upon this attribute being received in the Access-Accept message</p>					

16.4.5 Accounting Request ON (optionally sent from GGSN to AAA server)

The table below5 describes the attributes of the Accounting-Request ON message.

Table 5: The attributes of the Accounting-Request ON message

Attr #	Attribute Name	Description	Content	Presence Requirement
4	NAS-IP-Address	IP address of the GGSN for communication with the AAA server.	IPv4	Conditional Note 3
30	Called-Station-ID	Identifier for the target network.	APN (UTF-8 encoded)	Optional
32	NAS-Identifier	Hostname of the GGSN for communication with the AAA server.	String	Conditional Note 3
NOTE 3: Either NAS-IP-Address or NAS-Identifier shall be present.				

16.4.6 Accounting Request OFF (optionally sent from GGSN to AAA server)

The table below6 describes the attributes of the Accounting-Request OFF message.

Table 6: The attributes of the Accounting-Request OFF message

Attr #	Attribute Name	Description	Content	Presence Requirement
4	NAS-IP-Address	IP address of the GGSN for communication with the AAA server.	IPv4	Conditional Note 3
30	Called-Station-ID	Identifier for the target network.	APN (UTF-8 encoded)	Optional
32	NAS-Identifier	Hostname of the GGSN for communication with the AAA server.	String	Conditional Note 3
NOTE 3: Either NAS-IP-Address or NAS-Identifier shall be present.				

16.4.7 Sub-attributes of the 3GPP Vendor-Specific attribute

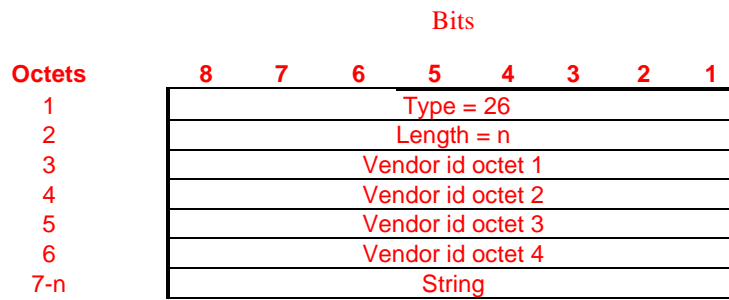
The table below7 describes the sub-attributes of the 3GPP Vendor-Specific attribute of the Access-Request, Accounting-Request START and Accounting-Request STOP message.

Table 7: The sub-attributes of the 3GPP Vendor-Specific attribute of the Access-Request, Accounting-Request START and Accounting-Request STOP message

Sub-attr #	Sub-attribute Name	Description	Presence Requirement	Associated attribute (Location of Sub-attr)
1	3GPP-IMSI	IMSI for this user	Optional	Access-Request, Accounting-Request START
2	3GPP-Charging-Id	Charging ID for this PDP Context (this together with the GGSN-Address constitutes a unique identifier for the PDP context).	Optional	Access-Request, Accounting-Request START
3	3GPP-PDP Type	Type of PDP context, e.g. IP or PPP	Conditional (mandatory if attribute 7 is present)	Access-Request
4	3GPP-CG-Address	Charging Gateway IP address	Optional	Access-Request, Accounting-Request START
5	3GPP-GPRS-QoS-Profile	QoS profile received	Optional	Access-Request, Accounting-Request START
6	3GPP-SGSN-Address	SGSN IP address that is used by the GTP control plane for the handling of control messages. It may be used to identify the PLMN to which the user is attached.	Optional	Access-Request, Accounting-Request START
7	3GPP-GGSN-Address	GGSN IP address that is used by the GTP control plane for the context establishment. It is the same as the GGSN IP address used in the GCDRs.	Optional	Access-Request, Accounting-Request START
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
9	3GPP-GGSN- MCC-MNC	MCC-MNC of the network the GGSN belongs to.	Optional	Access-Request, Accounting-Request START
10	3GPP-NSAPI	Identifies a particular PDP context for the associated PDN and MSISDN/IMSI from creation to deletion.	Optional	Access-Request, Accounting-Request START, Access-Request STOP
11	3GPP- Session-Stop-Indicator	Indicateds to the AAA server that the last PDP context of a session is released and that	Optional	Accounting Request STOP

		the PDP session has been terminated.		
12	3GPP- Selection-Mode	Contains the Selection mode for this PDP Context received in the Create PDP Context Request Message	Optional	Access-Request, Accounting-Request START

The RADIUS vendor Attribute is encoded as follows (as per RFC 2865)



n>=7

3GPP Vendor Id = 10415

The string part is encoded as follows:



m>=2 and m<= 248

The 3GPP specific attributes encoding is clarified below.

1 - 3GPP-IMSI

Bits

Octets	8	7	6	5	4	3	2	1
1	3GPP type = 1							
2	3GPP Length= 15							
3	IMSI digit1 (UTF-8 encoded)							
4	IMSI digit2 (UTF-8 encoded)							
5	IMSI digit3 (UTF-8 encoded)							
6	IMSI digit4 (UTF-8 encoded)							
7	IMSI digit5 (UTF-8 encoded)							
8	IMSI digit6 (UTF-8 encoded)							
9-15	IMSI digits 7-15 (UTF-8 encoded)							

3GPP Type: 1

Length: L =17

IMSI value: Text:

This is the UTF-8 encoded IMSI; If the MNC is only 2 digits (e.g. MNC = 78), its encoding shall be with a leading '0', (e.g. "078").

2 - 3GPP-Charging ID

Octets	Bits							
	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

Octets	Bits							
	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

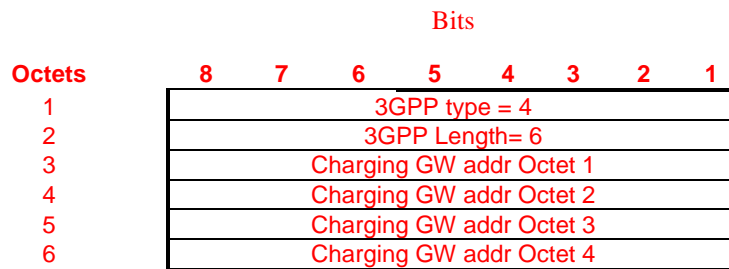
PDP type value: Unsigned 32 bits integer

PDP type octet possible values:

0 = IP

1 = PPP

4 - 3GPP-Charging Gateway address

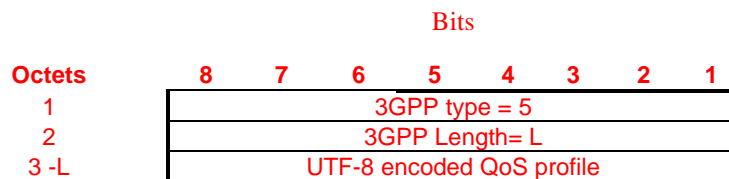


3GPP Type: 4

Length: 6

Charging GW address value: Address

5 - 3GPP-GPRS QoS profile



3GPP Type: 5

Length: 24 (release 99) or 8 (release 98)

QoS profile value: Text

UTF-8 encoded QoS profile syntax:

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

<Release indicator> = UTF-8 encoded number :

“98” = Release 98

“99”= Release 99

<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 digits, defining its hexadecimal representation. The QoS profile definition is in 3G TS 24.008

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

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

6 - 3GPP-SGSN address

Octets	Bits							
	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

7 - 3GPP-GGSN address

Octets	Bits							
	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

8 - 3GPP-IMSI MCC-MNC

Bits

Octets	8	7	6	5	4	3	2	1
1	3GPP type = 8							
2	3GPP Length= 8							
3	MCC digit1 (UTF-8 encoded)							
4	MCC digit2 (UTF-8 encoded)							
5	MCC digit3 (UTF-8 encoded)							
6	MNC digit1 (UTF-8 encoded)							
7	MNC digit2 (UTF-8 encoded)							
8	MNC digit3 (UTF-8 encoded)							

3GPP Type: 8

Length: 8

MS address value: text

This is the UTF-8 encoding of the MS MCC-MNC values. If the MNC is only 2 digits (e.g. MNC = 78), its encoding shall be with a leading '0', (e.g. "078").

9 - 3GPP-GGSN MCC-MNC

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

3GPP Type: 9

Length: 8

GGSN address value: text

This is the UTF-8 encoding of the GGSN MCC-MNC values. If the MNC is only 2 digits (e.g. MNC = 78), its encoding shall be with a leading '0', (e.g. "078").

10 - 3GPP-NSAPI

	Bits							
Octets	8	7	6	5	4	3	2	1
1	3GPP type = 10							
2	3GPP Length= 6							
3	NSAPI							

3GPP Type: 10

Length: 3

NSAPI value: text

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 UTF-8 encoded digit.

11 - 3GPP-Session Stop Indicator

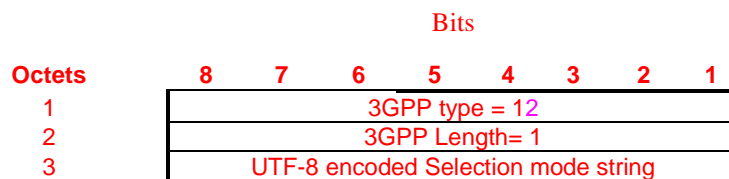


3GPP Type: 11

Length: 2

There is no value field for this Vendor Specific Attribute.

12 - 3GPP-Selection-Mode



3GPP Type: 12

Length: 3

Selection mode value: Text

The format of this attribute shall be a character string consisting of a single digit, mapping from the binary value of the selection mode in the Create PDP Context message [24]. Where TS 29.060 provides for interpretation of the value, e.g. map '3' to '2', this shall be done by the GGSN.

CR-Form-v4

CHANGE REQUEST

⌘ **29.061 CR 022** ⌘ ev **2** ⌘ Current version: **3.6.0** ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

Proposed change affects: ⌘ (U)SIM ME/UE Radio Access Network Core Network

Title: ⌘ Standard method for information delivery (MSISDN; IP address...) between GPRS and external PDN using RADIUS

Source: ⌘ CN3

Work item code: ⌘ GPRS

Date: ⌘ 20.09.2001

Category: ⌘ **A**

Release: ⌘ R99

Use one of the following categories:

Use one of the following releases:

F (correction)

2 (GSM Phase 2)

A (corresponds to a correction in an earlier release)

R96 (Release 1996)

B (addition of feature),

R97 (Release 1997)

C (functional modification of feature)

R98 (Release 1998)

D (editorial modification)

R99 (Release 1999)

Detailed explanations of the above categories can be found in 3GPP [TR 21.900](#).

REL-4 (Release 4)

REL-5 (Release 5)

Reason for change: ⌘ The MMS group (3GPP TSG T2 SWG3) found out a problem described in a LS resulted from the T2 MMS adhoc meeting (T2M010093/N3-010310) that „there is no standardised solution for a GGSN to deliver a mobile user’s identity forward to e.g. a WAP Gateway or a MMS Relay/Server”. In addition, other application servers also need this mapping: for example to charge a WAP session, dynamic IP address is not enough and MSISDN (or IMSI) is needed.
 This problem requires a simple solution to be quickly standardised to avoid the development of incompatible proprietary solutions. So this issue should be solved as soon as possible, in 3GPP REL4 and earlier releases specifications. This CR proposes a simple and generic solution to this problem based on existing IETF standards: Using RADIUS Accounting to provide this mapping to e.g. a WAP Gateway or a MMS Relay/Server.

The CR also takes the opportunity to clarify the use of RADIUS authentication already mentioned in 29.061, and add recommendations on how to carry other information with RADIUS.

Summary of change: ⌘ This CR proposes to use RADIUS Accounting to provide the MSISDN/IP address mapping on Gi interface (to e.g. a WAP Gateway or a MMS Relay/Server).

Consequences if not approved: ⌘ Mutually incompatible proprietary solutions will be developed.

Clauses affected: ⌘ 2; 16 (a new clause)

Other specs affected: ⌘ Other core specifications ⌘
 Test specifications
 O&M Specifications

Other comments: ⌘

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

- 1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.
- 2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under <ftp://ftp.3gpp.org/specs/> For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.
- 3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

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.

- [1] 3GPP TS 01.04: "Digital cellular telecommunication system (Phase 2+); Abbreviations and acronyms".
- [2] 3GPP TS 22.060: "3rd Generation Partnership Project: Technical Specification Group Services and System Aspects; General Packet Radio Service (GPRS): Stage 1 Service Description".
- [3] 3GPP TS 23.060: "3rd Generation Partnership Project: Technical Specification Services and System Aspects; General Packet Radio Service (GPRS); Service Description Stage 2".
- [4] 3GPP TS 03.61: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Point to Multipoint Multicast Service Description; Stage 2".
- [5] 3GPP TS 03.62: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Point to Multipoint Group Call Service Description; Stage 2".
- [6] 3GPP TS 03.64: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Overall description of the Radio interface; Stage 2".
- [7] 3GPP TS 04.60: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Mobile Station (MS) - Base Station System (BSS) interface; Radio Link Control / Medium Access Control (RLC/MAC) protocol".
- [8] 3GPP TS 04.64: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Logical Link Control (LLC)".
- [9] 3GPP TS 24.065: "3rd Generation Partnership Project: Technical Specification Group Core Network; General Packet Radio Service (GPRS); Mobile Station (MS) - Serving GPRS Support Node(SGSN); Subnetwork Dependent Convergence Protocol (SNDTCP)".
- [10] 3GPP TS 27.060: "3rd Generation Partnership Project: Technical Specification Group Core Network; Packet Domain; Mobile Station (MS) supporting Packet Switched Services".
- [11] ITU-T Recommendation E.164: "Numbering plan for the ISDN era".
- [12] <VOID>
- [13] <VOID>
- [14] <VOID>
- [15] IETF RFC 768 (1980): "User Datagram Protocol" (STD 6).
- [16] IETF RFC 791 (1981): "Internet Protocol" (STD 5).
- [17] IETF RFC 792 (1981): "Internet Control Message Protocol" (STD 5).
- [18] IETF RFC 793 (1981): "Transmission Control Protocol" (STD 7).
- [19] IETF RFC 1034 (1987): "Domain Names - Concepts and Facilities" (STD 7).
- [20] <VOID>
- [21] IETF RFC 1661 and 1662 (1994): "The Point-to-Point Protocol (PPP)" (STD 51).

- [22] IETF RFC 1700 (1994): "Assigned Numbers" (STD 2).3.
- [23] UMTS 24.008: "Mobile radio interface layer 3 specification; Core Network Protocols – Stage 3".
- [24] UMTS 29.060: "General Packet Radio Service (GPRS); GPRS Tunnelling Protocol (GTP) across the Gn and Gp Interface".
- [25] IETF RFC2794 (2000), Pat R. Calhoun and Charles E. Perkins: "Mobile IP Network Address Identifier Extension for IPv4", March 2000.
- [26] IETF RFC 2131 (1997): "Dynamic Host Configuration Protocol".
- [27] IETF RFC 1542 (1993): "Clarification and Extensions for the Bootstrap Protocol".
- [28] IETF RFC2373 (1998): "IP version 6 Addressing Architecture".
- [29] IETF RFC 2462 (1998): "IPv6 Stateless Address Autoconfiguration".
- [30] IETF RFC 2002 (1996), C. Perkins: "IP Mobility Support".
- [31] IETF RFC 2486 (1999), B. Aboba and M. Beadles: "The Network Access Identifier".
- [32] IETF RFC1112 (1989), S.E. Deering: "Host extensions for IP multicasting".
- [33] IETF RFC2236 (1997), W. Fenner: "Internet Group Management Protocol, Version 2".
- [34] IETF RFC2362 (1998), D. Estrin and al: "Protocol Independent Multicast-Sparse Mode (PIM-SM)".
- [35] IETF RFC1075 (1988), D. Waitzman and al: "Distance Vector Multicast Routing Protocol".
- [36] IETF RFC1585 (1994), J. Moy: "MOSPF"..
- [37] IETF RFC2290 (1998), J. Solomon, S. Glass: "Mobile-IPv4 Configuration Option for PPP IPCP".
- [38] IETF RFC2865 (2000), C. Rigney, S. Willens, A. Rubens, W. Simpson: "Remote Authentication Dial In User Service (RADIUS)".
- [39] IETF RFC2866 (2000), C. Rigney, Livingston: " RADIUS Accounting ".
- [40] 3GPP TS 23.003: "3rd Generation Partnership Project; Technical Specification Group Core Network; Numbering, addressing and identification".

16 Usage of RADIUS on Gi interface

A GGSN may, on a per APN basis, use RADIUS authentication to authenticate a user and RADIUS accounting to provide information to an AAA (Authentication, Authorization and Accounting) server.

16.1 RADIUS Authentication

RADIUS Authentication shall be used according to RFC2865 [38].

The RADIUS client function may reside in a GGSN. When the GGSN receives a Create PDP Context request message the RADIUS client function may send the authentication information to an authentication server, which is identified during the APN provisioning.

The authentication server checks that the user can be accepted. The response (when positive) may contain network information, such as an IP address for the user.

The information delivered during the Radius authentication can be used to automatically correlate the users identity (the MSISDN or IMSI) to the IP-address, assigned/confirmed by the GGSN or the authentication server respectively. The same procedure applies, in case of sending the authentication to a 'proxy' authentication server.

RADIUS Authentication is only applicable to the primary PDP context. When the GGSN receives an Access-Accept message from the authentication server it shall complete the PDP context activation procedure. If Access-Reject or no response is received, the GGSN shall reject the PDP Context Activation attempt with a suitable cause code, e.g. User Authentication failed.

16.2 RADIUS Accounting

RADIUS Accounting shall be used according to RFC 2866 [39].

The RADIUS accounting client function may reside in a GGSN. The RADIUS accounting client may send information to an accounting server, which is identified during the APN provisioning. The accounting server may store this information and use it to automatically identify the user. This information can be trusted because the GPRS network has authenticated the subscriber (i.e. SIM card and possibly other authentication methods).

RADIUS Accounting-Request Start and Stop messages may be used during both primary and secondary PDP context activation and deactivation procedures respectively.

The use of Accounting-Request STOP and in addition the Accounting ON and Accounting OFF messages may be used to ensure that information stored in the accounting server is synchronised with the GGSN information.

If the AAA server is used for IP address assignment, then, upon reception of a RADIUS Accounting-Request STOP message for all PDP contexts associated to a session defined by APN and IMSI or MSISDN, the AAA server may make the associated IP address available for assignment.

In order to avoid race conditions, the GGSN shall include a 3GPP Vendor-Specific sub-attribute "Session Stop indicator" when it sends the Accounting-Request STOP for the last PDP context of a PDP session and the PDP session is terminated (i.e. the IP address and all GTP tunnels can be released). The AAA server shall not assume the PDP session terminated until an Accounting-Request STOP with the Session Stop indicator is received.

16.3 Authentication and accounting message flows

16.3.1 IP PDP type

The figure [below-14](#) represents the RADIUS message flows between a GGSN and an Authentication, Authorization and Accounting (AAA) server.

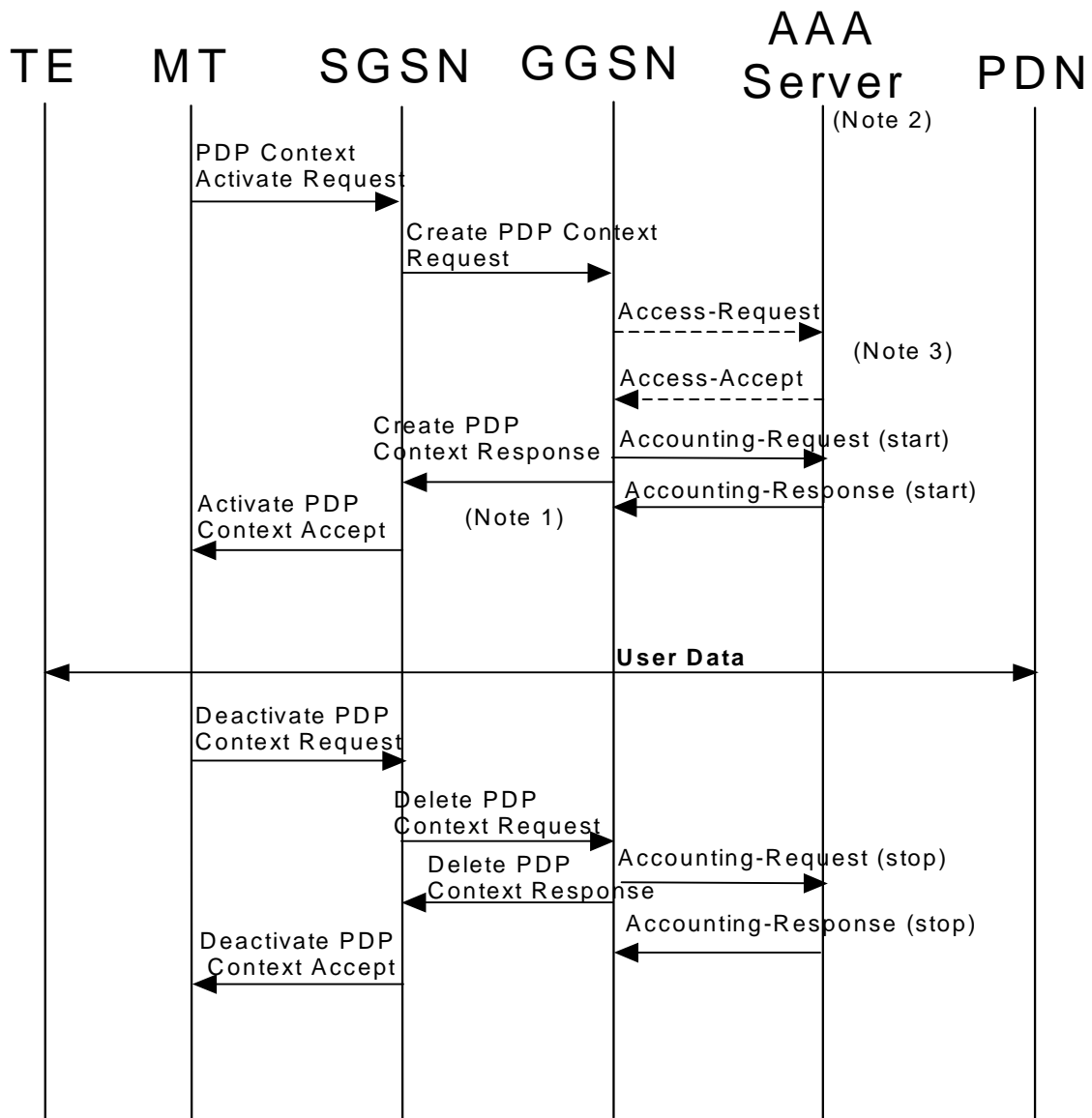


Figure 1: RADIUS message flow for PDP type IP (successful user authentication case)

NOTE 1: If some external applications require RADIUS Accounting request (Start) information before they can process user packets, then the selected APN (GGSN) may be configured in such a way that the GGSN drops user data until the Accounting Response (START) is received from the AAA server. Both Authentication and Accounting servers may be optional and separately configured for each APN.

NOTE 2: Separate accounting and authentication servers may be used.

NOTE 3: The Access-Request message shall be used for primary PDP context only.

Figure 14: RADIUS message flow for PDP type IP (successful user authentication case)

When a GGSN receives a Create PDP Context Request message for a given APN, the GGSN may (depending on the configuration for this APN) send a RADIUS Access-Request to an AAA server. The AAA server authenticates and authorizes the user. If RADIUS is also responsible for IP address allocation the AAA server shall return the allocated IP address in the Access-Accept message.

Even if the GGSN was not involved in user authentication (e.g. transparent network access mode), it may send a RADIUS Accounting-Request START message to an AAA server. This message contains parameters, e.g. the tuple which includes the user-id and IP address, to be used by application servers (e.g. WAP gateway) in order to identify the user. This message also indicates to the AAA server that the user session has started. User data forwarding at the GGSN

may not be allowed before the Accounting Response START is received. If this is the case, the GGSN drops user data until the Accounting Response START is received. This is configurable per APN.

When the GGSN receives a Delete PDP Context Request message and providing a RADIUS Accounting-Request START message was sent previously, the GGSN shall send a RADIUS Accounting-Request STOP message to the AAA server, which indicates the termination of this particular user session. The GGSN shall immediately send a Delete PDP context response, without waiting for an Accounting-Response STOP message from the AAA server.

~~NOTE:~~ The AAA server shall deallocate the IP address (if any) initially allocated to the subscriber, if there is no session for the subscriber.

Accounting-Request ON and Accounting-Request OFF messages may be sent from the GGSN to the AAA server to ensure the correct synchronization of the session information in the GGSN and the AAA server.

The GGSN may send an Accounting-Request ON message to the AAA server to indicate that a restart has occurred. The AAA server may then release the associated resources.

Prior to a scheduled restart, the GGSN may send Accounting-Request OFF message to the AAA server. The AAA server may then release the associated resources.

If an Access-Challenge is sent to the GGSN when an Access-Request message is pending and when IP PDP type is used, the GGSN shall silently discard the Access-Challenge message and it shall treat an Access-Challenge as though it had received an Access-Reject instead [38].

16.3.2 PPP PDP type

The figure [below15](#) describes the RADIUS message flows between a GGSN and an Authentication, Authorization and Accounting (AAA) server for the case where PPP is terminated at the GGSN. The case where PPP is relayed to an LNS is beyond the scope of this specification.

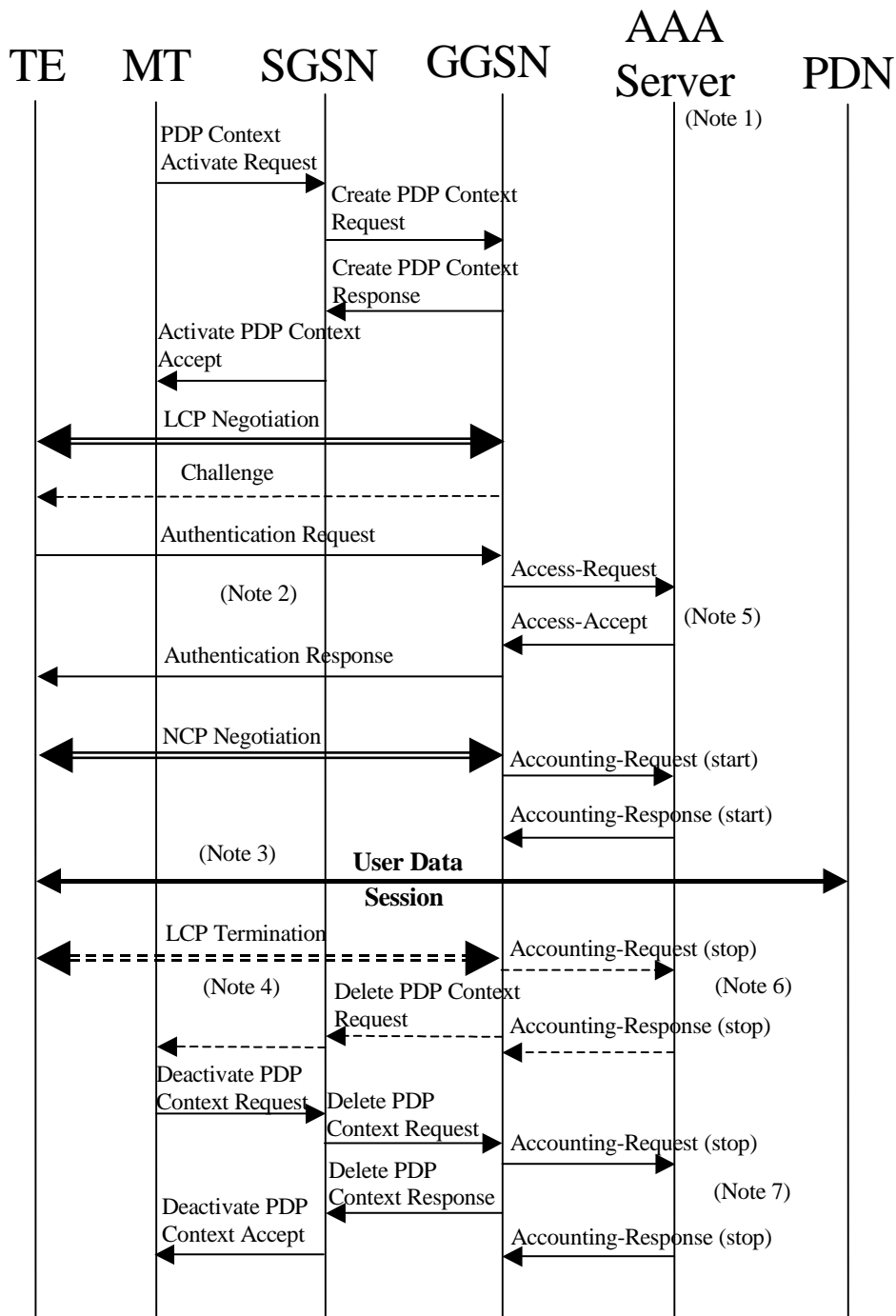


Figure 2: RADIUS message flow for PDP type PPP (successful user authentication case)

NOTE 1: Separate accounting and Authentication servers may be used.

NOTE 2: Actual messages depend on the used authentication protocol (e.g. PAP, CHAP)

NOTE 3: User data may not be allowed before the Accounting Response (START) is received. If this is the case, the GGSN drops user data until the Accounting Response (START) is received.

NOTE 4: An LCP termination procedure may be performed. Either the MS or the GGSN may initiate the context deactivation.

NOTE 5: The Access-Request message shall be used for primary PDP context only.

NOTE 6: Network Initiated deactivation

NOTE 7: User Initiated deactivation

Figure 15: RADIUS message flow for PDP type PPP (successful user authentication case)

When a GGSN receives a Create PDP Context Request message for a given APN, the GGSN shall immediately send a Create PDP context response back to the SGSN. After PPP link setup, the authentication phase may take place. During Authentication phase, the GGSN sends a RADIUS Access-Request to an AAA server. The AAA server authenticates and authorizes the user. If RADIUS is also responsible for IP address allocation the AAA server shall return the allocated IP address in the Access-Accept message (if the user was authenticated).

If the user is not authenticated, the GGSN shall send a Delete PDP context request to the SGSN.

Even if the GGSN was not involved in user authentication (e.g. for PPP no authentication may be selected), it may send a RADIUS Accounting-Request START message to an AAA server. This message contains parameters, e.g. a tuple which includes the user-id and IP address, to be used by application servers (e.g. WAP gateway) in order to identify the user. This message also indicates to the AAA server that the user session has started, and the QoS parameters associated to the session.

User data forwarding at the GGSN may not be allowed before the Accounting Response START is received. If this is the case, the GGSN drops user data until the Accounting Response START is received. This is configurable per APN.

When the GGSN receives a Delete PDP Context Request message and providing a RADIUS Accounting-Request START message was sent previously, the GGSN shall send a RADIUS Accounting-Request STOP message to the AAA server, which indicates the termination of this particular user session. The GGSN shall immediately send a Delete PDP context response, without waiting for an Accounting-Response STOP message from the AAA server.

~~NOTE:~~ The AAA server shall deallocate the IP address (if any) initially allocated to the subscriber.

Accounting-Request ON and Accounting-Request OFF messages may be sent from the GGSN to the AAA server to ensure the correct synchronization of the session information in the GGSN and the AAA server.

The GGSN may send an Accounting-Request ON message to the AAA server to indicate that a restart has occurred. The AAA server may then release the associated resources.

Prior to a scheduled restart, the GGSN may send Accounting-Request OFF message to the AAA server, the AAA server may then release the associated resources.

If an Access-Challenge is sent to the GGSN when using PPP PDP type, the GGSN shall handle it by PPP CHAP providing PPP CHAP was the selected Authentication protocol. If CHAP authentication was not selected, authentication shall fail [38].

16.4 List of RADIUS attributes

The following tables describe the actual content of the RADIUS messages exchanged between the GGSN and the AAA server. Other RADIUS attributes may be used as defined in RADIUS RFC(s). Unless otherwise stated, when the encoding scheme of an attribute is specified as UTF-8 encoding, this shall be interpreted as UTF-8 hexadecimal encoding.

~~The following notes are applicable to the sub-clauses of section 16.4~~

~~NOTE 1: Must be present if PAP is used.~~

~~NOTE 2: Must be present if CHAP is used.~~

~~NOTE 3: Either NAS-IP-Address or NAS-Identifier shall be present.~~

~~NOTE 4: The presence of this attribute is conditional upon this attribute being received in the Access-Accept message~~

16.4.1 Access-Request message (sent from the GGSN to AAA server)

The table below describes the attributes of the Access-Request message.

Table 1: The attributes of the Access-Request message

Attr #	Attribute Name	Description	Content	Presence Requirement
1	User-Name	Username is provided by the user (extracted from the Protocol Configuration Options (PCO) field of the Create PDP Context Request message) or PPP authentication phase (if PPP PDP type is used). If no username is available a generic username, configurable on a per APN basis, shall be present.	String	Mandatory
2	User-Password	User password provided by the user if PAP is used (extracted from the PCO field of the Create PDP Context Request message) or PPP authentication phase (if PPP PDP type is used). If no password is available a generic password, configurable on a per APN basis, shall be present.	String	Conditional Note 1
3	CHAP-Password	User password provided by the user if CHAP is used (extracted from the PCO field of the Create PDP Context Request message) or PPP authentication phase (if PPP PDP type is used).	String	Conditional Note 2
4	NAS-IP-Address	IP address of the GGSN for communication with the AAA server.	IPv4	Conditional Note 3
32	NAS-Identifier	Hostname of the GGSN for communication with the AAA server.	String	Conditional Note 3
6	Service-Type	Indicates the type of service for this user	Framed	Optional
7	Framed-Protocol	Indicates the type of protocol for this user	7 (GPRS PDP Context)	Optional
8	Framed-IP-Address	IP address allocated for this user	IPv4	Conditional
9	Framed-IP-Netmask	Netmask for the user IP address	IPv4	Conditional
30	Called-Station-Id	Identifier for the target network	APN (UTF-8 encoded)	Mandatory
31	Calling-Station-Id	Identifier for the MS	MSISDN in international format according to 3GPP TS 23.003, UTF-8 encoded decimal. Note that there are no leading characters in front of the country code.	Mandatory
60	CHAP-Challenge	Challenge if CHAP is used (extracted from the PCO field of the Create PDP Context Request message) or PPP authentication phase (if PPP PDP type is used).	String	Conditional Note 2
61	NAS-Port-Type	Port type for the GGSN	As per RFC 2865	Optional
26/10415	3GPP Vendor-Specific	Sub-attributes according sub-clause 16.4.7	See sub-clause 16.4.7	Optional except sub-attribute 3 which is conditional
<p>NOTE 1: Shall be present if PAP is used.</p> <p>NOTE 2: Shall be present if CHAP is used.</p> <p>NOTE 3: Either NAS-IP-Address or NAS-Identifier shall be present.</p>				

16.4.2 Access-Accept (sent from AAA server to GGSN)

The table below describes the attributes of the Access-Accept message.

Table 2: The attributes of the Access-Accept message

Attr #	Attribute Name	Description	Content	Presence Requirement
1	User-Name	Username received in the Access-Request message or a substitute username provided by the AAA server. If the User-Name has been received in the Access-Accept message, this user-name shall be used in preference to the above	String	Optional
6	Service-Type	Indicates the type of service for this user	Framed	Optional
7	Framed-Protocol	Indicates the type of protocol for this user	7 (GPRS PDP Context)	Optional
8	Framed-IP-Address	IP address allocated for this user, if the AAA server is used to allocate IP address.	IPv4	Conditional
9	Framed-IP-Netmask	Netmask for the user IP address, if the AAA server is used to allocate IP netmask.	IPv4	Conditional
12	Framed-IP-MTU	MTU for the user towards this particular APN, MTU shall be less or equal to 1500	String	Optional
25	Class	Identifier to be used in all subsequent accounting messages.	String	Optional (NOTE 4)
27	Session-Timeout	Indicates the timeout value (in seconds) for the user session	32 bit unsigned Integer	Optional
28	Idle-Timeout	Indicates the timeout value (in seconds) for idle user session	32 bit unsigned Integer	Optional
26/311	MS- primary-DNS-server	Contains the primary DNS server address for this APN	Ipv4	Optional
26/311	MS-Secondary-DNS-Server	Contains the secondary DNS server address for this APN	IPv4	Optional
26/311	MS-Primary-NBNS-Server	Contains the primary NetBios name server address for this APN	IPv4	Optional
26/311	MS-Secondary-NBNS-Server	Contains the secondary NetBios server address for this APN	IPv4	Optional
NOTE 4: The presence of this attribute is conditional upon this attribute being received in the Access-Accept message				

16.4.3 Accounting-Request START (sent from GGSN to AAA server)

The table [below](#) describes the attributes of the Accounting-Request START message.

Table 3: The attributes of the Accounting-Request START message

Attr #	Attribute Name	Description	Content	Presence Requirement
1	User-Name	Username provided by the user (extracted from the PCO field of the Create PDP Context Request message) or PPP authentication phase (if PPP PDP type is used). If no username is available a generic username, configurable on a per APN basis, shall be present. If the User-Name has been received in the Access-Accept message, this user-name shall be used in preference to the above	String	Optional
4	NAS-IP-Address	GGSN IP address for communication with the AAA server.	IPv4	Conditional Note 3
32	NAS-Identifier	Hostname of the GGSN for communication with the AAA server.	String	Conditional Note 3
6	Service-Type	Indicates the type of service for this user	Framed	Optional
7	Framed Protocol	Indicates the type of protocol for this user	7 (GPRS PDP Context)	Optional
8	Framed-IP-Address	User IP address	IPv4	Mandatory
25	Class	Received in the access accept	String	Conditional (NOTE 4)
30	Called-Station-Id	Identifier for the target network	APN (UTF-8 encoded)	Mandatory
31	Calling-Station-Id	Identifier for the MS	MSISDN in international format according to 3GPP TS 23.003, UTF-8 encoded decimal. Note that there are no leading characters in front of the country code.	Mandatory
40	Acct-Status-Type	Type of accounting message	START	Mandatory
41	Acct-Delay-Time	Indicates how many seconds the GGSN has been trying to send this record for, and can be subtracted from the time of arrival on the AAA server to find the approximate time (in seconds) of the event generating this Accounting-Request.	32 unsigned integer	Optional
44	Acct-Session-Id	User session identifier.	GGSN IP address and Charging-ID concatenated in a UTF-8 encoded hexadecimal. NOTE: The GGSN IP address is the same as that used in the GCDRs.	Mandatory
45	Acct-Authentic	Authentication method	RADIUS or LOCAL	Optional
61	NAS-Port-Type	Port type for the GGSN	As per RFC 2865	Optional
26/10415	3GPP Vendor-Specific	Sub-attributes according sub-clause 16.4.7.	See sub-clause 16.4.7	Optional except sub-attribute 3 which is conditional

NOTE 3: Either NAS-IP-Address or NAS-Identifier shall be present.

NOTE 4: The presence of this attribute is conditional upon this attribute being received in the Access-Accept message

16.4.4 Accounting Request STOP (sent from GGSN to AAA server)

The table [below](#) describes the attributes of the Accounting-Request STOP message.

Table 4: The attributes of the Accounting-Request STOP message

Attr #	Attribute Name	Description	Content	Presence Requirement
1	User-Name	Username provided by the user (extracted from the PCO field of the Create PDP Context Request message) or PPP authentication phase (if PPP PDP type is used). If no username is available a generic username, configurable on a per APN basis, shall be present. If the User-Name has been received in the Access-Accept message, this user-name shall be used in preference to the above	String	Optional
4	NAS-IP-Address	IP address of the GGSN for communication with the AAA server.	IPv4	Conditional Note 3
32	NAS-Identifier	Hostname of the GGSN for communication with the AAA server.	String	Conditional Note 3
6	Service-Type	Indicates the type of service for this user	Framed	Optional
7	Framed Protocol	Indicates the type of protocol for this user	7 (GPRS PDP Context)	Optional
8	Framed-IP-Address	User IP address	IPv4	Mandatory
25	Class	Received in the access accept	String	Optional (NOTE 4)
30	Called-Station-Id	Identifier for the target network	APN (UTF-8 encoded)	Mandatory
31	Calling-Station-Id	Identifier for the MS	MSISDN in international format according to 3GPP TS 23.003, UTF-8 encoded. Note that there are no leading characters in front of the country code.	Mandatory
40	Acct-Status-Type	Indicates the type of accounting request	STOP	Mandatory
41	Acct-Delay-Time	Indicates how many seconds the GGSN has been trying to send this record for, and can be subtracted from the time of arrival on the AAA server to find the approximate time of the event generating this Accounting-Request	Second	Optional
42	Acct-Input-Octets	GGSN counted number of octets sent by the user for the PDP context	32 bit unsigned integer	Optional
43	Acct-Output-Octets	GGSN counted number of octets received by the user for the PDP context	32 bit unsigned integer	Optional
44	Acct-Session-Id	User session identifier.	GGSN IP address and Charging-ID concatenated in a UTF-8 encoded hexadecimal. NOTE: The GGSN IP address is the same as that used in the GCDRs.	Mandatory
45	Acct-Authentic	Authentication method	RADIUS or LOCAL	Optional
46	Acct-Session-Time	Duration of the session	Second	Optional
47	Acct-Input-Packets	GGSN counted number of packets sent by the user	Packet	Optional
48	Acct-Output-Packets	GGSN counted number of packets received by the user	Packet	Optional
49	Acct-Terminate-	Indicate how the session was terminated	See RFC 2866	Optional

	Cause				
61	NAS-Port-Type	Port type for the GGSN	As per RFC 2865	Optional	
26/10415	3GPP Vendor-Specific	Sub-attributes according to sub-clause 16.4.7.	See sub-clause 16.4.7	Optional except sub-attribute 3 which is conditional	
<p>NOTE 3: Either NAS-IP-Address or NAS-Identifier shall be present.</p> <p>NOTE 4: The presence of this attribute is conditional upon this attribute being received in the Access-Accept message</p>					

16.4.5 Accounting Request ON (optionally sent from GGSN to AAA server)

The table below⁵ describes the attributes of the Accounting-Request ON message.

Table 5: The attributes of the Accounting-Request ON message

Attr #	Attribute Name	Description	Content	Presence Requirement
4	NAS-IP-Address	IP address of the GGSN for communication with the AAA server.	IPv4	Conditional Note 3
30	Called-Station-ID	Identifier for the target network.	APN (UTF-8 encoded)	Optional
32	NAS-Identifier	Hostname of the GGSN for communication with the AAA server.	String	Conditional Note 3
NOTE 3: Either NAS-IP-Address or NAS-Identifier shall be present.				

16.4.6 Accounting Request OFF (optionally sent from GGSN to AAA server)

The table below⁶ describes the attributes of the Accounting-Request OFF message.

Table 6: The attributes of the Accounting-Request OFF message

Attr #	Attribute Name	Description	Content	Presence Requirement
4	NAS-IP-Address	IP address of the GGSN for communication with the AAA server.	IPv4	Conditional Note 3
30	Called-Station-ID	Identifier for the target network.	APN (UTF-8 encoded)	Optional
32	NAS-Identifier	Hostname of the GGSN for communication with the AAA server.	String	Conditional Note 3
NOTE 3: Either NAS-IP-Address or NAS-Identifier shall be present.				

16.4.7 Sub-attributes of the 3GPP Vendor-Specific attribute

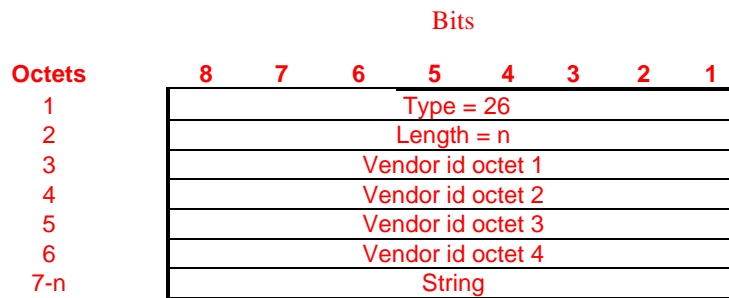
The table below describes the sub-attributes of the 3GPP Vendor-Specific attribute of the Access-Request, Accounting-Request START and Accounting-Request STOP message.

Table 7: The sub-attributes of the 3GPP Vendor-Specific attribute of the Access-Request, Accounting-Request START and Accounting-Request STOP message

Sub-attr #	Sub-attribute Name	Description	Presence Requirement	Associated attribute (Location of Sub-attr)
1	3GPP-IMSI	IMSI for this user	Optional	Access-Request, Accounting-Request START
2	3GPP-Charging-Id	Charging ID for this PDP Context (this together with the GGSN-Address constitutes a unique identifier for the PDP context).	Optional	Access-Request, Accounting-Request START
3	3GPP-PDP Type	Type of PDP context, e.g. IP or PPP	Conditional (mandatory if attribute 7 is present)	Access-Request
4	3GPP-CG-Address	Charging Gateway IP address	Optional	Access-Request, Accounting-Request START
5	3GPP-GPRS-QoS-Profile	QoS profile received	Optional	Access-Request, Accounting-Request START
6	3GPP-SGSN-Address	SGSN IP address that is used by the GTP control plane for the handling of control messages. It may be used to identify the PLMN to which the user is attached.	Optional	Access-Request, Accounting-Request START
7	3GPP-GGSN-Address	GGSN IP address that is used by the GTP control plane for the context establishment. It is the same as the GGSN IP address used in the GCDRs.	Optional	Access-Request, Accounting-Request START
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
9	3GPP-GGSN- MCC-MNC	MCC-MNC of the network the GGSN belongs to.	Optional	Access-Request, Accounting-Request START
10	3GPP-NSAPI	Identifies a particular PDP context for the associated PDN and MSISDN/IMSI from creation to deletion.	Optional	Access-Request, Accounting-Request START, Access-Request STOP
11	3GPP- Session-Stop-Indicator	Indicateds to the AAA server that the last PDP context of a session is released and that	Optional	Accounting Request STOP

		the PDP session has been terminated.		
12	3GPP- Selection-Mode	Contains the Selection mode for this PDP Context received in the Create PDP Context Request Message	Optional	Access-Request, Accounting-Request START
13	3GPP-Charging-Characteristics	Contains the charging characteristics for this PDP Context received in the Create PDP Context Request Message (only available in R99 and later releases)	Optional	Access-Request, Accounting-Request START

The RADIUS vendor Attribute is encoded as follows (as per RFC 2865)



n>=7

3GPP Vendor Id = 10415

The string part is encoded as follows:



m>=2 and m<= 248

The 3GPP specific attributes encoding is clarified below.

1 - 3GPP-IMSI

Octets	Bits							
	8	7	6	5	4	3	2	1
1	3GPP type = 1							
2	3GPP Length= 15							
3	IMSI digit1 (UTF-8 encoded)							
4	IMSI digit2 (UTF-8 encoded)							
5	IMSI digit3 (UTF-8 encoded)							
6	IMSI digit4 (UTF-8 encoded)							
7	IMSI digit5 (UTF-8 encoded)							
8	IMSI digit6 (UTF-8 encoded)							
9-15	IMSI digits 7-15 (UTF-8 encoded)							

3GPP Type: 1

Length: L =17

IMSI value: Text:

This is the UTF-8 encoded IMSI; If the MNC is only 2 digits (e.g. MNC = 78), its encoding shall be with a leading '0', (e.g. "078").

2 - 3GPP-Charging ID

Octets	Bits							
	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

Octets	Bits							
	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

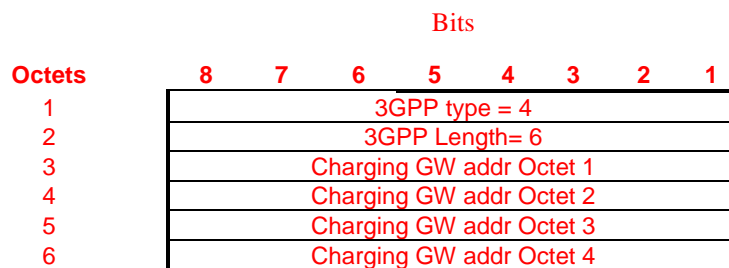
PDP type value: Unsigned 32 bits integer

PDP type octet possible values:

0 = IP

1 = PPP

4 - 3GPP-Charging Gateway address

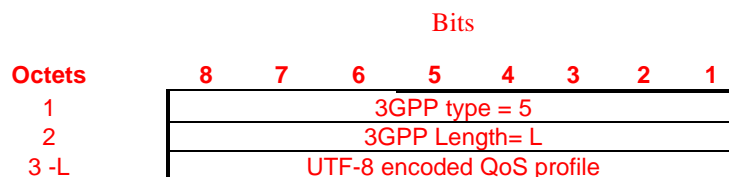


3GPP Type: 4

Length: 6

Charging GW address value: Address

5 - 3GPP-GPRS QoS profile



3GPP Type: 5

Length: 24 (release 99) or 8 (release 98)

QoS profile value: Text

UTF-8 encoded QoS profile syntax:

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

<Release indicator> = UTF-8 encoded number :

“98” = Release 98

“99”= Release 99

<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 digits, defining its hexadecimal representation. The QoS profile definition is in 3G TS 24.008

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

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

6 - 3GPP-SGSN address

Octets	Bits							
	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

7 - 3GPP-GGSN address

Octets	Bits							
	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

8 - 3GPP-IMSI MCC-MNC

Bits

Octets	8	7	6	5	4	3	2	1
1	3GPP type = 8							
2	3GPP Length= 8							
3	MCC digit1 (UTF-8 encoded)							
4	MCC digit2 (UTF-8 encoded)							
5	MCC digit3 (UTF-8 encoded)							
6	MNC digit1 (UTF-8 encoded)							
7	MNC digit2 (UTF-8 encoded)							
8	MNC digit3 (UTF-8 encoded)							

3GPP Type: 8

Length: 8

MS address value: text

This is the UTF-8 encoding of the MS MCC-MNC values. If the MNC is only 2 digits (e.g. MNC = 78), its encoding shall be with a leading '0', (e.g. "078").

9 - 3GPP-GGSN MCC-MNC

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

3GPP Type: 9

Length: 8

GGSN address value: text

This is the UTF-8 encoding of the GGSN MCC-MNC values. If the MNC is only 2 digits (e.g. MNC = 78), its encoding shall be with a leading '0', (e.g. "078").

10 - 3GPP-NSAPI

	Bits							
Octets	8	7	6	5	4	3	2	1
1	3GPP type = 10							
2	3GPP Length= 6							
3	NSAPI							

3GPP Type: 10

Length: 3

NSAPI value: text

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 UTF-8 encoded digit.

11 - 3GPP-Session Stop Indicator

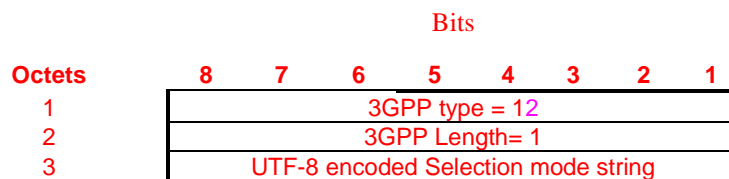


3GPP Type: 11

Length: 2

There is no value field for this Vendor Specific Attribute.

12 - 3GPP-Selection-Mode



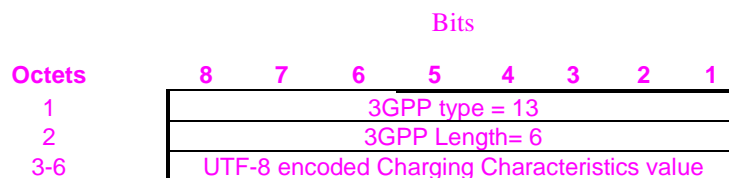
3GPP Type: 12

Length: 3

Selection mode value: Text

The format of this attribute shall be a character string consisting of a single digit, mapping from the binary value of the selection mode in the Create PDP Context message [24]. Where TS 29.060 provides for interpretation of the value, e.g. map '3' to '2', this shall be done by the GGSN.

13 - 3GPP-Charging-Characteristics



3GPP Type: 13

Length: 6

Charging characteristics value: Text

The charging characteristics is value is the value of the 2 octets value field taken from the GTP IE described in 29.060section 7.7.23.

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

CR-Form-v4

CHANGE REQUEST

⌘ **29.061 CR 021** ⌘ ev **5** ⌘ Current version: **4.1.0** ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

Proposed change affects: ⌘ (U)SIM ME/UE Radio Access Network Core Network

Title: ⌘ Standard method for information delivery (MSISDN; IP address...) between GPRS and external PDN using RADIUS

Source: ⌘ CN3

Work item code: ⌘ GPRS

Date: ⌘ 20.09.2001

Category: ⌘ **A**

Release: ⌘ REL4

Use one of the following categories:

Use one of the following releases:

F (correction)

2 (GSM Phase 2)

A (corresponds to a correction in an earlier release)

R96 (Release 1996)

B (addition of feature),

R97 (Release 1997)

C (functional modification of feature)

R98 (Release 1998)

D (editorial modification)

R99 (Release 1999)

Detailed explanations of the above categories can be found in 3GPP [TR 21.900](#).

REL-4 (Release 4)

REL-5 (Release 5)

Reason for change: ⌘ The MMS group (3GPP TSG T2 SWG3) found out a problem described in a LS resulted from the T2 MMS adhoc meeting (T2M010093/N3-010310) that „there is no standardised solution for a GGSN to deliver a mobile user’s identity forward to e.g. a WAP Gateway or a MMS Relay/Server”. In addition, other application servers also need this mapping: for example to charge a WAP session, dynamic IP address is not enough and MSISDN (or IMSI) is needed.
 This problem requires a simple solution to be quickly standardised to avoid the development of incompatible proprietary solutions. So this issue should be solved as soon as possible, in 3GPP REL4 and earlier releases specifications. This CR proposes a simple and generic solution to this problem based on existing IETF standards: Using RADIUS Accounting to provide this mapping to e.g. a WAP Gateway or a MMS Relay/Server.

The CR also takes the opportunity to clarify the use of RADIUS authentication already mentioned in 29.061, and add recommendations on how to carry other information with RADIUS.

Summary of change: ⌘ This CR proposes to use RADIUS Accounting to provide the MSISDN/IP address mapping on Gi interface (to e.g. a WAP Gateway or a MMS Relay/Server).

Consequences if not approved: ⌘ Mutually incompatible proprietary solutions will be developed.

Clauses affected: ⌘ 2; 16 (a new clause)

Other specs affected: ⌘ Other core specifications ⌘
 Test specifications
 O&M Specifications

Other comments: ⌘

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

- 1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.
- 2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under <ftp://ftp.3gpp.org/specs/> For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.
- 3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

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.

- [1] 3GPP TS 01.04: "Digital cellular telecommunication system (Phase 2+); Abbreviations and acronyms".
- [2] 3GPP TS 22.060: "3rd Generation Partnership Project: Technical Specification Group Services and System Aspects; General Packet Radio Service (GPRS): Stage 1 Service Description".
- [3] 3GPP TS 23.060: "3rd Generation Partnership Project: Technical Specification Services and System Aspects; General Packet Radio Service (GPRS); Service Description Stage 2".
- [4] 3GPP TS 03.61: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Point to Multipoint Multicast Service Description; Stage 2".
- [5] 3GPP TS 03.62: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Point to Multipoint Group Call Service Description; Stage 2".
- [6] 3GPP TS 03.64: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Overall description of the Radio interface; Stage 2".
- [7] 3GPP TS 04.60: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Mobile Station (MS) - Base Station System (BSS) interface; Radio Link Control / Medium Access Control (RLC/MAC) protocol".
- [8] 3GPP TS 04.64: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Logical Link Control (LLC)".
- [9] 3GPP TS 24.065: "3rd Generation Partnership Project: Technical Specification Group Core Network; General Packet Radio Service (GPRS); Mobile Station (MS) - Serving GPRS Support Node(SGSN); Subnetwork Dependent Convergence Protocol (SNDTCP)".
- [10] 3GPP TS 27.060: "3rd Generation Partnership Project: Technical Specification Group Core Network; Packet Domain; Mobile Station (MS) supporting Packet Switched Services".
- [11] ITU-T Recommendation E.164: "Numbering plan for the ISDN era".
- [12] <VOID>
- [13] <VOID>
- [14] <VOID>
- [15] IETF RFC 768 (1980): "User Datagram Protocol" (STD 6).
- [16] IETF RFC 791 (1981): "Internet Protocol" (STD 5).
- [17] IETF RFC 792 (1981): "Internet Control Message Protocol" (STD 5).
- [18] IETF RFC 793 (1981): "Transmission Control Protocol" (STD 7).
- [19] IETF RFC 1034 (1987): "Domain Names - Concepts and Facilities" (STD 7).
- [20] <VOID>
- [21] IETF RFC 1661 and 1662 (1994): "The Point-to-Point Protocol (PPP)" (STD 51).

- [22] IETF RFC 1700 (1994): "Assigned Numbers" (STD 2).3.
- [23] UMTS 24.008: "Mobile radio interface layer 3 specification; Core Network Protocols – Stage 3".
- [24] UMTS 29.060: "General Packet Radio Service (GPRS); GPRS Tunnelling Protocol (GTP) across the Gn and Gp Interface".
- [25] IETF RFC2794 (2000), Pat R. Calhoun and Charles E. Perkins: "Mobile IP Network Address Identifier Extension for IPv4", March 2000.
- [26] IETF RFC 2131 (1997): "Dynamic Host Configuration Protocol".
- [27] IETF RFC 1542 (1993): "Clarification and Extensions for the Bootstrap Protocol".
- [28] IETF RFC2373 (1998): "IP version 6 Addressing Architecture".
- [29] IETF RFC 2462 (1998): "IPv6 Stateless Address Autoconfiguration".
- [30] IETF RFC 2002 (1996), C. Perkins: "IP Mobility Support".
- [31] IETF RFC 2486 (1999), B. Aboba and M. Beadles: "The Network Access Identifier".
- [32] IETF RFC1112 (1989), S.E. Deering: "Host extensions for IP multicasting".
- [33] IETF RFC2236 (1997), W. Fenner: "Internet Group Management Protocol, Version 2".
- [34] IETF RFC2362 (1998), D. Estrin and al: "Protocol Independent Multicast-Sparse Mode (PIM-SM)".
- [35] IETF RFC1075 (1988), D. Waitzman and al: "Distance Vector Multicast Routing Protocol".
- [36] IETF RFC1585 (1994), J. Moy: "MOSPF"..
- [37] IETF RFC2290 (1998), J. Solomon, S. Glass: "Mobile-IPv4 Configuration Option for PPP IPCP".
- [38] IETF RFC2865 (2000), C. Rigney, S. Willens, A. Rubens, W. Simpson: "Remote Authentication Dial In User Service (RADIUS)".
- [39] IETF RFC2866 (2000), C. Rigney, Livingston: " RADIUS Accounting ".
- [40] 3GPP TS 23.003: "3rd Generation Partnership Project; Technical Specification Group Core Network; Numbering, addressing and identification".

16 Usage of RADIUS on Gi interface

A GGSN may, on a per APN basis, use RADIUS authentication to authenticate a user and RADIUS accounting to provide information to an AAA (Authentication, Authorization and Accounting) server.

16.1 RADIUS Authentication

RADIUS Authentication shall be used according to RFC2865 [38].

The RADIUS client function may reside in a GGSN. When the GGSN receives a Create PDP Context request message the RADIUS client function may send the authentication information to an authentication server, which is identified during the APN provisioning.

The authentication server checks that the user can be accepted. The response (when positive) may contain network information, such as an IP address for the user.

The information delivered during the Radius authentication can be used to automatically correlate the users identity (the MSISDN or IMSI) to the IP-address, assigned/confirmed by the GGSN or the authentication server respectively. The same procedure applies, in case of sending the authentication to a 'proxy' authentication server.

RADIUS Authentication is only applicable to the primary PDP context. When the GGSN receives an Access-Accept message from the authentication server it shall complete the PDP context activation procedure. If Access-Reject or no response is received, the GGSN shall reject the PDP Context Activation attempt with a suitable cause code, e.g. User Authentication failed.

16.2 RADIUS Accounting

RADIUS Accounting shall be used according to RFC 2866 [39].

The RADIUS accounting client function may reside in a GGSN. The RADIUS accounting client may send information to an accounting server, which is identified during the APN provisioning. The accounting server may store this information and use it to automatically identify the user. This information can be trusted because the GPRS network has authenticated the subscriber (i.e. SIM card and possibly other authentication methods).

RADIUS Accounting-Request Start and Stop messages may be used during both primary and secondary PDP context activation and deactivation procedures respectively.

The use of Accounting-Request STOP and in addition the Accounting ON and Accounting OFF messages may be used to ensure that information stored in the accounting server is synchronised with the GGSN information.

If the AAA server is used for IP address assignment, then, upon reception of a RADIUS Accounting-Request STOP message for all PDP contexts associated to a session defined by APN and IMSI or MSISDN, the AAA server may make the associated IP address available for assignment.

In order to avoid race conditions, the GGSN shall include a 3GPP Vendor-Specific sub-attribute "Session Stop indicator" when it sends the Accounting-Request STOP for the last PDP context of a PDP session and the PDP session is terminated (i.e. the IP address and all GTP tunnels can be released). The AAA server shall not assume the PDP session terminated until an Accounting-Request STOP with the Session Stop indicator is received.

16.3 Authentication and accounting message flows

16.3.1 IP PDP type

The figure [below](#)14 represents the RADIUS message flows between a GGSN and an Authentication, Authorization and Accounting (AAA) server.

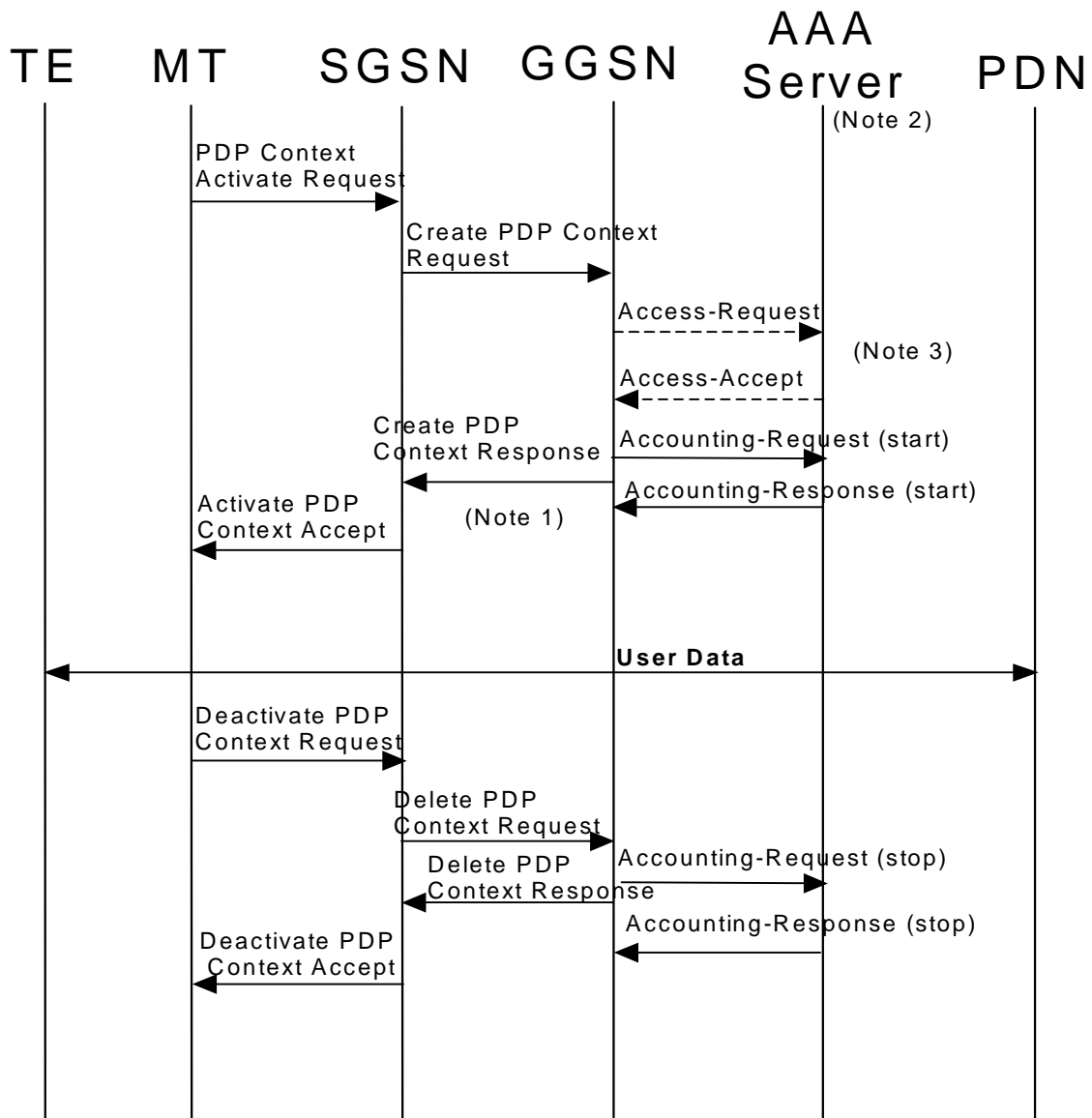


Figure 1: RADIUS message flow for PDP type IP (successful user authentication case)

NOTE 1: If some external applications require RADIUS Accounting request (Start) information before they can process user packets, then the selected APN (GGSN) may be configured in such a way that the GGSN drops user data until the Accounting Response (START) is received from the AAA server. Both Authentication and Accounting servers may be optional and separately configured for each APN.

NOTE 2: Separate accounting and authentication servers may be used.

NOTE 3: The Access-Request message shall be used for primary PDP context only.

Figure 14: RADIUS message flow for PDP type IP (successful user authentication case)

When a GGSN receives a Create PDP Context Request message for a given APN, the GGSN may (depending on the configuration for this APN) send a RADIUS Access-Request to an AAA server. The AAA server authenticates and authorizes the user. If RADIUS is also responsible for IP address allocation the AAA server shall return the allocated IP address in the Access-Accept message.

Even if the GGSN was not involved in user authentication (e.g. transparent network access mode), it may send a RADIUS Accounting-Request START message to an AAA server. This message contains parameters, e.g. the tuple which includes the user-id and IP address, to be used by application servers (e.g. WAP gateway) in order to identify the

user. This message also indicates to the AAA server that the user session has started. User data forwarding at the GGSN may not be allowed before the Accounting Response START is received. If this is the case, the GGSN drops user data until the Accounting Response START is received. This is configurable per APN.

When the GGSN receives a Delete PDP Context Request message and providing a RADIUS Accounting-Request START message was sent previously, the GGSN shall send a RADIUS Accounting-Request STOP message to the AAA server, which indicates the termination of this particular user session. The GGSN shall immediately send a Delete PDP context response, without waiting for an Accounting-Response STOP message from the AAA server.

~~NOTE:~~ The AAA server shall deallocate the IP address (if any) initially allocated to the subscriber, if there is no session for the subscriber.

Accounting-Request ON and Accounting-Request OFF messages may be sent from the GGSN to the AAA server to ensure the correct synchronization of the session information in the GGSN and the AAA server.

The GGSN may send an Accounting-Request ON message to the AAA server to indicate that a restart has occurred. The AAA server may then release the associated resources.

Prior to a scheduled restart, the GGSN may send Accounting-Request OFF message to the AAA server. The AAA server may then release the associated resources.

If an Access-Challenge is sent to the GGSN when an Access-Request message is pending and when IP PDP type is used, the GGSN shall silently discard the Access-Challenge message and it shall treat an Access-Challenge as though it had received an Access-Reject instead [38].

16.3.2 PPP PDP type

The figure [below](#)¹⁵ describes the RADIUS message flows between a GGSN and an Authentication, Authorization and Accounting (AAA) server for the case where PPP is terminated at the GGSN. The case where PPP is relayed to an LNS is beyond the scope of this specification.

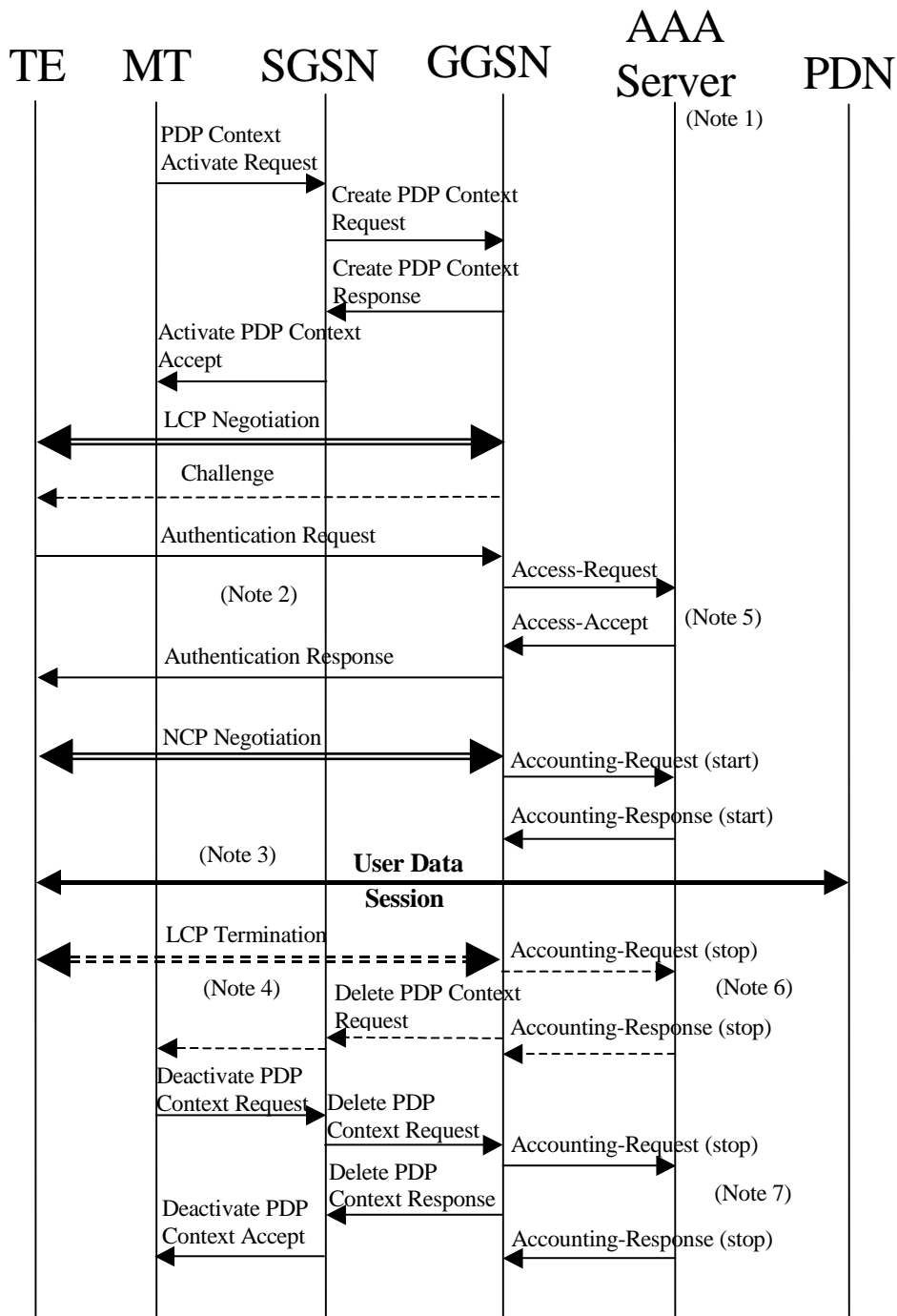


Figure 2: RADIUS message flow for PDP type PPP (successful user authentication case)

NOTE 1: Separate accounting and Authentication servers may be used.

NOTE 2: Actual messages depend on the used authentication protocol (e.g. PAP, CHAP)

NOTE 3: User data may not be allowed before the Accounting Response (START) is received. If this is the case, the GGSN drops user data until the Accounting Response (START) is received.

NOTE 4: An LCP termination procedure may be performed. Either the MS or the GGSN may initiate the context deactivation.

NOTE 5: The Access-Request message shall be used for primary PDP context only.

NOTE 6: Network Initiated deactivation

NOTE 7: User Initiated deactivation

Figure 15: RADIUS message flow for PDP type PPP (successful user authentication case)

When a GGSN receives a Create PDP Context Request message for a given APN, the GGSN shall immediately send a Create PDP context response back to the SGSN. After PPP link setup, the authentication phase may take place. During Authentication phase, the GGSN sends a RADIUS Access-Request to an AAA server. The AAA server authenticates and authorizes the user. If RADIUS is also responsible for IP address allocation the AAA server shall return the allocated IP address in the Access-Accept message (if the user was authenticated).

If the user is not authenticated, the GGSN shall send a Delete PDP context request to the SGSN.

Even if the GGSN was not involved in user authentication (e.g. for PPP no authentication may be selected), it may send a RADIUS Accounting-Request START message to an AAA server. This message contains parameters, e.g. a tuple which includes the user-id and IP address, to be used by application servers (e.g. WAP gateway) in order to identify the user. This message also indicates to the AAA server that the user session has started, and the QoS parameters associated to the session.

User data forwarding at the GGSN may not be allowed before the Accounting Response START is received. If this is the case, the GGSN drops user data until the Accounting Response START is received. This is configurable per APN.

When the GGSN receives a Delete PDP Context Request message and providing a RADIUS Accounting-Request START message was sent previously, the GGSN shall send a RADIUS Accounting-Request STOP message to the AAA server, which indicates the termination of this particular user session. The GGSN shall immediately send a Delete PDP context response, without waiting for an Accounting-Response STOP message from the AAA server.

~~NOTE:~~ The AAA server shall deallocate the IP address (if any) initially allocated to the subscriber.

Accounting-Request ON and Accounting-Request OFF messages may be sent from the GGSN to the AAA server to ensure the correct synchronization of the session information in the GGSN and the AAA server.

The GGSN may send an Accounting-Request ON message to the AAA server to indicate that a restart has occurred. The AAA server may then release the associated resources.

Prior to a scheduled restart, the GGSN may send Accounting-Request OFF message to the AAA server, the AAA server may then release the associated resources.

If an Access-Challenge is sent to the GGSN when using PPP PDP type, the GGSN shall handle it by PPP CHAP providing PPP CHAP was the selected Authentication protocol. If CHAP authentication was not selected, authentication shall fail [38].

16.4 List of RADIUS attributes

The following tables describe the actual content of the RADIUS messages exchanged between the GGSN and the AAA server. Other RADIUS attributes may be used as defined in RADIUS RFC(s). Unless otherwise stated, when the encoding scheme of an attribute is specified as UTF-8 encoding, this shall be interpreted as UTF-8 hexadecimal encoding.

~~The following notes are applicable to the sub-clauses of section 16.4~~

~~NOTE 1: Must be present if PAP is used.~~

~~NOTE 2: Must be present if CHAP is used.~~

~~NOTE 3: Either NAS IP Address or NAS Identifier shall be present.~~

~~NOTE 4: The presence of this attribute is conditional upon this attribute being received in the Access-Accept message~~

16.4.1 Access-Request message (sent from the GGSN to AAA server)

The table below describes the attributes of the Access-Request message.

Table 1: The attributes of the Access-Request message

Attr #	Attribute Name	Description	Content	Presence Requirement
1	User-Name	Username is provided by the user (extracted from the Protocol Configuration Options (PCO) field of the Create PDP Context Request message) or PPP authentication phase (if PPP PDP type is used). If no username is available a generic username, configurable on a per APN basis, shall be present.	String	Mandatory
2	User-Password	User password provided by the user if PAP is used (extracted from the PCO field of the Create PDP Context Request message) or PPP authentication phase (if PPP PDP type is used). If no password is available a generic password, configurable on a per APN basis, shall be present.	String	Conditional Note 1
3	CHAP-Password	User password provided by the user if CHAP is used (extracted from the PCO field of the Create PDP Context Request message) or PPP authentication phase (if PPP PDP type is used).	String	Conditional Note 2
4	NAS-IP-Address	IP address of the GGSN for communication with the AAA server.	IPv4	Conditional Note 3
32	NAS-Identifier	Hostname of the GGSN for communication with the AAA server.	String	Conditional Note 3
6	Service-Type	Indicates the type of service for this user	Framed	Optional
7	Framed-Protocol	Indicates the type of protocol for this user	7 (GPRS PDP Context)	Optional
8	Framed-IP-Address	IP address allocated for this user	IPv4	Conditional
9	Framed-IP-Netmask	Netmask for the user IP address	IPv4	Conditional
30	Called-Station-Id	Identifier for the target network	APN (UTF-8 encoded)	Mandatory
31	Calling-Station-Id	Identifier for the MS	MSISDN in international format according to 3GPP TS 23.003, UTF-8 encoded decimal. Note that there are no leading characters in front of the country code.	Mandatory
60	CHAP-Challenge	Challenge if CHAP is used (extracted from the PCO field of the Create PDP Context Request message) or PPP authentication phase (if PPP PDP type is used).	String	Conditional Note 2
61	NAS-Port-Type	Port type for the GGSN	As per RFC 2865	Optional
26/10415	3GPP Vendor-Specific	Sub-attributes according sub-clause 16.4.7	See sub-clause 16.4.7	Optional except sub-attribute 3 which is conditional
<p>NOTE 1: Shall be present if PAP is used.</p> <p>NOTE 2: Shall be present if CHAP is used.</p> <p>NOTE 3: Either NAS-IP-Address or NAS-Identifier shall be present.</p>				

16.4.2 Access-Accept (sent from AAA server to GGSN)

The table below² describes the attributes of the Access-Accept message.

Table 2: The attributes of the Access-Accept message

Attr #	Attribute Name	Description	Content	Presence Requirement
1	User-Name	Username received in the Access-Request message or a substitute username provided by the AAA server. If the User-Name has been received in the Access-Accept message, this user-name shall be used in preference to the above	String	Optional
6	Service-Type	Indicates the type of service for this user	Framed	Optional
7	Framed-Protocol	Indicates the type of protocol for this user	7 (GPRS PDP Context)	Optional
8	Framed-IP-Address	IP address allocated for this user, if the AAA server is used to allocate IP address.	IPv4	Conditional
9	Framed-IP-Netmask	Netmask for the user IP address, if the AAA server is used to allocate IP netmask.	IPv4	Conditional
12	Framed-IP-MTU	MTU for the user towards this particular APN, MTU shall be less or equal to 1500	String	Optional
25	Class	Identifier to be used in all subsequent accounting messages.	String	Optional (NOTE 4)
27	Session-Timeout	Indicates the timeout value (in seconds) for the user session	32 bit unsigned Integer	Optional
28	Idle-Timeout	Indicates the timeout value (in seconds) for idle user session	32 bit unsigned Integer	Optional
26/311	MS- primary-DNS-server	Contains the primary DNS server address for this APN	Ipv4	Optional
26/311	MS-Secondary-DNS-Server	Contains the secondary DNS server address for this APN	IPv4	Optional
26/311	MS-Primary-NBNS-Server	Contains the primary NetBios name server address for this APN	IPv4	Optional
26/311	MS-Secondary-NBNS-Server	Contains the secondary NetBios server address for this APN	IPv4	Optional
NOTE 4: The presence of this attribute is conditional upon this attribute being received in the Access-Accept message				

16.4.3 Accounting-Request START (sent from GGSN to AAA server)

The table below³ describes the attributes of the Accounting-Request START message.

Table 3: The attributes of the Accounting-Request START message

Attr #	Attribute Name	Description	Content	Presence Requirement
1	User-Name	Username provided by the user (extracted from the PCO field of the Create PDP Context Request message) or PPP authentication phase (if PPP PDP type is used). If no username is available a generic username, configurable on a per APN basis, shall be present. If the User-Name has been received in the Access-Accept message, this user-name shall be used in preference to the above	String	Optional
4	NAS-IP-Address	GGSN IP address for communication with the AAA server.	IPv4	Conditional Note 3
32	NAS-Identifier	Hostname of the GGSN for communication with the AAA server.	String	Conditional Note 3
6	Service-Type	Indicates the type of service for this user	Framed	Optional
7	Framed Protocol	Indicates the type of protocol for this user	7 (GPRS PDP Context)	Optional

8	Framed-IP-Address	User IP address	IPv4	Mandatory
25	Class	Received in the access accept	String	Conditional (NOTE 4)
30	Called-Station-Id	Identifier for the target network	APN (UTF-8 encoded)	Mandatory
31	Calling-Station-Id	Identifier for the MS	MSISDN in international format according to 3GPP TS 23.003, UTF-8 encoded decimal. Note that there are no leading characters in front of the country code.	Mandatory
40	Acct-Status-Type	Type of accounting message	START	Mandatory
41	Acct-Delay-Time	Indicates how many seconds the GGSN has been trying to send this record for, and can be subtracted from the time of arrival on the AAA server to find the approximate time (in seconds) of the event generating this Accounting-Request.	32 unsigned integer	Optional
44	Acct-Session-Id	User session identifier.	GGSN IP address and Charging-ID concatenated in a UTF-8 encoded hexadecimal. NOTE: The GGSN IP address is the same as that used in the GCDRs.	Mandatory
45	Acct-Authentic	Authentication method	RADIUS or LOCAL	Optional
61	NAS-Port-Type	Port type for the GGSN	As per RFC 2865	Optional
26/10415	3GPP Vendor-Specific	Sub-attributes according sub-clause 16.4.7.	See sub-clause 16.4.7	Optional except sub-attribute 3 which is conditional

NOTE 3: Either NAS-IP-Address or NAS-Identifier shall be present.

NOTE 4: The presence of this attribute is conditional upon this attribute being received in the Access-Accept message

16.4.4 Accounting Request STOP (sent from GGSN to AAA server)

The table below describes the attributes of the Accounting-Request STOP message.

Table 4: The attributes of the Accounting-Request STOP message

Attr #	Attribute Name	Description	Content	Presence Requirement
1	User-Name	Username provided by the user (extracted from the PCO field of the Create PDP Context Request message) or PPP authentication phase (if PPP PDP type is used). If no username is available a generic username, configurable on a per APN basis, shall be present. If the User-Name has been received in the Access-Accept message, this user-name shall be used in preference to the	String	Optional

		above			
4	NAS-IP-Address	IP address of the GGSN for communication with the AAA server.	IPv4	Conditional Note 3	
32	NAS-Identifier	Hostname of the GGSN for communication with the AAA server.	String	Conditional Note 3	
6	Service-Type	Indicates the type of service for this user	Framed	Optional	
7	Framed Protocol	Indicates the type of protocol for this user	7 (GPRS PDP Context)	Optional	
8	Framed-IP-Address	User IP address	IPv4	Mandatory	
25	Class	Received in the access accept	String	Optional (NOTE 4)	
30	Called-Station-Id	Identifier for the target network	APN (UTF-8 encoded)	Mandatory	
31	Calling-Station-Id	Identifier for the MS	MSISDN in international format according to 3GPP TS 23.003, UTF-8 encoded. Note that there are no leading characters in front of the country code.	Mandatory	
40	Acct-Status-Type	Indicates the type of accounting request	STOP	Mandatory	
41	Acct-Delay-Time	Indicates how many seconds the GGSN has been trying to send this record for, and can be subtracted from the time of arrival on the AAA server to find the approximate time of the event generating this Accounting-Request	Second	Optional	
42	Acct-Input-Octets	GGSN counted number of octets sent by the user for the PDP context	32 bit unsigned integer	Optional	
43	Acct-Output-Octets	GGSN counted number of octets received by the user for the PDP context	32 bit unsigned integer	Optional	
44	Acct-Session-Id	User session identifier.	GGSN IP address and Charging-ID concatenated in a UTF-8 encoded hexadecimal. NOTE: The GGSN IP address is the same as that used in the GCDRs.	Mandatory	
45	Acct-Authentic	Authentication method	RADIUS or LOCAL	Optional	
46	Acct-Session-Time	Duration of the session	Second	Optional	
47	Acct-Input-Packets	GGSN counted number of packets sent by the user	Packet	Optional	
48	Acct-Output-Packets	GGSN counted number of packets received by the user	Packet	Optional	
49	Acct-Terminate-Cause	Indicate how the session was terminated	See RFC 2866	Optional	
61	NAS-Port-Type	Port type for the GGSN	As per RFC 2865	Optional	
26/10415	3GPP Vendor-Specific	Sub-attributes according to sub-clause 16.4.7.	See sub-clause 16.4.7	Optional except sub-attribute 3 which is conditional	

NOTE 3: Either NAS-IP-Address or NAS-Identifier shall be present.

NOTE 4: The presence of this attribute is conditional upon this attribute being received in the Access-Accept message

16.4.5 Accounting Request ON (optionally sent from GGSN to AAA server)

The table below5 describes the attributes of the Accounting-Request ON message.

Table 5: The attributes of the Accounting-Request ON message

Attr #	Attribute Name	Description	Content	Presence Requirement
4	NAS-IP-Address	IP address of the GGSN for communication with the AAA server.	IPv4	Conditional Note 3
30	Called-Station-ID	Identifier for the target network.	APN (UTF-8 encoded)	Optional
32	NAS-Identifier	Hostname of the GGSN for communication with the AAA server.	String	Conditional Note 3

NOTE 3: Either NAS-IP-Address or NAS-Identifier shall be present.

16.4.6 Accounting Request OFF (optionally sent from GGSN to AAA server)

The table below6 describes the attributes of the Accounting-Request OFF message.

Table 6: The attributes of the Accounting-Request OFF message

Attr #	Attribute Name	Description	Content	Presence Requirement
4	NAS-IP-Address	IP address of the GGSN for communication with the AAA server.	IPv4	Conditional Note 3
30	Called-Station-ID	Identifier for the target network.	APN (UTF-8 encoded)	Optional
32	NAS-Identifier	Hostname of the GGSN for communication with the AAA server.	String	Conditional Note 3

NOTE 3: Either NAS-IP-Address or NAS-Identifier shall be present.

16.4.7 Sub-attributes of the 3GPP Vendor-Specific attribute

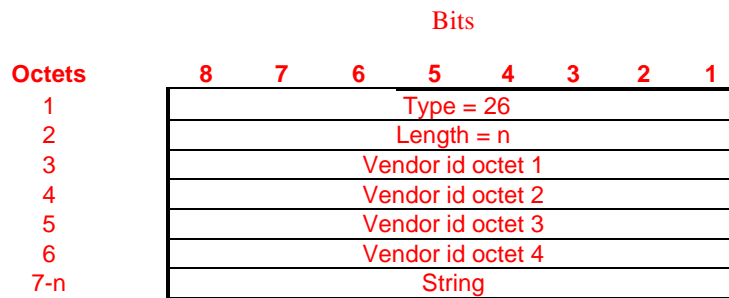
The table below7 describes the sub-attributes of the 3GPP Vendor-Specific attribute of the Access-Request, Accounting-Request START and Accounting-Request STOP message.

Table 7: The sub-attributes of the 3GPP Vendor-Specific attribute of the Access-Request, Accounting-Request START and Accounting-Request STOP message

Sub-attr #	Sub-attribute Name	Description	Presence Requirement	Associated attribute (Location of Sub-attr)
1	3GPP-IMSI	IMSI for this user	Optional	Access-Request, Accounting-Request START
2	3GPP-Charging-Id	Charging ID for this PDP Context (this together with the GGSN-Address constitutes a unique identifier for the PDP context).	Optional	Access-Request, Accounting-Request START
3	3GPP-PDP Type	Type of PDP context, e.g. IP or PPP	Conditional (mandatory if attribute 7 is present)	Access-Request
4	3GPP-CG-Address	Charging Gateway IP address	Optional	Access-Request, Accounting-Request START
5	3GPP-GPRS-QoS-Profile	QoS profile received	Optional	Access-Request, Accounting-Request START
6	3GPP-SGSN-Address	SGSN IP address that is used by the GTP control plane for the handling of control messages. It may be used to identify the PLMN to which the user is attached.	Optional	Access-Request, Accounting-Request START
7	3GPP-GGSN-Address	GGSN IP address that is used by the GTP control plane for the context establishment. It is the same as the GGSN IP address used in the GCDRs.	Optional	Access-Request, Accounting-Request START
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
9	3GPP-GGSN- MCC-MNC	MCC-MNC of the network the GGSN belongs to.	Optional	Access-Request, Accounting-Request START
10	3GPP-NSAPI	Identifies a particular PDP context for the associated PDN and MSISDN/IMSI from creation to deletion.	Optional	Access-Request, Accounting-Request START, Access-Request STOP
11	3GPP- Session-Stop-Indicator	Indicateds to the AAA server that the last PDP context of a session is released and that	Optional	Accounting Request STOP

		the PDP session has been terminated.		
12	3GPP- Selection-Mode	Contains the Selection mode for this PDP Context received in the Create PDP Context Request Message	Optional	Access-Request, Accounting-Request START
13	3GPP-Charging-Characteristics	Contains the charging characteristics for this PDP Context received in the Create PDP Context Request Message (only available in R99 and later releases)	Optional	Access-Request, Accounting-Request START

The RADIUS vendor Attribute is encoded as follows (as per RFC 2865)



n>=7

3GPP Vendor Id = 10415

The string part is encoded as follows:



m>=2 and m<= 248

The 3GPP specific attributes encoding is clarified below.

1 - 3GPP-IMSI

Octets	Bits							
	8	7	6	5	4	3	2	1
1	3GPP type = 1							
2	3GPP Length= 15							
3	IMSI digit1 (UTF-8 encoded)							
4	IMSI digit2 (UTF-8 encoded)							
5	IMSI digit3 (UTF-8 encoded)							
6	IMSI digit4 (UTF-8 encoded)							
7	IMSI digit5 (UTF-8 encoded)							
8	IMSI digit6 (UTF-8 encoded)							
9-15	IMSI digits 7-15 (UTF-8 encoded)							

3GPP Type: 1

Length: L =17

IMSI value: Text:

This is the UTF-8 encoded IMSI; If the MNC is only 2 digits (e.g. MNC = 78), its encoding shall be with a leading '0', (e.g. "078").

2 - 3GPP-Charging ID

Octets	Bits							
	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

Octets	Bits							
	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

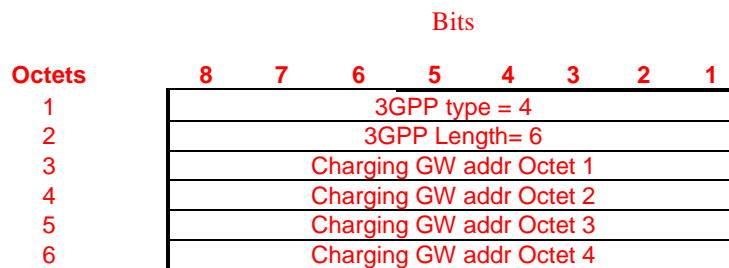
PDP type value: Unsigned 32 bits integer

PDP type octet possible values:

0 = IP

1 = PPP

4 - 3GPP-Charging Gateway address

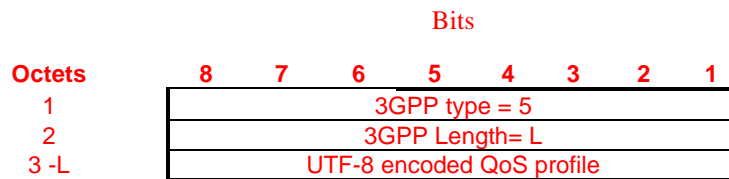


3GPP Type: 4

Length: 6

Charging GW address value: Address

5 - 3GPP-GPRS QoS profile



3GPP Type: 5

Length: 24 (release 99) or 8 (release 98)

QoS profile value: Text

UTF-8 encoded QoS profile syntax:

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

<Release indicator> = UTF-8 encoded number :

“98” = Release 98

“99”= Release 99

<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 digits, defining its hexadecimal representation. The QoS profile definition is in 3G TS 24.008

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

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

6 - 3GPP-SGSN address

Octets	Bits							
	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

7 - 3GPP-GGSN address

Octets	Bits							
	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

8 - 3GPP-IMSI MCC-MNC

Bits

Octets	8	7	6	5	4	3	2	1
1	3GPP type = 8							
2	3GPP Length= 8							
3	MCC digit1 (UTF-8 encoded)							
4	MCC digit2 (UTF-8 encoded)							
5	MCC digit3 (UTF-8 encoded)							
6	MNC digit1 (UTF-8 encoded)							
7	MNC digit2 (UTF-8 encoded)							
8	MNC digit3 (UTF-8 encoded)							

3GPP Type: 8

Length: 8

MS address value: text

This is the UTF-8 encoding of the MS MCC-MNC values. If the MNC is only 2 digits (e.g. MNC = 78), its encoding shall be with a leading '0', (e.g. "078").

9 - 3GPP-GGSN MCC-MNC

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

3GPP Type: 9

Length: 8

GGSN address value: text

This is the UTF-8 encoding of the GGSN MCC-MNC values. If the MNC is only 2 digits (e.g. MNC = 78), its encoding shall be with a leading '0', (e.g. "078").

10 - 3GPP-NSAPI

	Bits							
Octets	8	7	6	5	4	3	2	1
1	3GPP type = 10							
2	3GPP Length= 6							
3	NSAPI							

3GPP Type: 10

Length: 3

NSAPI value: text

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 IUTF-8 encoded digit.

11 - 3GPP-Session Stop Indicator

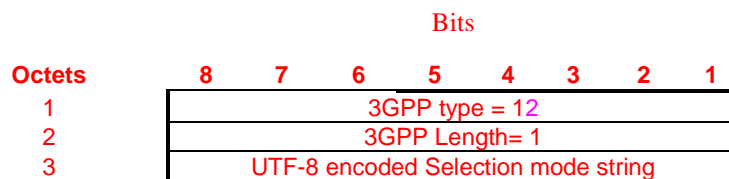


3GPP Type: 11

Length: 2

There is no value field for this Vendor Specific Attribute.

12 - 3GPP-Selection-Mode



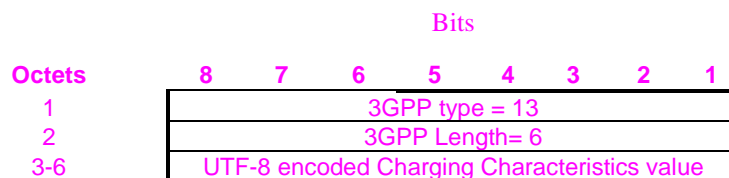
3GPP Type: 12

Length: 3

Selection mode value: Text

The format of this attribute shall be a character string consisting of a single digit, mapping from the binary value of the selection mode in the Create PDP Context message [24]. Where TS 29.060 provides for interpretation of the value, e.g. map '3' to '2', this shall be done by the GGSN.

13 - 3GPP-Charging-Characteristics



3GPP Type: 13

Length: 6

Charging characteristics value: Text

The charging characteristics is value is the value of the 2 octets value field taken from the GTP IE described in 29.060section 7.7.23.

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