3GPP TSG CN Plenary Meeting #18 **NP-020583**
4th – 6th December 2002 New Orleans, USA.

Source: TSG CN WG4

Title: Small corrections on technical enhancements and improvements forR99

Agenda item: 7.11

Document for: APPROVAL

Spec	CR	Rev	Doc-2nd-Level	Phase	Subject	Cat	Ver_C
29.060	380	1	N4-021541	R99	Clarification on presence of optional fields in GTP header	F	3.15.0
29.060	381	1	N4-021542	Rel-4	Clarification on presence of optional fields in GTP header	A	4.5.0
29.060	382	1	N4-021543	Rel-5	Clarification on presence of optional fields in GTP header	A	5.3.0

3GPP TSG-CN WG4 Meeting #17 **N4-021541**
Bangkok, Thailand, 11-15 November 2002

CR-Form-v7

CHANGE REQUEST

⌘ **29.060** **CR** **380** ⌘ **rev** **1** ⌘ Current version: **3.14.0** ⌘

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

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☒ Core Network ☒

Title:	⌘	Clarification on presence of optional fields in GTP header
Source:	⌘	CN4
Work item code:	⌘	TEI
Date:	⌘	06/11/2002
Category:	⌘	**F**
Release:	⌘	R99

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)

Reason for change: ⌘ **This is an essential correction.**

Clauses 6 and clause 9.3.1 are not consistent with regards to the presence of Sequence Number and N-PDU fields in the GTP header. Furthermore, clause 6 text is also ambiguous and contradicts clause 8.2.
Clause 9.3.1 specifies that Sequence Number and N-PDU fields shall be present if and only if the respective flags S and N are set to 1, whereas Clause 6 specifies that Sequence Number and N-PDU fields shall be present when any one or more of the S, PN and E flags are set.

Moreover, clause 6 specifies "The GTP-C and the GTP-U use some of the fields in the GTP header differently. The different use of such fields is described in the sections related to GTP-C and to GTP-U". It is clarified that clause 6 defines the overall handling of the GTP header and clauses 8.2 and 9.3.1 only define the specific additions and clarifications for GTP-C and GTP-U.

In addition, in figure 2 of clause 6 the last note must be changed because the text " This field shall be present when any one or more of the S, PN and E flags are set" does not prevent the said field to be present even when none of S, PN or E flag is set.

Summary of change: ⌘ Clause 6 (always present field) and clause 9.3.1 are changed to make clear that the presence of Extension header, Sequence Number and N-PDU is according to 6, but these fields only contain a meaningful value if the respective flags (E, S or/and PN) are set to 1.

Clause 8.2 and 9.3.1 state that the GTP header shall be used as specified in

		clause 6 and that the clarifications and additions are defined in these clauses. Specific GTP-U and GTP-C handlings are removed since they are covered by clauses 8.2 and 9.3.1. Figure 2 in clause 6 is changed to remove presence ambiguity.
Consequences if not approved:	⌘	If this CR is not approved, the GTP header can be coded and interpreted differently by different vendors, and this would lead to serious interoperability problems.

Clauses affected:	⌘	6, 8.2, 9.3.1			
		Y	**N**		
Other specs Affected:	⌘		**X**	Other core specifications	⌘
			X	Test specifications	
			X	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/specs/CR.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.

First modification

6 GTP Header

The GTP header is a variable length header used for both the GTP-C and the GTP-U protocols. The minimum length of the GTP header is 8 bytes. There are three flags that are used to signal the presence of additional optional fields: the PN flag, the S flag and the E flag. The PN flag is used to signal the presence of N-PDU Numbers. The S flag is used to signal the presence of the GTP Sequence Number field. The E flag is used to signal the presence of the Extension Header field, used to enable future extensions of the GTP header defined in this document, without the need to use another version number. If and only if ~~any~~ one or more of these three flags are set, the fields Sequence Number, N-PDU and Extension Header shall be present~~, and the length of the header is at least 12 octets and the fields corresponding to the flags that are set shall be evaluated by the receiver.~~. The sender shall set all the bits of the unused fields to zero. The receiver shall not evaluate the unused fields.

The GTP-C and the GTP-U use some of the fields in the GTP header differently. The ~~different~~ detailed use of such fields is described in the sections related to GTP-C and to GTP-U ~~and superseedes the present clause description in case of discrepancy~~.

Always present fields:

- Version field: This field is used to determine the version of the GTP protocol. For the treatment of other versions, see clause 11.1.1, "Different GTP versions". The version number shall be set to '1'.

- Protocol Type (PT): This bit is used as a protocol discriminator between GTP (when PT is '1') and GTP' (when PT is '0'). GTP is described in this document and the GTP' protocol in GSM 12.15. Note that the interpretation of the header fields may be different in GTP' than in GTP.

- Extension Header flag (E): This flag indicates the presence of a ~~valid~~meaningful value of the Next Extension Header field ~~when it is set to '1'~~. When it is set to '0', the Next Extension Header field either is not present or, if present, ~~must~~ shall not be interpreted. When it is set to '1', the Next Extension Header field is present, and ~~must~~shall be interpreted, as described below in this section.

- Sequence number flag (S): This flag indicates the presence of a meaningful ~~valid~~ value of the Sequence Number field ~~when it is set to '1'~~. When it is set to '0', the Sequence Number field either is not present or, if present, ~~must~~ shall not be interpreted. ~~The S flag shall be set to '1' in GTP-C messages and in GTP-U/GTP signalling type of messages.~~ When it is set to '1', the Sequence Number field is present, and shall be interpreted, as described below in this section.

- N-PDU Number flag (PN): This flag indicates the presence of a meaningful ~~valid~~ value of the N-PDU Number field ~~when it is set to '1'~~. When it is set to '0', the N-PDU Number field either is not present, or, if present, ~~must~~ shall not be interpreted. ~~This flag is significant only for GTP-U. As such, this flag is unused by GTP-C and it shall be ignored by a GTP-C receiving entity.~~ When it is set to '1', the N-PDU Number field is present, and shall be interpreted, as described below in this section.

- Message Type: This field indicates the type of GTP message. The valid values of the message type are defined in clause 7.1 for both GTP-C and GTP-U.

- Length: This field indicates the length in octets of the payload, i.e. the rest of the packet following the mandatory part of the GTP header (that is the first 8 octets). The Sequence Number, the N-PDU Number or any Extension headers shall be considered to be part of the payload, i.e. included in the length count.

- Tunnel Endpoint Identifier (TEID): This field unambiguously identifies a tunnel endpoint in the receiving GTP-U or GTP-C protocol entity. The receiving end side of a GTP tunnel locally assigns the TEID value the transmitting side has to use. The TEID values are exchanged between tunnel endpoints using GTP-C (or RANAP, over the Iu) messages.

Optional fields:

- Sequence Number: This field is an optional field in G -PDUs. It is used as a transaction identity for -signalling messages -having a response message defined for a request message, that is the Sequence Number value is

copied from the request to the response message header. In the user plane, an increasing sequence number for T-PDUs is transmitted via GTP-U tunnels, when transmission order must be preserved.

- N-PDU Number: This field is used at the Inter SGSN Routeing Area Update procedure and some inter-system handover procedures (e.g. between 2G and 3G radio access networks). This field is used to co-ordinate the data transmission for acknowledged mode of communication between the MS and the SGSN. The exact meaning of this field depends upon the scenario. (For example, for GSM/GPRS to GSM/GPRS, the SNDCP N-PDU number is present in this field).

- Next Extension Header Type: This field defines the type of Extension Header that follows this field in the GTP-PDU.

	Bits							
Octets	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**
1	Version			PT	(*)	E	S	PN
2	Message Type							
3	Length (1st Octet)							
4	Length (2nd Octet)							
5	Tunnel Endpoint Identifier (1st Octet)							
6	Tunnel Endpoint Identifier (2nd Octet)							
7	Tunnel Endpoint Identifier (3rd Octet)							
8	Tunnel Endpoint Identifier (4th Octet)							
9	Sequence Number (1st Octet) 1) 4)							
10	Sequence Number (2nd Octet) 1) 4)							
11	N-PDU Number 2) 4)							
12	Next Extension Header Type 3) 4)							

Figure 2: Outline of the GTP Header

NOTE 0~~1~~ (*) This bit is a spare bit. It shall be sent as '0'. The receiver shall not evaluate this bit.

NOTE 1~~2~~ 1) This field shall only be evaluated when indicated by the S flag set to 1.

NOTE 2~~3~~ 2) This field shall only be evaluated when indicated by the PN flag set to 1.

NOTE 3~~4~~ 3) This field shall only be evaluated when indicated by the E flag set to 1.

NOTE 4~~5~~ 4) This field shall be present if and only if~~when~~ any one or more of the S, PN and E flags are set.

The format of GTP Extension Headers is depicted in Figure 2. The Extension Header Length field specifies the length of the particular Extension header in 4 octets units. The Next Extension Header Type field specifies the type of any Extension Header that may follow a particular Extension Header. If no such Header follows, then the value of the Next Extension Header Type shall be 0.

Octets	
1	Extension Header Length
2 - m	Extension Header Content
m+1	Next Extension Header Type (*)

Figure 3: Outline of the Extension Header Format

NOTE ~~1~~ (*) The value of this field is 0 if no other Extension header follows.

The length of the Extension header shall be defined in a variable length of 4 octets, i.e. m+1 = n*4 octets, where n is a positive integer.

Bits 7 and 8 of the Next Extension Header Type define how the recipient shall handle unknown Extension Types. The recipient of an extension header of unknown type but marked as 'comprehension not required' for that recipient shall read the 'Next Extension Header Type' field (using the Extension Header Length field to identify its location in the GTP-PDU).

The recipient of an extension header of unknown type but marked as 'comprehension required' for that recipient shall:

- If the message with the unknown extension header was a request, send a response message back with CAUSE set to "unknown mandatory extension header".
- Send a Supported Extension Headers Notification to the originator of the GTP PDU.
- Log an error.

Bits 7 and 8 of the Next Extension Header Type have the following meaning:

Bits 8	Bits 7	Meaning
0	0	Comprehension of this extension header is not required. An Intermediate Node shall forward it to any Receiver Endpoint
0	1	Comprehension of this extension header is not required. An Intermediate Node shall discard the Extension Header Content and not forward it to any Receiver Endpoint. Other extension headers shall be treated independently of this extension header.
1	0	Comprehension of this extension header is required by the Endpoint Receiver but not by an Intermediate Node. An Intermediate Node shall forward the whole field to the Endpoint Receiver.
1	1	Comprehension of this header type is required by recipient (either Endpoint Receiver or Intermediate Node)

Figure 4: Definition of bits 7 and 8 of the Extension Header Type

An Endpoint Receiver is the ultimate receiver of the GTP-PDU (e.g. an RNC or the GGSN for the GTP-U plane). An Intermediate Node is a node that handles GTP but is not the ultimate endpoint (e.g. an SGSN for the GTP-U plane traffic between GGSN and RNC).

Next Extension Header Field Value	Type of Extension Header
0000 0000	No more extension headers
1100 0000	PDCP PDU number

Figure 5: Definition of Extension Header Type

Next Modification

8.2 Usage of the GTP-C Header

For control plane messages the GTP header shall be used as specified in clause 6 with the followings clarifications and additions:

- Version shall be set to decimal 1 ('001').
- Protocol Type flag (PT) shall be set to '1'.
- Sequence number flag (S) shall be set to '1'.
- N-PDU Number flag (PN) shall be set to '0'. A GTP-C receiver shall ~~ignore~~ not return an error if this flag is set to '1'.

- Message Type shall be set to the unique value that is used for each type of control plane message. Valid message types are marked with an x in the GTP-C column in Table 1.

- Length shall be the length in octets of the payload, i.e. the rest of the packet following the mandatory part of the GTP header (that is the first 8 octets). The Sequence Number, the N-PDU Number or any Extension headers shall be considered to be part of the payload, i.e. included in the length count.

- The Tunnel Endpoint Identifier is set by the sending entity to the value requested by the corresponding entity (SGSN or GGSN); it identifies all the PDP Contexts with the same PDP address and APN (for Tunnel Management messages) or it identifies each MS and its associated context data (for messages not related to Tunnel Management), except for the following cases:

    - The Create PDP Context Request message for a given MS sent to a specific GGSN shall have the Tunnel Endpoint Identifier set to all zeros, if the SGSN has not been assigned a Tunnel Endpoint Identifier Control Plane by the GGSN.

    - The Update PDP Context Request message for a given MS sent to a specific GGSN shall have the Tunnel Endpoint Identifier set to all zeros, if it is used to switch the GTP version of the tunnel to the GGSN from GTP v0 to GTP v1.

    - The Identification Request/Response messages, where the Tunnel Endpoint Identifier shall be set to all zeros.

    - The SGSN Context Request message, where the Tunnel Endpoint Identifier shall be set to all zeros.

    - The Echo Request/Response, Supported Extension Headers notification and the Version Not Supported messages, where the Tunnel Endpoint Identifier shall be set to all zeros.

    - The Forward Relocation Request message, where the Tunnel Endpoint Identifier shall be set to all zeros.

    - The PDU Notification Request message, where the Tunnel Endpoint Identifier shall be set to all zeros.

    - The Relocation Cancel Request message where the Tunnel Endpoint Identifier shall be set to all zeros, except for the case where the old SGSN has already been assigned the Tunnel Endpoint Identifier Control Plane of the new SGSN.

    - All Location Management messages, where the Tunnel Endpoint Identifier shall be set to all zeros.

  The GSN Address for Control Plane set in the request message could be different from the IP Source address of the message. The Tunnel Endpoint Identifier notified in the request message is also used in this case for sending the corresponding response message.

- Sequence Number shall be a message number valid for a path. Within a given set of contiguous Sequence Numbers from 0 to 65535, a given Sequence Number shall, if used, unambiguously define a GTP control plane request message sent on the path (see section Reliable delivery of signalling messages). The Sequence Number in a control plane response message shall be copied from the control plane request message that the GSN is replying to. For GTP-C messages not having a defined response message for a request message, i.e. for messages Version Not Supported and Supported Extension Headers Notification, the Sequence Number shall be ignored by the receiver.

- N-PDU Number shall not be interpreted.

The GTP-C header may be followed by subsequent information elements dependent on the type of control plane message. Only one information element of each type is allowed in a single control plane message, except for the Authentication Triplet, the PDP Context and the Tunnel Endpoint Identifier Data II information element where several occurrences of each type are allowed.

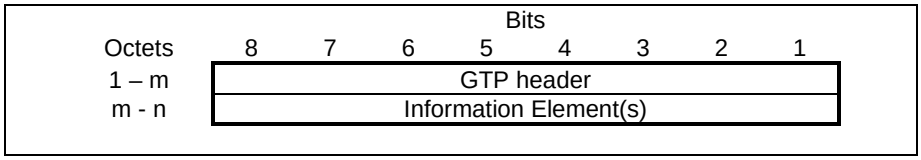

Figure 61: GTP Header followed by subsequent Information Elements

Last modification

9.3.1 Usage of the GTP-U Header

The GTP-U header shall be used as specified in clause 6 with the followings details:

- Version shall be set to decimal 1 ('001').
- Protocol Type flag (PT) shall be set to '1'.
- If the Sequence Number flagield (S) is set to '1' the sequence number field is present and validmeaningful otherwise it is set to '0'. For GTP-U messages Echo Request, Echo Response, Error Indication and Supported Extension Headers Notification, the S flagield shall be set to '1'.
- N-PDU Number flag (PN) flag: the GTP-U header contains a validmeaningful includes the N-PDU Number field if the PN flag is set to 1.
- Message Type shall be set according to Table 1. The value 255 is used when T-PDUs are transmitted. -The value 1 and 2 are used for "Echo" messages. The value 26 is used for “Error Indication” message. The value 31 is used for “Supported Extension Headers Notification” message.
- Length: This field indicates the length in octets of the payload, i.e. the rest of the packet following the mandatory part of the GTP header (that is the first 8 octets). The Sequence Number, the N-PDU Number or any Extension headers shall be considered to be part of the payload, i.e. included in the length count.
- Sequence Number: This field is present meaningful valid if and only if the S field is set to 1. Its presence is defined in clause 6. The handling of this field is specified in clause 9.1.1. It shall be used in order to decide whether or not to discard a received T-PDU, as specified in clause 9.3.1.1 Usage of the Sequence Number or as a transaction identity for GTP-U signalling messages having a response message defined for a request message. For GTP-U message, Supported Extension Headers Notification and Error Indication the Sequence Number shall be ignored by the receiver.
- N-PDU Number: This field shall be includedis meaningful valid if and only if the PN flag is set to 1. Its presence is defined in clause 6. In this case, the old SGSN (or RNC) uses it, at the Inter SGSN Routeing Area Update procedure (or SRNS relocation), to inform the new SGSN (or RNC) of the N-PDU number assigned to T-PDU. If an N-PDU number was not assigned to the T-PDU by PDCP, or if the T-PDU is to be transferred using unacknowledged peer-to-peer LLC operation, then PN shall be set to 0.
- TEID: Contains the Tunnel Endpoint Identifier for the tunnel to which this T-PDU belongs. The TEID shall be used by the receiving entity to find the PDP context, except for the following cases:
- The Echo Request/Response and Supported Extension Headers notification messages, where the Tunnel Endpoint Identifier shall be set to all zeroes.
- The Error Indication message where the Tunnel Endpoint Identifier shall be set to all zeros.

End of modifications

3GPP TSG-CN WG4 Meeting #17 ***N4-021542***
Bangkok, Thailand, 11-15 November 2002

CR-Form-v7

CHANGE REQUEST

⌘ **29.060** **CR** **381** ⌘ **rev** **1** ⌘ Current version: **4.5.0** ⌘

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

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☒ Core Network ☒

Title:	⌘	Clarification on presence of optional fields in GTP header
Source:	⌘	CN4
Work item code:	⌘	TEI
Date:	⌘	06/11/2002
Category:	⌘	**A**
Release:	⌘	Rel-4

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change: ⌘

Clauses 6 and clause 9.3.1 are not consistent with regards to the presence of Sequence Number and N-PDU fields in the GTP header. Furthermore, clause 6 text is also ambiguous and contradicts clause 8.2.
Clause 9.3.1 specifies that Sequence Number and N-PDU fields shall be present if and only if the respective flags S and N are set to 1, whereas Clause 6 specifies that Sequence Number and N-PDU fields shall be present when any one or more of the S, PN and E flags are set.

Moreover, clause 6 specifies "The GTP-C and the GTP-U use some of the fields in the GTP header differently. The different use of such fields is described in the sections related to GTP-C and to GTP-U". It is clarified that clause 6 defines the overall handling of the GTP header and clauses 8.2 and 9.3.1 only define the specific additions and clarifications for GTP-C and GTP-U.

In addition, in figure 2 of clause 6 the last note must be changed because the text " This field shall be present when any one or more of the S, PN and E flags are set" does not prevent the said field to be present even when none of S, PN or E flag is set.

Summary of change: ⌘

Clause 6 (always present field) and clause 9.3.1 are changed to make clear that the presence of Extension header, Sequence Number and N-PDU is according to 6, but these fields only contain a meaningful value if the respective flags (E, S or/and PN) are set to 1.

Clause 8.2 and 9.3.1 state that the GTP header shall be used as specified in clause 6 and that the clarifications and additions are defined in these clauses.

		Specific GTP-U and GTP-C handlings are removed since they are covered by clauses 8.2 and 9.3.1. Figure 2 in clause 6 is changed to remove presence ambiguity.
Consequences if not approved:	⌘	If this CR is not approved, the GTP header can be coded and interpreted differently by different vendors, and this would lead to serious interoperability problems.

Clauses affected:	⌘	6, 8.2, 9.3.1			
Other specs affected:	⌘	**Y** / **N**			
		X /	Other core specifications	⌘	
		/ **X**	Test specifications		
		/ **X**	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/specs/CR.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.

First modification

6 GTP Header

The GTP header is a variable length header used for both the GTP-C and the GTP-U protocols. The minimum length of the GTP header is 8 bytes. There are three flags that are used to signal the presence of additional optional fields: the PN flag, the S flag and the E flag. The PN flag is used to signal the presence of N-PDU Numbers. The S flag is used to signal the presence of the GTP Sequence Number field. The E flag is used to signal the presence of the Extension Header field, used to enable future extensions of the GTP header defined in this document, without the need to use another version number. If and only if ~~any~~ one or more of these three flags are set, the fields Sequence Number, N-PDU and Extension Header shall be present~~, and the length of the header is at least 12 octets and the fields corresponding to the flags that are set shall be evaluated by the receiver~~. The sender shall set all the bits of the unused fields to zero. The receiver shall not evaluate the unused fields.

The GTP-C and the GTP-U use some of the fields in the GTP header differently. The detailed~~different~~ use of such fields is described in the sections related to GTP-C and to GTP-U~~ and superseedes the present clause description in case of discrepancy~~.

Always present fields:

- Version field: This field is used to determine the version of the GTP protocol. For the treatment of other versions, see clause 11.1.1, "Different GTP versions". The version number shall be set to '1'.

- Protocol Type (PT): This bit is used as a protocol discriminator between GTP (when PT is '1') and GTP' (when PT is '0'). GTP is described in this document and the GTP' protocol in GSM 12.15. Note that the interpretation of the header fields may be different in GTP' than in GTP.

- Extension Header flag (E): This flag indicates the presence of a meaningful~~valid~~ value of the Next Extension Header field ~~when it is set to '1'~~. When it is set to '0', the Next Extension Header field either is not present or, if present, shall~~must~~ not be interpreted. When it is set to '1', the Next Extension Header field is present, and shall be interpreted, as described below in this section.

- Sequence number flag (S): This flag indicates the presence of a meaningful~~valid~~ value of the Sequence Number field ~~when it is set to '1'~~. When it is set to '0', the Sequence Number field either is not present or, if present, shall~~must~~ not be interpreted. ~~The S flag shall be set to '1' in GTP-C messages and in GTP-U/GTP signalling type of messages.~~ When it is set to '1', the Sequence Number field is present, and shall be interpreted, as described below in this section.

- N-PDU Number flag (PN): This flag indicates the presence of a meaningful~~valid~~ value of the N-PDU Number field ~~when it is set to '1'~~. When it is set to '0', the N-PDU Number field either is not present, or, if present, shall~~must~~ not be interpreted. ~~This flag is significant only for GTP-U. As such, this flag is unused by GTP-C and it shall be ignored by a GTP-C receiving entity.~~ When it is set to '1', the N-PDU Number field is present, and shall be interpreted, as described below in this section.

- Message Type: This field indicates the type of GTP message. The valid values of the message type are defined in clause 7.1 for both GTP-C and GTP-U.

- Length: This field indicates the length in octets of the payload, i.e. the rest of the packet following the mandatory part of the GTP header (that is the first 8 octets). The Sequence Number, the N-PDU Number or any Extension headers shall be considered to be part of the payload, i.e. included in the length count.

- Tunnel Endpoint Identifier (TEID): This field unambiguously identifies a tunnel endpoint in the receiving GTP-U or GTP-C protocol entity. The receiving end side of a GTP tunnel locally assigns the TEID value the transmitting side has to use. The TEID values are exchanged between tunnel endpoints using GTP-C (or RANAP, over the Iu) messages.

Optional fields:

- Sequence Number: This field is an optional field in G -PDUs. It is used as a transaction identity for signalling messages having a response message defined for a request message, that is the Sequence Number value is

copied from the request to the response message header. In the user plane, an increasing sequence number for T-PDUs is transmitted via GTP-U tunnels, when transmission order must be preserved.

- N-PDU Number: This field is used at the Inter SGSN Routeing Area Update procedure and some inter-system handover procedures (e.g. between 2G and 3G radio access networks). This field is used to co-ordinate the data transmission for acknowledged mode of communication between the MS and the SGSN. The exact meaning of this field depends upon the scenario. (For example, for GSM/GPRS to GSM/GPRS, the SNDCP N-PDU number is present in this field).

- Next Extension Header Type: This field defines the type of Extension Header that follows this field in the GTP-PDU.

Bits

Octets	8	7	6	5	4	3	2	1
1	Version			PT	(*)	E	S	PN
2	Message Type							
3	Length (1st Octet)							
4	Length (2nd Octet)							
5	Tunnel Endpoint Identifier (1st Octet)							
6	Tunnel Endpoint Identifier (2nd Octet)							
7	Tunnel Endpoint Identifier (3rd Octet)							
8	Tunnel Endpoint Identifier (4th Octet)							
9	Sequence Number (1st Octet) 1) 4)							
10	Sequence Number (2nd Octet) 1) 4)							
11	N-PDU Number 2) 4)							
12	Next Extension Header Type 3) 4)							

Figure 2: Outline of the GTP Header

NOTE 0~~1~~ (*) This bit is a spare bit. It shall be sent as '0'. The receiver shall not evaluate this bit.

NOTE 1~~2~~ 1) This field shall only be evaluated when indicated by the S flag set to 1.

NOTE 2~~3~~ 2) This field shall only be evaluated when indicated by the PN flag set to 1.

NOTE 3~~4~~ 3) This field shall only be evaluated when indicated by the E flag set to 1.

NOTE 4~~5~~ 4) This field shall be present if and only if~~when~~ any one or more of the S, PN and E flags are set.

The format of GTP Extension Headers is depicted in Figure 2. The Extension Header Length field specifies the length of the particular Extension header in 4 octets units. The Next Extension Header Type field specifies the type of any Extension Header that may follow a particular Extension Header. If no such Header follows, then the value of the Next Extension Header Type shall be 0.

Octets	
1	Extension Header Length
2 - m	Extension Header Content
m+1	Next Extension Header Type (*)

Figure 3: Outline of the Extension Header Format

NOTE (*) The value of this field is 0 if no other Extension header follows.

The length of the Extension header shall be defined in a variable length of 4 octets, i.e. m+1 = n*4 octets, where n is a positive integer.

Bits 7 and 8 of the Next Extension Header Type define how the recipient shall handle unknown Extension Types. The recipient of an extension header of unknown type but marked as 'comprehension not required' for that recipient shall read the 'Next Extension Header Type' field (using the Extension Header Length field to identify its location in the GTP-PDU).

The recipient of an extension header of unknown type but marked as 'comprehension required' for that recipient shall:

- If the message with the unknown extension header was a request, send a response message back with CAUSE set to "unknown mandatory extension header".
- Send a Supported Extension Headers Notification to the originator of the GTP PDU.
- Log an error.

Bits 7 and 8 of the Next Extension Header Type have the following meaning:

Bits 8	Bits 7	Meaning
0	0	Comprehension of this extension header is not required. An Intermediate Node shall forward it to any Receiver Endpoint
0	1	Comprehension of this extension header is not required. An Intermediate Node shall discard the Extension Header Content and not forward it to any Receiver Endpoint. Other extension headers shall be treated independently of this extension header.
1	0	Comprehension of this extension header is required by the Endpoint Receiver but not by an Intermediate Node. An Intermediate Node shall forward the whole field to the Endpoint Receiver.
1	1	Comprehension of this header type is required by recipient (either Endpoint Receiver or Intermediate Node)

Figure 4: Definition of bits 7 and 8 of the Extension Header Type

An Endpoint Receiver is the ultimate receiver of the GTP-PDU (e.g. an RNC or the GGSN for the GTP-U plane). An Intermediate Node is a node that handles GTP but is not the ultimate endpoint (e.g. an SGSN for the GTP-U plane traffic between GGSN and RNC).

Next Extension Header Field Value	Type of Extension Header
0000 0000	No more extension headers
1100 0000	PDCP PDU number
1100 0001	Suspend Request
1100 0010	Suspend Response

Figure 5: Definition of Extension Header Type

Next Modification

8.2 Usage of the GTP-C Header

For control plane messages the GTP header shall be used as specified in clause 6 with the followings clarifications and additions:

- Version shall be set to decimal 1 ('001').
- Protocol Type flag (PT) shall be set to '1'.

- Sequence number flag (S) shall be set to '1'.

- N-PDU Number flag (PN) shall be set to '0'. A GTP-C receiver shall not return an error if~~ignore~~ this flag is set to '1'.

- Message Type shall be set to the unique value that is used for each type of control plane message. Valid message types are marked with an x in the GTP-C column in Table 1.

- Length shall be the length in octets of the payload, i.e. the rest of the packet following the mandatory part of the GTP header (that is the first 8 octets). The Sequence Number, the N-PDU Number or any Extension headers shall be considered to be part of the payload, i.e. included in the length count.

- The Tunnel Endpoint Identifier is set by the sending entity to the value requested by the corresponding entity (SGSN or GGSN); it identifies all the PDP Contexts with the same PDP address and APN (for Tunnel Management messages) or it identifies each MS and its associated context data (for messages not related to Tunnel Management), except for the following cases:

- The Create PDP Context Request message for a given MS sent to a specific GGSN shall have the Tunnel Endpoint Identifier set to all zeros, if the SGSN has not been assigned a Tunnel Endpoint Identifier Control Plane by the GGSN.

- The Update PDP Context Request message for a given MS sent to a specific GGSN shall have the Tunnel Endpoint Identifier set to all zeros, if it is used to switch the GTP version of the tunnel to the GGSN from GTP v0 to GTP v1.

- The Identification Request/Response messages, where the Tunnel Endpoint Identifier shall be set to all zeros.

- The SGSN Context Request message, where the Tunnel Endpoint Identifier shall be set to all zeros.

- The Echo Request/Response, Supported Extension Headers notification and the Version Not Supported messages, where the Tunnel Endpoint Identifier shall be set to all zeros.

- The Forward Relocation Request message, where the Tunnel Endpoint Identifier shall be set to all zeros.

- The PDU Notification Request message, where the Tunnel Endpoint Identifier shall be set to all zeros.

~~-~~

- The Relocation Cancel Request message where the Tunnel Endpoint Identifier shall be set to all zeros, except for the case where the old SGSN has already been assigned the Tunnel Endpoint Identifier Control Plane of the new SGSN.

- All Location Management messages, where the Tunnel Endpoint Identifier shall be set to all zeros.

  The GSN Address for Control Plane set in the request message could be different from the IP Source address of the message. The Tunnel Endpoint Identifier notified in the request message is also used in this case for sending the corresponding response message.

- Sequence Number shall be a message number valid for a path. Within a given set of contiguous Sequence Numbers from 0 to 65535, a given Sequence Number shall, if used, unambiguously define a GTP control plane request message sent on the path (see section Reliable delivery of signalling messages). The Sequence Number in a control plane response message shall be copied from the control plane request message that the GSN is replying to. For GTP-C messages not having a defined response message for a request message, i.e. for messages Version Not Supported and Supported Extension Headers Notification, the Sequence Number shall be ignored by the receiver.

- N-PDU Number shall not be interpreted.

The GTP-C header may be followed by subsequent information elements dependent on the type of control plane message. Only one information element of each type is allowed in a single control plane message, except for the Authentication Triplet, the PDP Context and the Tunnel Endpoint Identifier Data II information element where several occurrences of each type are allowed.

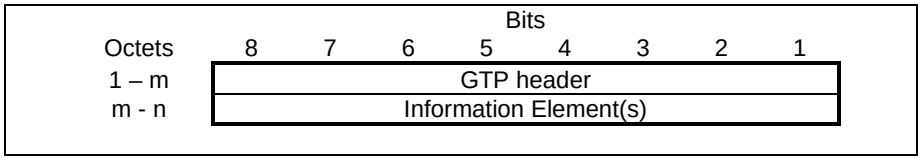

Figure 61: GTP Header followed by subsequent Information Elements

Last modification

9.3.1 Usage of the GTP-U Header

The GTP-U header shall be used as specified in clause 6 with the followings details:

- Version shall be set to decimal 1 ('001').
- Protocol Type flag (PT) shall be set to '1'.
- If the Sequence Number flagield (S) is set to '1' the sequence number field is present and meaningfulvalid otherwise it is set to '0'. For GTP-U messages Echo Request, Echo Response, Error Indication and Supported Extension Headers Notification, the S flagield shall be set to '1'.
- N-PDU Number flag (PN) flag: the GTP-U header contains a meaningfulvalidincludes the N-PDU Number field if the PN flag is set to 1.
- Message Type shall be set according to Table 1. The value 255 is used when T-PDUs are transmitted. The value 1 and 2 are used for "Echo" messages. The value 26 is used for “Error Indication” message. The value 31 is used for “Supported Extension Headers Notification” message.
- Length: This field indicates the length in octets of the payload, i.e. the rest of the packet following the mandatory part of the GTP header (that is the first 8 octets). The Sequence Number, the N-PDU Number or any Extension headers shall be considered to be part of the payload, i.e. included in the length count.
- Sequence Number: This field is present meaningfulvalid if and only if the S field is set to 1. Its presence is defined in clause 6. The handling of this field is specified in clause 9.1.1. It shall be used in order to decide whether or not to discard a received T-PDU, as specified in clause 9.3.1.1 Usage of the Sequence Number or as a transaction identity for GTP-U signalling messages having a response message defined for a request message. For GTP-U message, Supported Extension Headers Notification and Error Indication the Sequence Number shall be ignored by the receiver.
- N-PDU Number: This field shall be includedis meaningfulvalid if and only if the PN flag is set to 1. Its presence is defined in clause 6. In this case, the old SGSN (or RNC) uses it, at the Inter SGSN Routeing Area Update procedure (or SRNS relocation), to inform the new SGSN (or RNC) of the N-PDU number assigned to T-PDU. If an N-PDU number was not assigned to the T-PDU by PDCP, or if the T-PDU is to be transferred using unacknowledged peer-to-peer LLC operation, then PN shall be set to 0.
- TEID: Contains the Tunnel Endpoint Identifier for the tunnel to which this T-PDU belongs. The TEID shall be used by the receiving entity to find the PDP context, except for the following cases:
- The Echo Request/Response and Supported Extension Headers notification messages, where the Tunnel Endpoint Identifier shall be set to all zeroes.
- The Error Indication message where the Tunnel Endpoint Identifier shall be set to all zeros.

End of modifications

3GPP TSG-CN WG4 Meeting #17 ***N4-021543***
Bangkok, Thailand, 11-15 November 2002

CR-Form-v7

CHANGE REQUEST

⌘ **29.060** **CR** **382** ⌘ **rev** **1** ⌘ Current version: **5.3.0** ⌘

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

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☒ Core Network ☒

Title:	⌘	Clarification on presence of optional fields in GTP header
Source:	⌘	CN4
Work item code:	⌘	TEI
Date:	⌘	06/11/2002
Category:	⌘	**A**
Release:	⌘	Rel-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change: ⌘

Clauses 6 and clause 9.3.1 are not consistent with regards to the presence of Sequence Number and N-PDU fields in the GTP header. Furthermore, clause 6 text is also ambiguous and contradicts clause 8.2.
Clause 9.3.1 specifies that Sequence Number and N-PDU fields shall be present if and only if the respective flags S and N are set to 1, whereas Clause 6 specifies that Sequence Number and N-PDU fields shall be present when any one or more of the S, PN and E flags are set.

Moreover, clause 6 specifies "The GTP-C and the GTP-U use some of the fields in the GTP header differently. The different use of such fields is described in the sections related to GTP-C and to GTP-U". It is clarified that clause 6 defines the overall handling of the GTP header and clauses 8.2 and 9.3.1 only define the specific additions and clarifications for GTP-C and GTP-U.

In addition, in figure 2 of clause 6 the last note must be changed because the text " This field shall be present when any one or more of the S, PN and E flags are set" does not prevent the said field to be present even when none of S, PN or E flag is set.

Summary of change: ⌘

Clause 6 (always present field) and clause 9.3.1 are changed to make clear that the presence of Extension header, Sequence Number and N-PDU is according to 6, but these fields only contain a meaningful value if the respective flags (E, S or/and PN) are set to 1.

Clause 8.2 and 9.3.1 state that the GTP header shall be used as specified in clause 6 and that the clarifications and additions are defined in these clauses.

		Specific GTP-U and GTP-C handlings are removed since they are covered by clauses 8.2 and 9.3.1. Figure 2 in clause 6 is changed to remove presence ambiguity.
Consequences if not approved:	⌘	If this CR is not approved, the GTP header can be coded and interpreted differently by different vendors, and this would lead to serious interoperability problems.

Clauses affected:	⌘	6, 8.2, 9.3.1			
Other specs affected:	⌘	**Y** / **N**			
		X /	Other core specifications	⌘	
		/ **X**	Test specifications		
		/ **X**	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/specs/CR.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.

First modification

6 GTP Header

The GTP header is a variable length header used for both the GTP-C and the GTP-U protocols. The minimum length of the GTP header is 8 bytes. There are three flags that are used to signal the presence of additional optional fields: the PN flag, the S flag and the E flag. The PN flag is used to signal the presence of N-PDU Numbers. The S flag is used to signal the presence of the GTP Sequence Number field. The E flag is used to signal the presence of the Extension Header field, used to enable future extensions of the GTP header defined in this document, without the need to use another version number. If and only if ~~any~~ one or more of these three flags are set, the fields Sequence Number, N-PDU and Extension Header shall be present~~, and the length of the header is at least 12 octets and the fields corresponding to the flags that are set shall be evaluated by the receiver~~. The sender shall set all the bits of the unused fields to zero. The receiver shall not evaluate the unused fields.

The GTP-C and the GTP-U use some of the fields in the GTP header differently. The detailed~~different~~ use of such fields is described in the sections related to GTP-C and to GTP-U~~ and superseedes the present clause description in case of discrepancy~~.

Always present fields:

- Version field: This field is used to determine the version of the GTP protocol. For the treatment of other versions, see clause 11.1.1, "Different GTP versions". The version number shall be set to '1'.

- Protocol Type (PT): This bit is used as a protocol discriminator between GTP (when PT is '1') and GTP' (when PT is '0'). GTP is described in this document and the GTP' protocol in GSM 12.15. Note that the interpretation of the header fields may be different in GTP' than in GTP.

- Extension Header flag (E): This flag indicates the presence of a meaningful~~valid~~ value of the Next Extension Header field ~~when it is set to '1'~~. When it is set to '0', the Next Extension Header field either is not present or, if present, shall~~must~~ not be interpreted. When it is set to '1', the Next Extension Header field is present, and shall be interpreted, as described below in this section.

- Sequence number flag (S): This flag indicates the presence of a meaningful~~valid~~ value of the Sequence Number field ~~when it is set to '1'~~. When it is set to '0', the Sequence Number field either is not present or, if present, shall~~must~~ not be interpreted. ~~The S flag shall be set to '1' in GTP-C messages and in GTP-U/GTP signalling type of messages.~~ When it is set to '1', the Sequence Number field is present, and shall be interpreted, as described below in this section.

- N-PDU Number flag (PN): This flag indicates the presence of a meaningful~~valid~~ value of the N-PDU Number field ~~when it is set to '1'~~. When it is set to '0', the N-PDU Number field either is not present, or, if present, shall~~must~~ not be interpreted. ~~This flag is significant only for GTP-U. As such, this flag is unused by GTP-C and it shall be ignored by a GTP-C receiving entity.~~ When it is set to '1', the N-PDU Number field is present, and shall be interpreted, as described below in this section.

- Message Type: This field indicates the type of GTP message. The valid values of the message type are defined in clause 7.1 for both GTP-C and GTP-U.

- Length: This field indicates the length in octets of the payload, i.e. the rest of the packet following the mandatory part of the GTP header (that is the first 8 octets). The Sequence Number, the N-PDU Number or any Extension headers shall be considered to be part of the payload, i.e. included in the length count.

- Tunnel Endpoint Identifier (TEID): This field unambiguously identifies a tunnel endpoint in the receiving GTP-U or GTP-C protocol entity. The receiving end side of a GTP tunnel locally assigns the TEID value the transmitting side has to use. The TEID values are exchanged between tunnel endpoints using GTP-C (or RANAP, over the Iu) messages.

Optional fields:

- Sequence Number: This field is an optional field in G -PDUs. It is used as a transaction identity for signalling messages having a response message defined for a request message, that is the Sequence Number value is

copied from the request to the response message header. In the user plane, an increasing sequence number for T-PDUs is transmitted via GTP-U tunnels, when transmission order must be preserved.

- N-PDU Number: This field is used at the Inter SGSN Routeing Area Update procedure and some inter-system handover procedures (e.g. between 2G and 3G radio access networks). This field is used to co-ordinate the data transmission for acknowledged mode of communication between the MS and the SGSN. The exact meaning of this field depends upon the scenario. (For example, for GSM/GPRS to GSM/GPRS, the SNDCP N-PDU number is present in this field).

- Next Extension Header Type: This field defines the type of Extension Header that follows this field in the GTP-PDU.

Bits

Octets	8	7	6	5	4	3	2	1
1	Version			PT	(*)	E	S	PN
2	Message Type							
3	Length (1st Octet)							
4	Length (2nd Octet)							
5	Tunnel Endpoint Identifier (1st Octet)							
6	Tunnel Endpoint Identifier (2nd Octet)							
7	Tunnel Endpoint Identifier (3rd Octet)							
8	Tunnel Endpoint Identifier (4th Octet)							
9	Sequence Number (1st Octet) 1) 4)							
10	Sequence Number (2nd Octet) 1) 4)							
11	N-PDU Number 2) 4)							
12	Next Extension Header Type 3) 4)							

Figure 2: Outline of the GTP Header

NOTE 0~~1~~ (*) This bit is a spare bit. It shall be sent as '0'. The receiver shall not evaluate this bit.

NOTE 1~~2~~ 1) This field shall only be evaluated when indicated by the S flag set to 1.

NOTE 2~~3~~ 2) This field shall only be evaluated when indicated by the PN flag set to 1.

NOTE 3~~4~~ 3) This field shall only be evaluated when indicated by the E flag set to 1.

NOTE 4~~5~~ 4) This field shall be present if and only if~~when~~ any one or more of the S, PN and E flags are set.

The format of GTP Extension Headers is depicted in Figure 2. The Extension Header Length field specifies the length of the particular Extension header in 4 octets units. The Next Extension Header Type field specifies the type of any Extension Header that may follow a particular Extension Header. If no such Header follows, then the value of the Next Extension Header Type shall be 0.

Octets	
1	Extension Header Length
2 - m	Extension Header Content
m+1	Next Extension Header Type (*)

Figure 3: Outline of the Extension Header Format

NOTE (*) The value of this field is 0 if no other Extension header follows.

The length of the Extension header shall be defined in a variable length of 4 octets, i.e. m+1 = n*4 octets, where n is a positive integer.

Bits 7 and 8 of the Next Extension Header Type define how the recipient shall handle unknown Extension Types. The recipient of an extension header of unknown type but marked as 'comprehension not required' for that recipient shall read the 'Next Extension Header Type' field (using the Extension Header Length field to identify its location in the GTP-PDU).

The recipient of an extension header of unknown type but marked as 'comprehension required' for that recipient shall:

- If the message with the unknown extension header was a request, send a response message back with CAUSE set to "unknown mandatory extension header".
- Send a Supported Extension Headers Notification to the originator of the GTP PDU.
- Log an error.

Bits 7 and 8 of the Next Extension Header Type have the following meaning:

Bits 8	7	Meaning
0	0	Comprehension of this extension header is not required. An Intermediate Node shall forward it to any Receiver Endpoint
0	1	Comprehension of this extension header is not required. An Intermediate Node shall discard the Extension Header Content and not forward it to any Receiver Endpoint. Other extension headers shall be treated independently of this extension header.
1	0	Comprehension of this extension header is required by the Endpoint Receiver but not by an Intermediate Node. An Intermediate Node shall forward the whole field to the Endpoint Receiver.
1	1	Comprehension of this header type is required by recipient (either Endpoint Receiver or Intermediate Node)

Figure 4: Definition of bits 7 and 8 of the Extension Header Type

An Endpoint Receiver is the ultimate receiver of the GTP-PDU (e.g. an RNC or the GGSN for the GTP-U plane). An Intermediate Node is a node that handles GTP but is not the ultimate endpoint (e.g. an SGSN for the GTP-U plane traffic between GGSN and RNC).

Next Extension Header Field Value	Type of Extension Header
0000 0000	No more extension headers
1100 0000	PDCP PDU number
1100 0001	Suspend Request
1100 0010	Suspend Response

Figure 5: Definition of Extension Header Type

Next Modification

8.2 Usage of the GTP-C Header

For control plane messages the GTP header shall be used as specified in clause 6 with the followings clarifications and additions:

- Version shall be set to decimal 1 ('001').
- Protocol Type flag (PT) shall be set to '1'.
- Sequence number flag (S) shall be set to '1'.

- N-PDU Number flag (PN) shall be set to '0'. A GTP-C receiver shall not return an error if~~ignore~~ this flag is set to '1'.

- Message Type shall be set to the unique value that is used for each type of control plane message. Valid message types are marked with an x in the GTP-C column in Table 1.

- Length shall be the length in octets of the payload, i.e. the rest of the packet following the mandatory part of the GTP header (that is the first 8 octets). The Sequence Number, the N-PDU Number or any Extension headers shall be considered to be part of the payload, i.e. included in the length count.

- The Tunnel Endpoint Identifier is set by the sending entity to the value requested by the corresponding entity (SGSN or GGSN); it identifies all the PDP Contexts with the same PDP address and APN (for Tunnel Management messages) or it identifies each MS and its associated context data (for messages not related to Tunnel Management), except for the following cases:

- The Create PDP Context Request message for a given MS sent to a specific GGSN shall have the Tunnel Endpoint Identifier set to all zeros, if the SGSN has not been assigned a Tunnel Endpoint Identifier Control Plane by the GGSN.

- The Update PDP Context Request message for a given MS sent to a specific GGSN shall have the Tunnel Endpoint Identifier set to all zeros, if it is used to switch the GTP version of the tunnel to the GGSN from GTP v0 to GTP v1.

- The Identification Request/Response messages, where the Tunnel Endpoint Identifier shall be set to all zeros.

- The SGSN Context Request message, where the Tunnel Endpoint Identifier shall be set to all zeros.

- The Echo Request/Response, Supported Extension Headers notification and the Version Not Supported messages, where the Tunnel Endpoint Identifier shall be set to all zeros.

- The Forward Relocation Request message, where the Tunnel Endpoint Identifier shall be set to all zeros.

- The PDU Notification Request message, where the Tunnel Endpoint Identifier shall be set to all zeros.

- The RAN Information Relay message, where the Tunnel Endpoint Identifier shall be set to all zeros.

- The Relocation Cancel Request message where the Tunnel Endpoint Identifier shall be set to all zeros, except for the case where the old SGSN has already been assigned the Tunnel Endpoint Identifier Control Plane of the new SGSN.

- All Location Management messages, where the Tunnel Endpoint Identifier shall be set to all zeros.

  The GSN Address for Control Plane set in the request message could be different from the IP Source address of the message. The Tunnel Endpoint Identifier notified in the request message is also used in this case for sending the corresponding response message.

- Sequence Number shall be a message number valid for a path. Within a given set of contiguous Sequence Numbers from 0 to 65535, a given Sequence Number shall, if used, unambiguously define a GTP control plane request message sent on the path (see section Reliable delivery of signalling messages). The Sequence Number in a control plane response message shall be copied from the control plane request message that the GSN is replying to. For GTP-C messages not having a defined response message for a request message, i.e. for messages Version Not Supported, RAN Information Relay and Supported Extension Headers Notification, the Sequence Number shall be ignored by the receiver.

- N-PDU Number shall not be interpreted.

The GTP-C header may be followed by subsequent information elements dependent on the type of control plane message. Only one information element of each type is allowed in a single control plane message, except for the Authentication Triplet, the PDP Context and the Tunnel Endpoint Identifier Data II information element where several occurrences of each type are allowed.

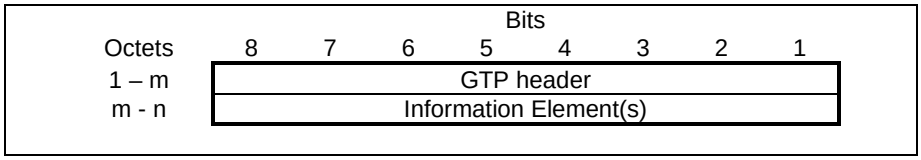

Figure 63: GTP Header followed by subsequent Information Elements

Last modification

9.3.1 Usage of the GTP-U Header

The GTP-U header shall be used as specified in clause 6 with the followings details:

- Version shall be set to decimal 1 ('001').
- Protocol Type flag (PT) shall be set to '1'.
- If the Sequence Number flagield (S) is set to '1' the sequence number field is present and meaningfulvalid otherwise it is set to '0'. For GTP-U messages Echo Request, Echo Response, Error Indication and Supported Extension Headers Notification, the S flagield shall be set to '1'.
- N-PDU Number flag (PN) flag: the GTP-U header contains a meaningfulvalid includes the N-PDU Number field if the PN flag is set to 1.
- Message Type shall be set according to Table 1. The value 255 is used when T-PDUs are transmitted. The value 1 and 2 are used for "Echo" messages. The value 26 is used for “Error Indication” message. The value 31 is used for “Supported Extension Headers Notification” message.
- Length: This field indicates the length in octets of the payload, i.e. the rest of the packet following the mandatory part of the GTP header (that is the first 8 octets). The Sequence Number, the N-PDU Number or any Extension headers shall be considered to be part of the payload, i.e. included in the length count.
- Sequence Number: This field is present meaningfulvalid if and only if the S field is set to 1. Its presence is defined in clause 6. The handling of this field is specified in clause 9.1.1. It shall be used in order to decide whether or not to discard a received T-PDU, as specified in clause 9.3.1.1 Usage of the Sequence Number or as a transaction identity for GTP-U signalling messages having a response message defined for a request message. For GTP-U message, Supported Extension Headers Notification and Error Indication the Sequence Number shall be ignored by the receiver.
- N-PDU Number: This field shall be includedis meaningfulvalid if and only if the PN flag is set to 1. Its presence is defined in clause 6. In this case, the old SGSN (or RNC) uses it, at the Inter SGSN Routeing Area Update procedure (or SRNS relocation), to inform the new SGSN (or RNC) of the N-PDU number assigned to T-PDU. If an N-PDU number was not assigned to the T-PDU by PDCP, or if the T-PDU is to be transferred using unacknowledged peer-to-peer LLC operation, then PN shall be set to 0.
- TEID: Contains the Tunnel Endpoint Identifier for the tunnel to which this T-PDU belongs. The TEID shall be used by the receiving entity to find the PDP context, except for the following cases:
- The Echo Request/Response and Supported Extension Headers notification messages, where the Tunnel Endpoint Identifier shall be set to all zeroes.
- The Error Indication message where the Tunnel Endpoint Identifier shall be set to all zeros.

End of modifications