

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

NP-010459

Source: TSG CN WG4
Title: CRs on Rel-4 TEI
Agenda item: 8.12
Document for: APPROVAL

Introduction:

This document contains 6 CRs on Rel-4 Work Item "TEI4", that have been agreed by TSG CN WG4, and are forwarded to TSG CN Plenary meeting #13 for approval.

Spec	CR	Re	Doc-2nd-Level	Phase	Subject	Cat	Ver_C
23.003	031		N4-010859	Rel-4	Clarification on APN labels that begin with a digit	F	4.2.0
23.003	032		N4-010860	Rel-5	Clarification on APN labels that begin with a digit	A	5.0.0
23.082	012		N4-010841	Rel-4	Clarifications on long forwarded-to numbers	F	4.1.0
29.002	277	1	N4-010845	Rel-4	Correction on the SDL of NW initiated USSD operations	F	4.4.1
29.002	290		N4-010840	Rel-4	Clarifications on long forwarded-to numbers	F	4.4.1
29.060	230	1	N4-010974	Rel-4	Introduction of the Suspend-resume functionality in Rel-4 GTP specification	F	4.1.0

CHANGE REQUEST

⌘ **23.003 CR 031** ⌘ rev **-** ⌘ 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:	⌘ Clarification on APN labels that begin with a digit.		
Source:	⌘ CN4		
Work item code:	⌘ TEI4	Date:	⌘ 25/1/01
Category:	⌘ F	Release:	⌘ REL-4
	<p>Use <u>one</u> of the following categories:</p> <p>F (essential correction)</p> <p>A (corresponds to a correction in an earlier release)</p> <p>B (Addition of feature),</p> <p>C (Functional modification of feature)</p> <p>D (Editorial modification)</p> <p>Detailed explanations of the above categories can be found in 3GPP TR 21.900.</p>		<p>Use <u>one</u> of the following releases:</p> <p>2 (GSM Phase 2)</p> <p>R96 (Release 1996)</p> <p>R97 (Release 1997)</p> <p>R98 (Release 1998)</p> <p>R99 (Release 1999)</p> <p>REL-4 (Release 4)</p> <p>REL-5 (Release 5)</p>

Reason for change:	⌘ The wording in section 9.1 does not explicitly allow, nor explicitly forbid, APN labels to begin with a digit (as well as an alphabetic character). In RFC 1035 ("Domain Names - Implementation and Specification") it recommends (not mandates) that an initial letter should be used. In RFC 2181 ("Clarifications to the DNS Specification") it states that any binary values <i>are</i> permissible. But in RFC 1123 ("Requirements for Internet Hosts -- Application and Support") it states that for host name syntax, "The syntax of a legal Internet host name was specified in RFC-952 ["DOD Internet Host Table Specification"]. One aspect of host name syntax is hereby changed: the restriction on the first character is relaxed to allow either a letter or a digit. Host software MUST support this more liberal syntax." A real world example of this would be http://www.3gpp.org ! This CR therefore proposes to make support of APN labels that begin with either a letter or a number mandatory in GSM 03.03/23.003. This CR also fixes some missing references in the reference section.
Summary of change:	⌘ This document clarifies that it shall be possible for APN labels to begin with a digit or a letter. It also clarifies that hyphens shall never be used for the first or the last character of an APN label.
Consequences if not approved:	⌘ It will be ambiguous as to whether or not GPRS nodes are required to support APN labels which begin with a digit.

Clauses affected:	⌘ 1.1, 9.1		
Other specs affected:	<input type="checkbox"/> Other core specifications <input type="checkbox"/> Test specifications <input type="checkbox"/> O&M Specifications	⌘	

Other comments: ☼ Mirror CRs are submitted to R97 & R99. (No 23.003 yet for Rel4 or Rel5).

***** First Modified Section *****

1 Scope

...

1.1 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.
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- [1] 3GPP TS 21.905: "3G Vocabulary".
- [2] 3GPP TS 23.008: "Organization of subscriber data".
- [3] Void.
- [4] 3GPP TS 23.070: "Routeing of calls to/from Public Data Networks (PDN)".
- [5] 3GPP TS 24.008: "Mobile Radio Interface Layer 3 specification; Core Network Protocols; Stage 3".
- [6] 3GPP TS 29.060: "GPRS Tunnelling protocol (GPT) across the Gn and Gp interface".
- [7] GSM 03.20: "Digital cellular telecommunications system (Phase 2+); Security related network functions".
- [8] GSM 09.03: "Digital cellular telecommunications system (Phase 2+); Signalling requirements on interworking between the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN) and the Public Land Mobile Network (PLMN)".
- [9] GSM 11.11: "Digital cellular telecommunications system (Phase 2+); Specification of the Subscriber Identity Module - Mobile Equipment (SIM - ME) interface".
- [10] ITU-T Recommendation E.164: "Numbering plan for the ISDN era".
- [11] ITU-T Recommendation E.212: "Identification plan for land MSs".
- [12] ITU-T Recommendation E.213: "Telephone and ISDN numbering plan for land MSs in public land mobile networks (PLMN)".
- [13] ITU-T Recommendation X.121: "International numbering plan for public data networks".
- [14] RFC 791: "Internet Protocol".
- [15] RFC 1883: "Internet Protocol, Version 6 (IPv6) Specification".
- [16] 3GPP TS 25.401: "UTRAN Overall Description".
- [17] 3GPP TS 25.413: "UTRAN Iu Interface RANAP Signalling".
- [18] RFC 2181: "Clarifications to the DNS Specification".

[19] [RFC 1035: "Domain Names - Implementation and Specification"](#).

[20] [RFC 1123: "Requirements for Internet Hosts -- Application and Support"](#).

****** Next Modified Section ******

9 Definition of Access Point Name

In the GPRS backbone, an Access Point Name (APN) is a reference to a GGSN. To support inter-PLMN roaming, the internal GPRS DNS functionality is used to translate the APN into the IP address of the GGSN.

9.1 Structure of APN

The APN is composed of two parts as follows:

- The APN Network Identifier which defines to which external network the GGSN is connected to and optionally a requested service by the MS. This part of the APN is mandatory.
- The APN Operator Identifier which defines in which PLMN GPRS backbone the GGSN is located. This part of the APN is optional.

The APN Operator Identifier is placed after the APN Network Identifier. An APN consisting of both the Network Identifier and Operator Identifier corresponds to a DNS name of a GGSN and has a maximum length of 100 octets.

The syntax of the APN shall follow the Name Syntax defined in RFC 2181 [184], ~~and RFC 1035 [195]~~ and RFC 1123 [20]. The APN consists of one or more labels. Each label is coded as one octet length field followed by that number of octets coded as 8 bit ASCII characters. ~~Following RFC 1035 [195] the labels shall consist only of the alphabetic characters (A-Z and a-z), digits (0-9) and the dash/hyphen (-).~~ Following RFC 1123 [20], the label shall begin and end with either an alphabetic character or a digit. The case of alphabetic characters is not significant. The APN is not terminated by a length byte of zero.

NOTE: A length byte of zero is added by the SGSN at the end of the APN before interrogating a DNS server.

For the purpose of presentation, an APN is usually displayed as a string in which the labels are separated by dots (e.g. "Label1.Label2.Label3").

CHANGE REQUEST

⌘ **23.003 CR 032** ⌘ rev **-** ⌘ Current version: **5.0.0** ⌘

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:	⌘ Clarification on APN labels that begin with a digit.		
Source:	⌘ CN4		
Work item code:	⌘ TEI4	Date:	⌘ 25/1/01
Category:	⌘ A	Release:	⌘ REL-4
	<p>Use <u>one</u> of the following categories:</p> <p>F (essential correction)</p> <p>A (corresponds to a correction in an earlier release)</p> <p>B (Addition of feature),</p> <p>C (Functional modification of feature)</p> <p>D (Editorial modification)</p> <p>Detailed explanations of the above categories can be found in 3GPP TR 21.900.</p>		<p>Use <u>one</u> of the following releases:</p> <p>2 (GSM Phase 2)</p> <p>R96 (Release 1996)</p> <p>R97 (Release 1997)</p> <p>R98 (Release 1998)</p> <p>R99 (Release 1999)</p> <p>REL-4 (Release 4)</p> <p>REL-5 (Release 5)</p>

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Clauses affected:	⌘ 1.1, 9.1		
Other specs affected:	<input type="checkbox"/> Other core specifications <input type="checkbox"/> Test specifications <input type="checkbox"/> O&M Specifications	⌘	

Other comments: ☼ Mirror CRs are submitted to R97 & R99. (No 23.003 yet for Rel4 or Rel5).

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- [10] ITU-T Recommendation E.164: "Numbering plan for the ISDN era".
- [11] ITU-T Recommendation E.212: "Identification plan for land MSs".
- [12] ITU-T Recommendation E.213: "Telephone and ISDN numbering plan for land MSs in public land mobile networks (PLMN)".
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CR-Form-v4

CHANGE REQUEST

⌘ **23.082 CR 012** ⌘ ev **-** ⌘ 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:	⌘ Clarifications on long forwarded-to numbers		
Source:	⌘ CN4		
Work item code:	⌘ TEI4	Date:	⌘ 2001-07-03
Category:	⌘ F	Release:	⌘ REL-4
	Use <u>one</u> of the following categories:		Use <u>one</u> 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:	⌘ In current specifications there is a lack of definition of the long forwarded-to numbers.
Summary of change:	⌘ When not explicitly said, all information about forwarded-to numbers shall also apply to long forwarded-to numbers.
Consequences if not approved:	⌘ Misinterpretation of the format of long forwarded-to numbers

Clauses affected:	⌘ 0.5		
Other specs affected:	⌘ <input checked="" type="checkbox"/> Other core specifications	⌘ 29.002 v4.4.0 CR290 (N4-010840)	
	<input type="checkbox"/> Test specifications		
	<input type="checkbox"/> 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.

0.5 Support of Long Forwarded-to Numbers

For the following supplementary services, it shall be possible to register a long forwarded-to number which was not possible in previous versions of the services:

- Call forwarding unconditional;
- Call forwarding on mobile subscriber busy;
- Call forwarding on no reply;
- Call forwarding on mobile subscriber not reachable.

The main body of the present document assumes that all network entities comply with this version of the service. In each case an additional subclause (subclause x.10) defines the additional requirements when one or more network entities and/or the mobile station does not support Long Forwarded-to Numbers.

The functionality specified in this document does not imply any constraint on the length of a forwarded to number, except where such a constraint is explicitly stated.

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CR-Form-v3
CHANGE REQUEST
⌘ 29.002 CR 277 ⌘ rev 1 ⌘ Current version: 4.4.1 ⌘

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:	⌘ Correction on the SDL of NW initiated USSD operations		
Source:	⌘ CN4		
Work item code:	⌘ TEI	Date:	⌘ 4 July 2001
Category:	⌘ F	Release:	⌘ R4
	Use <u>one</u> of the following categories: F (essential correction) A (corresponds to a correction in an earlier release) B (Addition of feature), C (Functional modification of feature) D (Editorial modification)		Use <u>one</u> 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)
	Detailed explanations of the above categories can be found in 3GPP TR 21.900.		

Reason for change:	⌘ Similar to most of supplementary service operations, in NW initiated USSD operations, IMSI of terminating user are set in the destination reference in MAP_OPEN. And the IMSI is checked in the Receive_Open_Ind macro. So the NW initiated USSD's SDL does not have to check the IMSI. But this check is described in it. Therefore this CR proposes the deletion of the duplicate IMSI check.
Summary of change:	⌘ Delete the IMSI check from the SDL of NW initiated USSD operations.
Consequences if not approved:	⌘ An unnecessary and misleading check remains in the SDL of NW initiated USSD operations.

Clauses affected:	⌘ 22.10.3	
Other specs affected:	⌘ <input type="checkbox"/> Other core specifications ⌘ <input type="checkbox"/> Test specifications <input type="checkbox"/> 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.
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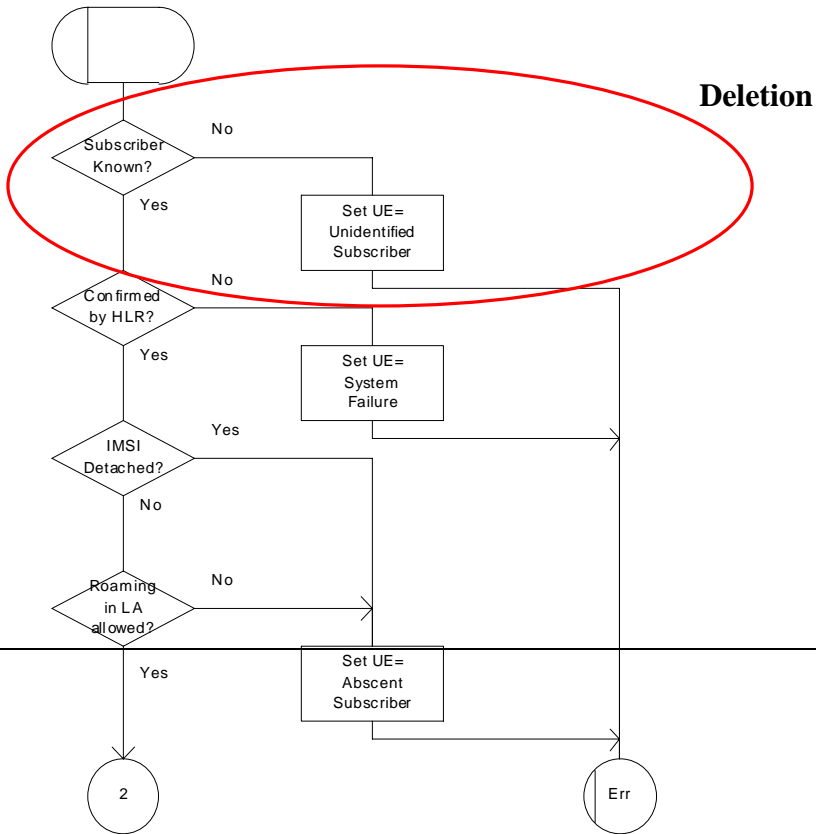
downloaded from the 3GPP server under <ftp://www.3gpp.org/specs/>. For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 TSG meetings.

- 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.

Macrodefinition Start_USSD_VLR

22.10.3_2.1(2)

Figure 22.10.3/2: Macro to establish a connection to the MS for a network initiated USSD operation.



Macrodefinition Start_USSD_VLR

22.10.3_2.1(2)

Figure 22.10.3/2: Macro to establish a connection to the MS for a network initiated USSD operation,

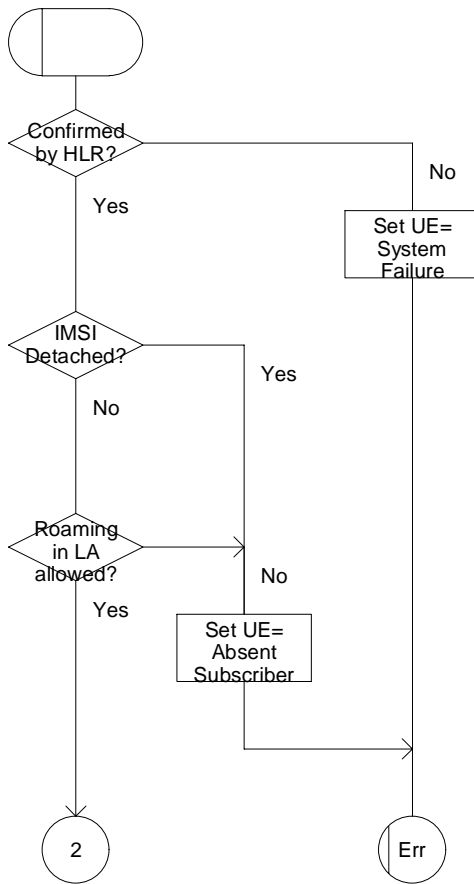


Figure 22.10.3/2 (sheet 1 of 2): Macro Start_USSD_VLR

CR-Form-v4	
CHANGE REQUEST	
⌘ 29.002 CR 290 ⌘ ev - ⌘ Current version: 4.4.1 ⌘	

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:	⌘ Clarifications on long forwarded-to numbers		
Source:	⌘ CN4		
Work item code:	⌘ TEI4	Date:	⌘ 2001-07-03
Category:	⌘ F	Release:	⌘ REL-4
	Use <u>one</u> of the following categories:		Use <u>one</u> 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:	⌘ In current specifications there is a lack of definition of the long forwarded-to numbers.
Summary of change:	⌘ It is specified that if a long forwarded-to number is to be sent, the NPI value has to be unknown. If the NAI value indicates that the number is in international format, the first digits shall contain the country code, as in E.164.
Consequences if not approved:	⌘ Supplementary services procedures should be modified to work properly with long forwarded-to numbers.

Clauses affected:	⌘ 17.7.8		
Other specs affected:	⌘ <input checked="" type="checkbox"/> Other core specifications	⌘ 23.082 v4.1.0 CR012 (N4-010841)	
	<input type="checkbox"/> Test specifications		
	<input type="checkbox"/> O&M Specifications		
Other comments:	⌘		

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- 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.

17.7.8 Common data types

...

```
FTN-AddressString ::=
    AddressString (SIZE (1..maxFTN-AddressLength))
    -- This type is used to represent forwarded-to numbers.
    -- For long forwarded-to numbers (longer than 15 digits) NPI shall be unknown;
    -- if NAI = international the first digits represent the country code (CC) as for E.164.
```

...

CR-Form-v4
CHANGE REQUEST
⌘ 29.060 CR 230 ⌘ rev 1 ⌘ 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:	⌘ Introduction of the Suspend-resume functionality in Rel-4 GTP specification		
Source:	⌘ CN4		
Work item code:	⌘ TEI4	Date:	⌘ 12-07-2001
Category:	⌘ F alignment with stage 2	Release:	⌘ Rel-4
	Use <u>one</u> 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 <u>one</u> 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)

Reason for change:	⌘ The stage 2 GPRS specification (23.060) has been changed recently to add a new feature for R'99. CN4 have agreed in Puerto rico that it is too late for such a change to be reflected in the GTP R99 specification andd a preferable option would have been to find a solution that would meet these requirements: 1) Be part of R4 2) Not introduce backward compatibility problems
Summary of change:	⌘ New Extension headers have been introduced to make sure that the handling of existing GTP messages is modified, when they are present, to functionally fulfill the stage 2 definition of Suspend messages.
Consequences if not approved:	⌘ The agreed position from N4 would not be fulfilled, and staged 2 and stage 3 would lack alignment strategy.

Clauses affected:	⌘ 6.1
Other specs affected:	⌘ <input type="checkbox"/> Other core specifications ⌘ <input type="checkbox"/> Test specifications <input type="checkbox"/> O&M Specifications
Other comments:	⌘

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- 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.

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 any of these three flags are set, 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 use of such fields is described in the sections related to GTP-C and to GTP-U.

Always present fields:

- Version field: This field is used to determine the version of the GTP protocol. For the treatment of other versions, see subclause 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 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 not be interpreted.
- Sequence number flag (S): This flag indicates the presence 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 not be interpreted. The S flag shall be set to '1' in GTP-C messages and in GTP-U/GTP signalling type of messages.
- N-PDU Number flag (PN): This flag indicates the presence 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 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.
- Message Type: This field indicates the type of GTP message. The valid values of the message type are defined in subclause 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.

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

- (*) This bit is a spare bit. It shall be sent as '0'. The receiver shall not evaluate this bit.
- 1) This field shall only be evaluated when indicated by the S flag.
- 2) This field shall only be evaluated when indicated by the PN flag.
- 3) This field shall only be evaluated when indicated by the E flag.
- 4) This field shall be present when any one or more of the S, PN and E flags are set.

Figure 2: Outline of the GTP Header

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 (*)

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

Figure 3: Outline of the Extension Header Format

The length of the Extension header shall be defined in a variable length of 4 octets, i.e. $m+1 = n \cdot 4$ 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		Meaning
8	7	
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).

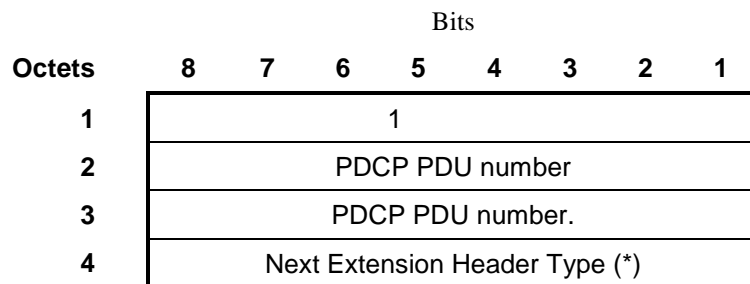
Next Extension Header Field Value	Type of Extension Header
0000 0000	No more extension headers
1100 0000	PDCP PDU number
<u>1100 0001</u>	<u>Suspend Request</u>
<u>1100 0010</u>	<u>Suspend Response</u>

Figure 5: Definition of Extension Header Type

6.1 Extension headers

6.1.1 PDCP PDU Number

This extension header is transmitted, for example, at SRNS relocation time to provide the PDCP sequence number of not yet acknowledged N-PDUs. It is 4 octets long, and therefore the Length field has value 1.



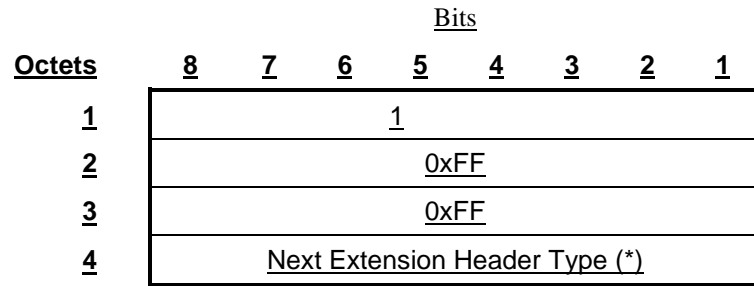
(*) The value of this field is 0 if no other Extension header follows.

Figure 6: PDCP PDU number Extension Header

6.1.2 Suspend Request

This extension header is transmitted at inter-SGSN handover, when a DTM capable MS has an ongoing circuit call and it moves to a cell that does not support DTM, under the domain of a new 2G SGSN. When the new SGSN receives a "Suspend" message from the BSS, it sends a SGSN context request with this additional extension header to the old SGSN. The old SGSN shall reply with a SGSN context response, including the Extension Header described in section

6.1.3. The SGSN Context Request message shall not be handled other than for the purpose of implementing the Suspend functionality as described in 23.060. The “SGSN context request” message shall not include the “IMSI”, “packet-TMSI”, “packet TMSI signature” and “MS validated” IEs.

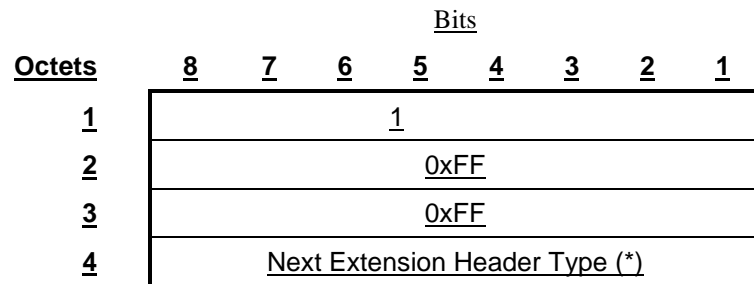


(*) The value of this field is 0 if no other Extension header follows.

Figure 7: Suspend Request Extension Header

6.1.3 Suspend Response

When a SGSN receives a SGSN Context Request with the extension header “Suspend Request” described in 6.1.2, it shall perform the actions specified in 23.060 and it shall return a SGSN Context Response with this extension header included. The SGSN Context Response message shall not be handled other than for the purpose of implementing the Suspend functionality as described in 23.060. The “SGSN context response” shall not include the “IMSI”, “Radio priority SMS”, “Radio priority”, “packet flow ID”, “MM context”, “PDP context” and “SGSN Address for control plane” IEs.



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

Figure 8: Suspend Response Extension Header