**3GPP TSG_CN**
**Plenary Meeting #9, Oahu, Hawaii**
**20th – 22nd September 2000.**

**Tdoc NP-000489**

**Source:** TSG_N WG 4

**Title:** CRs to R99 Work Item GTP enhancements

**Agenda item:**

**Document for:** APPROVAL

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**Introduction:**

This document contains 16 CRs on R99 Work Item GTP enhancements, that have been agreed by TSG_N WG4, and is forwarded to TSG_N Plenary meeting #9 for approval.

| SM | TDoc | SPEC | CR | REV | PHAS | VERS | SUBJECT | CAT |
|---|---|---|---|---|---|---|---|---|
| CN9 | N4-000719 | 29.060 | 148 | | R99 | 3.5.0 | Clarification on SGSN context acknowledge message | F |
| CN9 | N4-000699 | 29.060 | 139 | 1 | R99 | 3.5.0 | Clarifications on the use of TEID in the Control Plane | F |
| CN9 | N4-000694 | 29.060 | 126 | 2 | R99 | 3.5.0 | Sequence number in signalling messages | F |
| CN9 | N4-000753 | 29.060 | 146 | 2 | R99 | 3.5.0 | Correction to the SGSN Forward relocation Request and | F |
| CN9 | N4-000729 | 29.060 | 145 | 1 | R99 | 3.5.0 | Correction to the SGSN Context transfer Request and | F |
| CN9 | N4-000616 | 29.060 | 142 | | R99 | 3.5.0 | Clarifications on the presence condition of TLLI/P-TMSI in | F |
| CN9 | N4-000606 | 29.060 | 140 | | R99 | 3.5.0 | Correction on the handling of the PDP Context at | F |
| CN9 | N4-000679 | 29.060 | 144 | | R99 | 3.5.0 | Alignment of the description of tables for Identification | F |
| CN9 | N4-000718 | 29.060 | 147 | | R99 | 3.5.0 | Clarification or the handling of response messages | F |
| CN9 | N4-000715 | 29.060 | 105 | 1 | R99 | 3.5.0 | Race Conditions Avoidance | F |
| CN9 | N4-000724 | 29.060 | 143 | 2 | R99 | 3.5.0 | Correction on Reliable transmission of signalling messages | F |
| CN9 | N4-000780 | 29.060 | 122 | 3 | R99 | 3.5.0 | Solution for race condition of GTP procedures | F |
| CN9 | N4-000484 | 29.060 | 127 | | R99 | 3.5.0 | Clarification of the conditional information elements | D |
| CN9 | N4-000518 | 29.060 | 128 | 1 | R99 | 3.5.0 | Enhancement of MS Network capabirity and GPRS Ciphering | F |
| CN9 | N4-000517 | 29.060 | 124 | 1 | R99 | 3.5.0 | Editorial modifications concerning TEID Control Plane and | D |
| CN9 | N4-000516 | 29.060 | 123 | 1 | R99 | 3.5.0 | Clarifications concerning the use of TEID in the Control Plane | F |

**3GPP TSG CN WG4#04**
**Seattle, Washington, US**
***28 August - 1 September 2000***

3GPP TSG CNWG4
Rotenburg, Germany, 22-26 May 2000

*Document* ***N4-000715***
*e.g. for 3GPP use the format TP-99xxx*
*or for SMG, use the format P-99-xxx*

# CHANGE REQUEST

*Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.*

| **29.060** | **CR** | **105r1** | Current Version: | 3.5.0 |
|---|---|---|---|---|

*GSM (AA.BB) or 3G (AA.BBB) specification number ↑* *↑ CR number as allocated by MCC support team*

For submission to: CN#09 *list expected approval meeting # here ↑*

for approval [X] for information [ ]

strategic [ ] non-strategic [X] *(for SMG use only)*

*Form: CR cover sheet, version 2 for 3GPP and SMG* *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

**Proposed change affects:** *(at least one should be marked with an X)* (U)SIM [ ] ME [ ] UTRAN / Radio [ ] Core Network [ ]

**Source:** N4 **Date:** 26 May 2000

**Subject:** Race Conditions Avoidance

**Work item:** GTP Enhancements

**Category:** *(only one category shall be marked with an X)*

| | | |
|---|---|---|
| F | Correction | [X] |
| A | Corresponds to a correction in an earlier release | [ ] |
| B | Addition of feature | [ ] |
| C | Functional modification of feature | [ ] |
| D | Editorial modification | [ ] |

**Release:**

| | |
|---|---|
| Phase 2 | [ ] |
| Release 96 | [ ] |
| Release 97 | [ ] |
| Release 98 | [ ] |
| Release 99 | [X] |
| Release 00 | [ ] |

**Reason for change:**

The creation and deletion of PDP contexts as currently defined is prone to race conditions.

SGSN sends to GGSN creation of PDP context #2. This message gets lost.

SGSN sends to GGSN deletion of PDP context #1 (the primary and only PDP context already active)

GGSN ACKs deletion of PDP context # 1 and deletes all the context associated to the MS (including the TEID for signaling)

SGSN re-sends to GGSN creation of PDP context #2. The GGSN receives this message, but it is unfortunately populated with stale information (wrong TEID for signaling and linked N-SAPI) .

As a result the user gets unexpectedly disconnected, and the operator may receive complaints. This CR proposes changes to the mechanism that will avoid such situations:

The reason for the problem is that the concept of PDP session needs to be overlaid to the concept of PDP context. In R'98 this was not a problem, since a data session and a PDP contexts were isomorphic. Now, the session may be made of 1 or more PDP contexts. This introduces some problems if we don't explicitly differentiate between tear down of the session or of the PDP context.

This revision clarifies that the MS is not required to insert the Tear down Indicator. Instead, the sending GSN will include the TI if there is only one active PDP context and no outstanding PDP Context Creation Request messages for other PDP contexts than the one being torn down exist.

**Clauses affected:** 7.3.5

| | | | | |
|---|---|---|---|---|
| **Other specs affected:** | Other 3G core specifications | | → List of CRs: | |
| | Other GSM core specifications | | → List of CRs: | |
| | MS test specifications | | → List of CRs: | |
| | BSS test specifications | | → List of CRs: | |
| | O&M specifications | | → List of CRs: | |

| | |
|---|---|
| **Other comments:** | |


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<--------- double-click here for help and instructions on how to create a CR.

## 7.3.5 Delete PDP Context Request

A Delete PDP Context Request shall be sent from a SGSN node to a GGSN node as part of the GPRS Detach procedure or the GPRS PDP Context Deactivation procedure or from a GGSN node to a SGSN node as part of the PDP Context Deactivation Initiated by GGSN procedure. A request shall be used to deactivate an activated PDP Context or an activated set of PDP contexts associated to a PDP address assigned to a single MS.

A GSN shall be prepared to receive a Delete PDP Context Request at any time and shall always reply regardless if the PDP context exists or not, except in the case described below.

If any collision occurs, the Delete PDP Context Request takes precedence over any other Tunnel Management message.

The ~~optional~~ Teardown Ind is used to indicate that all PDP contexts that share the PDP address with the PDP context identified in the request should also be deactivated. This may trigger the deletion of all the information kept for a MS at a GSN, if no other PDP contexts associated to other PDP addresses are active on the GSN. This information element shall always be included by the sending GSN when the last PDP context associated to a PDP address is torn down and there are no outstanding Create PDP context requests for other PDP context different from the one being torn down for that PDP address.

If a GSN receives a Delete PDP context without a Teardown Indicator and only that PDP context is active for a PDP address, then the GSN shall ignore the message. (Note: This is symptom of a race condition. The reliable delivery of signalling messages will eventually lead to a consistent situation, allowing the teardown of the PDP context.)

The optional Private Extension contains vendor or operator specific information.

**Table 10: Information elements in a Delete PDP Context Request**

| Information element | Presence requirement | Reference |
|---|---|---|
| Teardown Ind | ~~Optional~~Conditional | 7.7.16 |
| NSAPI | Mandatory | 7.7.17 |
| Private Extension | Optional | 7.7.44 |

**3GPP TSG CN WG4 Meeting #3**
**Seattle, USA, 28 August - 1 September 2000**

***Document N4-000780***
*e.g. for 3GPP use the format TP-99xxx*
*or for SMG, use the format P-99-xxx*

# CHANGE REQUEST

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| 29.060 | CR | 122r3 | Current Version: | 3.5.0 |
|---|---|---|---|---|

*GSM (AA.BB) or 3G (AA.BBB) specification number ↑* *↑ CR number as allocated by MCC support team*

| For submission to: | CN#09 | For approval | X | strategic | | (for SMG use only) |
|---|---|---|---|---|---|---|
| *list expected approval meeting # here ↑* | | for information | | non-strategic | X | |

*Form: CR cover sheet, version 2 for 3GPP and SMG* *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

**Proposed change affects:** (U)SIM [ ] ME [ ] UTRAN / Radio [ ] Core Network [X]
*(at least one should be marked with an X)*

**Source:** N4 **Date:** 28/08/2000

**Subject:** Solution for race condition of GTP procedures

**Work item:** GTP enhancements

**Category:** *(only one category shall be marked with an X)*

| | | | | | |
|---|---|---|---|---|---|
| F | Correction | X | **Release:** | Phase 2 | |
| A | Corresponds to a correction in an earlier release | | | Release 96 | |
| B | Addition of feature | | | Release 97 | |
| C | Functional modification of feature | | | Release 98 | |
| D | Editorial modification | | | Release 99 | X |
| | | | | Release 00 | |

**Reason for change:**

According to the current 29.060 it is possible that following race condition occurs.

When the GGSN receives a T-PDU for a user, it checks whether another PDP context for the user has already been activated or not. If a PDP context has already been activated for the user, the GGSN uses the same TEID-C value as 1st PDP context for PDU notification procedure. However if existing PDP context is deleted before the SGSN receives the PDU notification request, the SGSN releases all information on the signalling tunnel including the TEID-C. This means the SGSN can't remember the TEID-C value in the header of PDU notification request when SGSN receives it, i.e. this network initiated activation procedure fails.

In addition there are some other possible race conditions similar to above case. According to the current GTP specification the single GTP Tunnel for signalling (i.e. the single TEID-C value) is shared to handle all PDP Contexts for the user. This causes above race conditions. Assigning TEID-C on PDP address/APN basis not on MS basis can reduce the possibility to be involved in the race condition because TEID-C is less shared.

It is therefore proposed that separate GTP Tunnel for signalling (i.e. separate TEID-C value) be allocated to each pair of PDP address and APN (for tunnel management messages).

If this CR is not approved the unnecessary race conditions occur and the user gets unexpectedly disconnected.

**Clauses affected:** 3.1, 7.3.8, 7.3.10, 8.2

**Other specs affected:**

| | | |
|---|---|---|
| Other 3G core specifications | [ ] | → List of CRs: |
| Other GSM core specifications | [ ] | → List of CRs: |
| MS test specifications | [ ] | → List of CRs: |
| BSS test specifications | [ ] | → List of CRs: |
| O&M specifications | [ ] | → List of CRs: |

**Other comments:**

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# 3 Definitions and abbreviations

## 3.1 Definitions

For the purposes of the present document, the following terms and definitions apply.

**Conditional:** When the presence requirement for the information element is conditional, the receiving protocol level can check the presence or absence of an IE based on the received information.

**G-PDU:** T-PDU plus a GTP header. A G-PDU is sent in a path.

**GTP Tunnel**: A GTP tunnel in the GTP-U plane is defined for each PDP Context in the GSNs and/or each RAB in the RNC. A GTP tunnel in the GTP-C plane is ~~also~~ defined for ~~each~~ all PDP Contexts with the same PDP address and APN (for Tunnel Management messages) or for each MS (for messages not related to Tunnel Management)~~in the GTP-C plane~~. A GTP tunnel is identified in each node with a TEID, an IP address and a UDP port number. A GTP tunnel is necessary to forward packets between an external packet data network and an MS user.

**MM Context:** Information sets held in MS and GSNs for a GPRS subscriber related to mobility management (MM) (please refer to the MM Context Information Element).

**NSAPI:** Network Service Access Point Identifier. An integer value in the range [0; 15], identifying a certain PDP Context. It identifies a PDP context belonging to a specific MM Context ID.

**Path:** UDP/IP path is used to multiplex GTP tunnels.

**Path Protocol:** Path Protocol is the protocol used as a bearer of GTP between GSNs or between a GSN and a RNC.

**PDP:** Packet Data Protocol (PDP) is a network protocol used by an external packet data network interfacing to GPRS.

**PDP Context:** Information sets held in MS and GSNs for a PDP address (please refer to the PDP Context Information Element).

**Quality of Service:** Quality of Service may be applicable for the GPRS backbone and the Iu interface if the path media supports it. Separate paths with different priorities may be defined between a GSN pair or between a GSN and an RNC.

**GTP-C Message:** GTP-C or control plane messages are exchanged between GSN/RNC pairs in a path. The control plane messages are used to transfer GSN capability information between GSN pairs, to create, update and delete GTP tunnels and for path management. Note that only the T-PDU message is a non-signalling message.

**GTP-U Message**: GTP-U or user plane messages are exchanged between GSN pairs or GSN/RNC pairs in a path. The user plane messages are used to carry user data packets and for path management.

**T-PDU:** Original packet, for example an IP datagram, from an MS or a network node in an external packet data network. A T-PDU is the payload that is tunnelled in the GTP tunnel.

**Traffic Flow Template:** TFTs are used by GGSN to distinguish between different user payload packets and transmit packets with different QoS requirements via different PDP context but to the same PDP address.

**Tunnel Endpoint IDentifier (TEID):** The TEID 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.

**UDP/IP Path:** UDP/IP path is a connection-less path defined by two end-points and an IP address and a UDP port number define an end-point. A UDP/IP path carries G-PDUs between GSN nodes related to one or more GTP tunnels.

*** *Next Change* ***

## 7.3.8 PDU Notification Request

When receiving a T-PDU the GGSN checks if a PDP context is established for that PDP address. If no PDP context has been previously established, the GGSN may try to deliver the T-PDU by initiating the Network-Requested PDP Context Activation procedure. The criteria, used by the GGSN to determine whether trying to deliver the T-PDU to the MS or not, may be based on subscription information in the GGSN and are outside the scope of GPRS standardisation.

As part of the Network-Requested PDP Context Activation procedure the GGSN sends a PDU Notification Request message to the SGSN indicated by the HLR. If the GGSN has an active PDP context with different SGSN from the one indicated by the HLR, then the SGSN information shall be obtained from an active PDP context. When receiving this message, the SGSN shall be responsible for requesting the MS to activate the indicated PDP Context.

The IMSI is inserted in the IMSI information element in the PDU Notification Request message.

The End User Address information element contains the PDP type and PDP address that the SGSN shall request the MS to activate.

The Access Point Name information element identifies the access point of packet data network that wishes to connect to the MS.

The Tunnel Endpoint Identifier Control Plane information element shall be a tunnel endpoint identifier control plane selected by the GGSN and shall be used by the SGSN in the GTP header of the corresponding PDU Notification Response or PDU Notification Request Reject message. ~~If the GGSN has already confirmed successful assignment of its Tunnel Endpoint Identifier for Signalling to the peer SGSN, this field shall not be present. The GGSN confirms successful assignment of its Tunnel Endpoint Identifier for Signalling to the SGSN when it receives any message with its assigned Tunnel Endpoint Identifier for Signalling in the GTP header from the SGSN.~~

If the GGSN receives a Create PDP Context Request before the PDU Notification Response, the GGSN shall handle the Create PDP Context Request as normal context activation and ignore the following PDU Notification Response.

If the SGSN receives a PDU Notification Request after a Create PDP Context Request has been sent but before a Create PDP Context Response has been received, the SGSN shall:

1. send a PDU Notification Response with Cause ‘Request accepted’ without any further processing and then
2. wait for the Create PDP Context Response.

The optional Private Extension contains vendor or operator specific information.

**Table 14: Information Elements in a PDU Notification Request**

| Information element | Presence requirement | Reference |
|---|---|---|
| IMSI | Mandatory | 7.7.2 |
| Tunnel Endpoint Identifier Control Plane | Mandatory~~Conditional~~ | 7.7.14 |
| End User Address | Mandatory | 7.7.27 |
| Access Point Name | Mandatory | 7.7.30 |
| Private Extension | Optional | 7.7.44 |

*** *Next Change* ***

## 7.3.10 PDU Notification Reject Request

If the PDP context activation proceeds after the PDU Notification Response, but the PDP context was not established, the SGSN sends a PDU Notification Reject Request message. The Cause value indicates the reason why the PDP Context could not be established:

- ‘MS Not GPRS Responding’.
- ‘MS Refuses’.

When receiving the PDU Notification Reject Request message the GGSN may reject or discard the stored T-PDU(s) depending on the PDP type.

After an unsuccessful activation attempt the GSNs may perform some actions to prevent unnecessary enquiries to the HLR as described in the section Unsuccessful Network-Requested PDP Context Activation procedure in 3G TS 23.060.

The Tunnel Endpoint Identifier in the GTP header of the PDU Notification Reject Request message shall be the same as the Tunnel Endpoint Identifier for Signalling information element of the PDU Notification Request that triggered the reject.

The Tunnel Endpoint Identifier for Signalling information element shall be a tunnel endpoint identifier signalling selected by the SGSN and shall be used by the GGSN in the GTP header of the corresponding PDU Notification Reject Response message. ~~If the SGSN has already confirmed successful assignment of its Tunnel Endpoint Identifier for Signalling to the peer GGSN, this field shall not be present. The SGSN confirms successful assignment of its Tunnel Endpoint Identifier for Signalling to the GGSN when it receives any message with its assigned Tunnel Endpoint Identifier for Signalling in the GTP header from the GGSN.~~

The End User Address information element contains the PDP type and PDP address of the PDP context that could not be activated.

The Access Point Name shall be the same as the Access Point Name of the received PDU Notification Request message that triggered the reject.

The optional Private Extension contains vendor or operator specific information.

**Table 16: Information Elements in a PDU Notification Reject Request**

| Information element | Presence requirement | Reference |
|---|---|---|
| Cause | Mandatory | 7.7.1 |
| Tunnel Endpoint Identifier Control Plane | Mandatory~~Conditional~~ | 7.7.14 |
| End User Address | Mandatory | 7.7.27 |
| Access Point Name | Mandatory | 7.7.30 |
| Private Extension | Optional | 7.7.44 |

*** *Next Change* ***

## 8.2 Usage of the GTP-C Header

For control plane messages the GTP header shall be used as follows:

- Version shall be set to decimal 1 (‘001’).
- Protocol Type (PT) shall be set to ‘1’.
- (S) shall be set to ‘1’.
- PN shall be set to ‘0’. A GTP-C receiver shall ignore this flag.
- 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 control plane message excluding the GTP header.
- 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 ~~the~~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 for Signalling by the GGSN.
  - 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~~, except for the case where the GGSN has already been assigned a Tunnel Endpoint Identifier for Signalling by the peer SGSN~~.
- The Error Indication message where the Tunnel Endpoint Identifier shall be set to all zeros, in case there is no signalling tunnel established for that specific MS.
- 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 Signalling of the new SGSN.
- All Location Management messages, where the Tunnel Endpoint Identifier shall be set to all zeros.

- 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 control plane 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.
- 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 for Data (II) information element where several occurrences of each type are allowed.

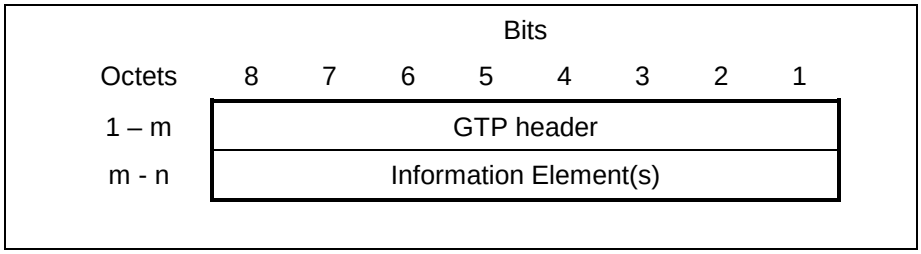


**Figure 61: GTP Header followed by subsequent Information Elements**

**Document (revision of N4-000516 N4-000467)**

**3GPP TSG CN WG4 Meeting #3**
**Helsinki, Finland, 17-21 July 2000**

*e.g. for 3GPP use the format TP-99xxx*
*or for SMG, use the format P-99-xxx*

# CHANGE REQUEST

*Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.*

| 29.060 | CR | 123r1 | Current Version: | 3.5.0 |
|---|---|---|---|---|

*GSM (AA.BB) or 3G (AA.BBB) specification number ↑* *↑ CR number as allocated by MCC support team*

| For submission to: | CN #09 | for approval | X | strategic | | (for SMG use only) |
|---|---|---|---|---|---|---|
| *list expected approval meeting # here ↑* | | for information | | non-strategic | X | |

*Form: CR cover sheet, version 2 for 3GPP and SMG* *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

**Proposed change affects:** *(at least one should be marked with an X)* (U)SIM [ ] ME [ ] UTRAN / Radio [ ] Core Network [X]

**Source:** N4 **Date:** 17.July.2000

**Subject:** Clarifications concerning the use of TEID in the Control Plane

**Work item:** GTP enhancements

**Category:** *(only one category shall be marked with an X)*

| | | | | | |
|---|---|---|---|---|---|
| F | Correction | X | **Release:** | Phase 2 | |
| A | Corresponds to a correction in an earlier release | | | Release 96 | |
| B | Addition of feature | | | Release 97 | |
| C | Functional modification of feature | | | Release 98 | |
| D | Editorial modification | | | Release 99 | X |
| | | | | Release 00 | |

**Reason for change:** To clarify the value used to populate the TEID parameter.

**Clauses affected:** 7.7.14

**Other specs affected:**

| | | |
|---|---|---|
| Other 3G core specifications | [ ] | → List of CRs: |
| Other GSM core specifications | [ ] | → List of CRs: |
| MS test specifications | [ ] | → List of CRs: |
| BSS test specifications | [ ] | → List of CRs: |
| O&M specifications | [ ] | → List of CRs: |

**Other comments:**

help.doc

<--------- double-click here for help and instructions on how to create a CR.

## 7.7.14 Tunnel Endpoint Identifier Control Plane

The Tunnel Endpoint Identifier Control Plane information element contains the Tunnel Endpoint Identifier for the control plane; it is assigned ~~requested~~ by the receiver of the flow. It distinguishes the tunnel from other tunnels between the same pair of entities.

If the receiver has not yet assigned a TEID for this tunnel, it shall assign an unused value to the TEID.

If the receiver has already ~~confirmed successful assignment of its~~assigned a Tunnel Endpoint Identifier ~~for Signalling~~Control Plane to the tunnel, but has not yet received confirmation of successful assignment from the transmitter, this information element shall ~~be~~ take the same ~~as the~~ value as was sent before for this tunnel.

The receiver receives confirm~~ation~~s of successful assignment of its Tunnel Endpoint Identifier ~~for Signalling~~Control Plane ~~to~~ from the transmitter when it receives any message with its assigned Tunnel Endpoint Identifier Control Plane ~~for Signalling~~ in the GTP header from the transmitter.

If the transmitter received the Tunnel Endpoint Identifier Control Plane ~~for Signalling~~ for the first time from the receiver, this information element shall be stored. If the transmitter has already received the Tunnel Endpoint Identifier Control Plane~~for Signalling~~, this information shall be ignored.

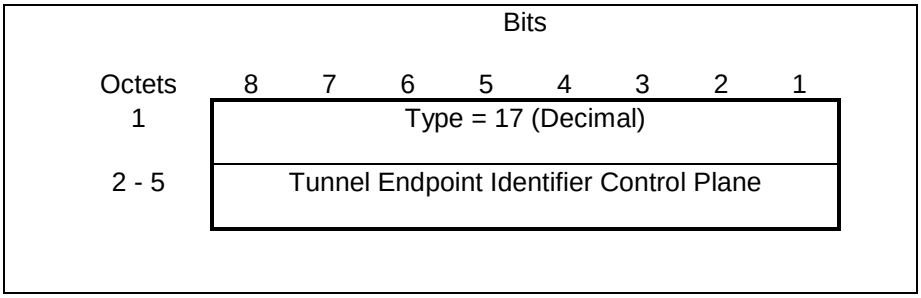


**Figure 22: Tunnel Endpoint Identifier Control Plane Information Element**

**3GPP TSG CN WG4 Meeting #3**
**Helsinki, Finland, 17-21 July 2000**

***Document*** (Revision of) ***N4-000517*** ***(N4-000468)***

*e.g. for 3GPP use the format TP-99xxx*
*or for SMG, use the format P-99-xxx*

# CHANGE REQUEST

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| **29.060** | **CR** | **124r1** | Current Version: | 3.5.0 |
|---|---|---|---|---|

*GSM (AA.BB) or 3G (AA.BBB) specification number ↑* *↑ CR number as allocated by MCC support team*

| For submission to: | CN #09 | for approval | X | strategic | | (for SMG use only) |
|---|---|---|---|---|---|---|
| *list expected approval meeting # here ↑* | | for information | | non-strategic | X | |

*Form: CR cover sheet, version 2 for 3GPP and SMG* *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

**Proposed change affects:** *(at least one should be marked with an X)* (U)SIM [ ] ME [ ] UTRAN / Radio [ ] Core Network [X]

**Source:** N4 **Date:** 17.July.2000

**Subject:** Editorial modifications concerning TEID Control Plane and TEID Data I/II

**Work item:** GTP enhancements

**Category:** *(only one category shall be marked with an X)*

| | | | | | |
|---|---|---|---|---|---|
| F | Correction | | **Release:** | Phase 2 | |
| A | Corresponds to a correction in an earlier release | | | Release 96 | |
| B | Addition of feature | | | Release 97 | |
| C | Functional modification of feature | | | Release 98 | |
| D | Editorial modification | X | | Release 99 | X |
| | | | | Release 00 | |

**Reason for change:**
N4-000341 that proposed to aline the name of “TEID Control Plane” was approved in last Rotenburg meeting. However some contents that were included by another CRs is still using “TEID for signalling”.
The aliments of the name of TEID Data I/II are also needed. TEID for Data (I)/(II) shall be replaced to TEID Data I/II.

And some editorial mistakes related TEIID IE shall be corrected.

**Clauses affected:** 7.3, 7.5, 7.7, 8.2

**Other specs affected:**

| | | |
|---|---|---|
| Other 3G core specifications | [ ] | → List of CRs: |
| Other GSM core specifications | [ ] | → List of CRs: |
| MS test specifications | [ ] | → List of CRs: |
| BSS test specifications | [ ] | → List of CRs: |
| O&M specifications | [ ] | → List of CRs: |

**Other comments:**

help.doc

<--------- double-click here for help and instructions on how to create a CR.

## 7.3 Tunnel Management Messages

### 7.3.1 Create PDP Context Request

A Create PDP Context Request shall be sent from a SGSN node to a GGSN node as a part of the GPRS PDP Context Activation procedure. The GGSN IP address where the SGSN sends the Create PDP Context Request is the first IP address in the list of IP addresses provided by the DNS server. After sending the Create PDP Context Request message, the SGSN marks the PDP context as 'waiting for response'. In this state the SGSN shall accept G-PDUs from the GGSN but shall not send these G-PDUs to the MS. A valid request initiates the creation of a tunnel between a PDP Context in a SGSN and a PDP Context in a GGSN. If the procedure is not successfully completed, the SGSN repeats the Create PDP Context Request message to the next GGSN address in the list of IP addresses, if there is one. If the list is exhausted the activation procedure fails.

The Tunnel Endpoint Identifier ~~for~~ Data ~~(~~I~~)~~ field specifies a downlink Tunnel Endpoint Identifier for G-PDUs which is chosen by the SGSN. The GGSN shall include this Tunnel Endpoint Identifier in the GTP header of all subsequent downlink G-PDUs which are related to the requested PDP context.

The Tunnel Endpoint Identifier Control Plane field specifies a downlink Tunnel Endpoint Identifier for control plane messages which is chosen by the SGSN. The GGSN shall include this Tunnel Endpoint Identifier in the GTP header of all subsequent downlink control plane messages which are related to the requested PDP context. If the SGSN has already confirmed successful assignment of its Tunnel Endpoint Identifier Control Plane ~~for Signalling~~ to the peer GGSN, this field shall not be present. The SGSN confirms successful assignment of its Tunnel Endpoint Identifier Control Plane ~~for Signalling~~ to the GGSN when it receives any message with its assigned Tunnel Endpoint Identifier Control Plane ~~for Signalling~~ in the GTP header from the GGSN.

The MSISDN of the MS is passed to the GGSN inside the Create PDP Context Request; This additional information can be used when a secure access to a remote application residing on a server is needed. The GGSN would be in fact able to provide the user identity (i. e. the MSISDN) to the remote application server, providing it with the level of trust granted to users through successfully performing the GPRS authentication procedures, without having to re-authenticate the user at the application level.

If the MS requests a dynamic PDP address and a dynamic PDP address is allowed, then the PDP Address field in the End User Address information element shall be empty. If the MS requests a static PDP Address then the PDP Address field in the End User Address information element shall contain the static PDP Address. In case the PDP addresses carried in the End User Address and optionally in the Protocol Configuration Option information element contain contradicting information, the PDP address carried in the End User Address information element takes the higher precedence. The Quality of Service Profile information element shall be the QoS values to be negotiated between the MS and the SGSN at PDP Context activation.

The SGSN shall include an SGSN Address for control plane and an SGSN address for user traffic, which may differ from that provided by the underlying network service (e.g. IP). The GGSN shall store these SGSN Addresses and use them when sending control plane on this GTP tunnel or G-PDUs to the SGSN for the MS.

The SGSN shall include a Recovery information element into the Create PDP Context Request if the SGSN is in contact with the GGSN for the very first time or if the SGSN has restarted recently and the new Restart Counter value has not yet been indicated to the GGSN. The GGSN that receives a Recovery information element in the Create PDP Context Request message element shall handle it in the same way as when receiving an Echo Response message. The Create PDP Context Request message shall be considered as a valid activation request for the PDP context included in the message.

The SGSN shall include either the MS provided APN, a subscribed APN or an SGSN selected APN in the message; the Access Point Name may be used by the GGSN to differentiate accesses to different external networks.
The Selection Mode information element shall indicate the origin of the APN in the message.

For contexts created by the Secondary PDP Context Activation Procedure the SGSN shall include the linked NSAPI. Linked NSAPI indicates the NSAPI assigned to any one of the already activated PDP contexts for this PDP address and APN.

The Secondary PDP Context Activation Procedure may be executed without providing a Traffic Flow Template (TFT) to the newly activated PDP context if all other active PDP contexts for this PDP address and APN already have an associated TFT, otherwise a TFT shall be provided. TFT is used for packet filtering in the GGSN.

When using the Secondary PDP Context Activation Procedure, the Selection mode, IMSI, MSISDN, End User Address, Access Point Name and Protocol Configuration Options information elements shall not be included in the message.

The optional Protocol Configuration Options information element is applicable for the end user protocol 'IP' only.

The SGSN shall select one GGSN based on the user provided or SGSN selected APN. The GGSN may have a logical name that is converted to an address. The conversion may be performed with any name-to-address function. The converted address shall be stored in the "GGSN Address in Use" field in the PDP context and be used during the entire lifetime of the PDP context.

NOTE: A DNS query may be used as the name-to-IP address mapping of the GGSN. The IP address returned in the DNS response is then stored in the "GGSN Address in Use" field in the PDP context.

The IMSI information element together with the NSAPI information element uniquely identifies the PDP context to be created.

The SGSN may send a Create PDP Context Request even if the PDP context is already active.

The GGSN shall check if the PDP context already exists for the MS. The existing parameters in the PDP context shall then be replaced with the parameters in the Create PDP Context Request message. If a dynamic PDP address has already been allocated for the existing context, this address should be used and copied to the Create PDP Context Response message.

If the GGSN uses the MNRG flag and the flag is set, the GGSN should treat the Create PDP Context Request as a Note MS Present Request and clear the MNRG flag.

The SGSN shall determine Charging Characteristics from the Subscribed Charging Characteristics and/or PDP Context Charging Characteristics depending on the presence of the information in the Packet Domain Subscription Data as defined in 3G TS 23.060 [4].

The SGSN shall include Trace Reference, Trace Type, Trigger Id, and OMC Identity in the message if GGSN trace is activated. The SGSN shall copy Trace Reference, Trace Type, and OMC Identity from the trace request received from the HLR or OMC.

The optional Private Extension contains vendor or operator specific information.

**Table 5: Information Elements in a Create PDP Context Request**

| Information element | Presence requirement | Reference |
|---|---|---|
| IMSI | Conditional | 7.7.2 |
| Recovery | Optional | 7.7.11 |
| Selection mode | Conditional | 7.7.12 |
| Tunnel Endpoint Identifier ~~for~~ Data ~~(I)~~ | Mandatory | 7.7.13 |
| Tunnel Endpoint Identifier Control Plane | Conditional | 7.7.14 |
| NSAPI | Mandatory | 7.7.17 |
| Linked NSAPI | Conditional | 7.7.17 |
| Charging Characteristics | Optional | 7.7.23 |
| Trace Reference | Optional | 7.7.24 |
| Trace Type | Optional | 7.7.25 |
| End User Address | Conditional | 7.7.27 |
| Access Point Name | Conditional | 7.7.30 |
| Protocol Configuration Options | Conditional | 7.7.31 |
| SGSN Address for signalling | Mandatory | GSN Address 7.7.32 |
| SGSN Address for user traffic | Mandatory | GSN Address 7.7.32 |
| MSISDN | Conditional | 7.7.33 |
| Quality of Service Profile | Mandatory | 7.7.34 |
| TFT | Conditional | 7.7.36 |
| Trigger Id | Optional | 7.7.41 |
| OMC Identity | Optional | 7.7.42 |
| Private Extension | Optional | 7.7.44 |

### 7.3.2 Create PDP Context Response

The message shall be sent from a GGSN node to a SGSN node as a response of a Create PDP Context Request. When the SGSN receives a Create PDP Context Response with the Cause value indicating 'Request Accepted', the SGSN activates the PDP context and may start to forward T-PDUs to/from the MS from/to the external data network.

The Cause value indicates if a PDP context has been created in the GGSN or not. A PDP context has not been created in the GGSN if the Cause differs from 'Request accepted'. Possible Cause values are:

- "Request Accepted".
- "No resources available".
- "All dynamic PDP addresses are occupied".
- "No memory is available".
- "Missing or unknown APN".
- "Unknown PDP address or PDP type".
- "User authentication failed".
- "System failure".
- "Semantic error in the TFT operation".
- "Syntactic error in the TFT operation".
- "Semantic errors in packet filter(s)".
- "Syntactic errors in packet filters(s)".
- "Mandatory IE incorrect".
- "Mandatory IE missing".
- "Optional IE incorrect".
- "Invalid message format".
- "Version not supported".

'No resources available' indicates e.g. that all dynamic PDP addresses are occupied or no memory is available. 'Missing or unknown APN' indicates e.g. when the GGSN does not support the Access Point Name. 'Unknown PDP address or PDP type' indicates e.g. when the GGSN does not support the PDP type or the PDP address. 'User authentication failed' indicates that the external packet network has rejected the service requested by the user.

Only the Cause information element, optionally Protocol Configuration Options and optionally the Recovery information element shall be included in the response if the Cause contains another value than 'Request accepted'.

All information elements, except Recovery, Protocol Configuration Options, and Private Extension, are mandatory if the Cause contains the value 'Request accepted'.

The Tunnel Endpoint Identifier ~~for~~ Data ~~(I)~~ field specifies an uplink Tunnel Endpoint Identifier for G-PDUs that is chosen by the GGSN. The SGSN shall include this Tunnel Endpoint Identifier in the GTP header of all subsequent uplink G-PDUs which are related to the requested PDP context.

The Tunnel Endpoint Identifier Control Plane field specifies an uplink Tunnel Endpoint Identifier for control plane messages, which is chosen by the GGSN. The SGSN shall include this Tunnel Endpoint Identifier in the GTP header of all subsequent uplink-control plane messages, which are related to the requested PDP context. If the GGSN has already confirmed successful assignment of its Tunnel Endpoint Identifier Control Plane to the peer SGSN, this field shall not be present. The GGSN confirms successful assignment of its Tunnel Endpoint Identifier Control Plane to the SGSN when it receives any message with its assigned Tunnel Endpoint Identifier Control Plane ~~for Signalling~~ in the GTP header from the SGSN.

The GGSN shall include a GGSN Address for control plane and a GGSN address for user traffic, which may differ from that provided by the underlying network service (e.g. IP). The SGSN shall store these GGSN Addresses and use them when sending control plane on this GTP tunnel or G-PDUs to the GGSN for the MS.

If the MS requests a dynamic PDP address and a dynamic PDP address is allowed, then the End User Address information element shall be included and the PDP Address field in the End User Address information element shall contain the dynamic PDP Address allocated by the GGSN. If the MS requests a static PDP address, then the End User Address information element shall not be included. In case the PDP addresses carried in the End User Address and optionally in the Protocol Configuration Option information element contain contradicting information, the PDP address carried in the End User Address information element takes the higher precedence.

The QoS values supplied in the Create PDP Context Request may be negotiated downwards by the GGSN. The negotiated values or the original values from SGSN are inserted in the Quality of Service Profile information element of the Create PDP Context Response message.

The GGSN may start to forward T-PDUs after the Create PDP Context Response has been sent. The SGSN may start to forward T-PDUs when the Create PDP Context Response has been received. In this case the SGSN shall also be prepared to receive T-PDUs from the GGSN after it has sent a Create PDP Context Request but before a Create PDP Context Response has been received.

The Reordering Required value supplied in the Create PDP Context Response indicates whether the end user protocol benefits from packet in sequence delivery and whether the SGSN and the GGSN therefore shall perform reordering or not. In other words, if reordering is required by the GGSN, the SGSN and the GGSN shall perform reordering of incoming T-PDUs on this path. When the Quality of Service (QoS) Profile is Release 99 the receiving entity shall ignore the Reordering Required.

The GGSN shall include the Recovery information element into the Create PDP Context Response if the GGSN is in contact with the SGSN for the first time or the GGSN has restarted recently and the new Restart Counter value has not yet been indicated to the SGSN. The SGSN receiving the Recovery information element shall handle it as when an Echo Response message is received but shall consider the PDP context being created as active if the response indicates successful context activation at the GGSN.

The Charging ID is used to identify all charging records produced in SGSN(s) and the GGSN for this PDP context. The Charging ID is generated by the GGSN and shall be unique within the GGSN.

The Charging Gateway Address is the IP address of the recommended Charging Gateway Functionality to which the SGSN should transfer the Charging Detail Records (CDR) for this PDP Context.

The optional Private Extension contains vendor or operator specific information.

**Table 6: Information Elements in a Create PDP Context Response**

| Information element | Presence requirement | Reference |
|---|---|---|
| Cause | Mandatory | 7.7.1 |
| Reordering required | Conditional | 7.7.6 |
| Recovery | Optional | 7.7.11 |
| Tunnel Endpoint Identifier ~~for~~ Data ~~(I)~~ | Conditional | 7.7.13 |
| Tunnel Endpoint Identifier Control Plane | Conditional | 7.7.14 |
| Charging ID | Conditional | 7.7.26 |
| End User Address | Conditional | 7.7.27 |
| Protocol Configuration Options | Optional | 7.7.31 |
| GGSN Address for Control Plane | Conditional | GSN Address 7.7.32 |
| GGSN Address for user traffic | Conditional | GSN Address 7.7.32 |
| Quality of Service Profile | Conditional | 7.7.34 |
| Charging Gateway Address | Optional | 7.7.43 |
| Private Extension | Optional | 7.7.44 |

## 7.3.3 Update PDP Context Request

An Update PDP Context Request message shall be sent from a SGSN to a GGSN as part of the GPRS Inter SGSN Routeing Update procedure or the PDP Context Modification procedure or to redistribute contexts due to load sharing. It shall be used to change the QoS and the path. The message shall be sent by the new SGSN at the Inter SGSN Routeing Update procedure.

The NSAPI information element together with the Tunnel Endpoint Identifier in the GTP header unambiguously identifies a PDP Context in the GGSN.

The Tunnel Endpoint Identifier ~~for~~ Data ~~(I)~~ field specifies a downlink Tunnel Endpoint Identifier for G-PDUs which is chosen by the SGSN. The GGSN shall include this Tunnel Endpoint Identifier in the GTP header of all subsequent downlink G-PDUs that are related to the requested PDP context.

The Tunnel Endpoint Identifier Control Plane field specifies a downlink Tunnel Endpoint Identifier Control Plane ~~for signalling~~ messages which is chosen by the SGSN. The GGSN shall include this Tunnel Endpoint Identifier in the GTP header of all subsequent downlink control plane messages that are related to the requested PDP context. If the SGSN has already confirmed successful assignment of its Tunnel Endpoint Identifier Control Plane ~~for Signalling~~ to the peer GGSN, this field shall not be present. The SGSN confirms successful assignment of its Tunnel Endpoint Identifier Control Plane ~~for Signalling~~ to the GGSN when it receives any message with its assigned Tunnel Endpoint Identifier Control Plane ~~for Signalling~~ in the GTP header from the GGSN.

The Quality of Service Profile information element shall include the QoS negotiated between the MS and SGSN at PDP Context activation or the new QoS negotiated in the PDP Context Modification procedure.

The SGSN shall include an SGSN Address for control plane and an SGSN address for user traffic, which may differ from that provided by the underlying network service (e.g. IP). The GGSN shall store these SGSN Addresses and use them when sending subsequent control plane on this GTP tunnel or G-PDUs to the SGSN for the MS. When active contexts are being redistributed due to load sharing, G-PDUs that are in transit across the Gn-interface are in an undetermined state and may be lost.

The SGSN shall include a Recovery information element into the Update PDP Context Request if the SGSN is in contact with the GGSN for the very first time or if the SGSN has restarted recently and the new Restart Counter value has not yet been indicated to the GGSN. The GGSN that receives a Recovery information element in the Update PDP Context Request message element shall handle it in the same way as when receiving an Echo Response message. The Update PDP Context Request message shall be considered as a valid update request for the PDP context indicated in the message.

The Traffic Flow Template (TFT) is used to distinguish between different user traffic flows.

The SGSN shall include Trace Reference, Trace Type, Trigger Id, and OMC Identity in the message if GGSN trace is activated while the PDP context is active. The SGSN shall copy Trace Reference, Trace Type, and OMC Identity from the trace request received from the HLR or OMC.

The optional Private Extension contains vendor or operator specific information.

**Table 7: Information Elements in an SGSN-Initiated Update PDP Context Request**

| Information element | Presence requirement | Reference |
|---|---|---|
| Recovery | Optional | 7.7.11 |
| Tunnel Endpoint Identifier ~~for~~ Data ~~(I)~~ | Mandatory | 7.7.13 |
| Tunnel Endpoint Identifier Control Plane | Conditional | 7.7.14 |
| NSAPI | Mandatory | 7.7.17 |
| Trace Reference | Optional | 7.7.24 |
| Trace Type | Optional | 7.7.25 |
| SGSN Address for Control Plane | Mandatory | GSN Address 7.7.32 |
| SGSN Address for User Traffic | Mandatory | GSN Address 7.7.32 |
| Quality of Service Profile | Mandatory | 7.7.34 |
| TFT | Optional | 7.7.36 |
| Trigger Id | Optional | 7.7.41 |
| OMC Identity | Optional | 7.7.42 |
| Private Extension | Optional | 7.7.44 |

An Update PDP Context Request may also be sent from a GGSN to a SGSN to re-negotiate the QoS of a PDP context. This GGSN-initiated Update PDP Context Request can also be used to provide a PDP address to the SGSN (and MS). The latter shall be used by GGSN when it acts as a DHCP Relay Agent or Mobil IP Foreign Agent.

The Quality of Service Profile information element shall include the GGSN requested QoS.

The End User Address information element shall contain a valid IPv4 or IPv6 address.

The GGSN shall include a Recovery information element into the Update PDP Context Request if the GGSN has restarted recently and the new Restart Counter value has not yet been indicated to the SGSN. The SGSN that receives a Recovery information element in the Update PDP Context Request message element shall handle it in the same way as when receiving an Echo Response message. The Update PDP Context Request message shall be considered as a valid update request for the PDP context indicated in the message.

The NSAPI information element together with the Tunnel Endpoint Identifier in the GTP header unambiguously identifies a PDP Context in the SGSN.

The optional Private Extension contains vendor or operator specific information.

**Table 8: Information Elements in a GGSN-Initiated Update PDP Context Request**

| Information element | Presence requirement | Reference |
|---|---|---|
| Recovery | Optional | 7.7.11 |
| NSAPI | Mandatory | 7.7.17 |
| End User Address | Optional | 7.7.27 |
| Quality of Service Profile | Optional | 7.7.34 |
| Private Extension | Optional | 7.7.44 |

## 7.3.4 Update PDP Context Response

The message shall be sent from a GGSN node to a SGSN node as a response of an Update PDP Context Request.

If the SGSN receives an Update PDP Context Response with a Cause value other than 'Request accepted', it shall deactivate the PDP context.

Only the Cause information element and optionally the Recovery information element shall be included in the response if the Cause contains another value than 'Request accepted'.

Possible Cause values are:

- 'Request Accepted'.
- 'Non-existent'.
- 'Service not supported'.
- 'System failure'.
- 'Semantic error in the TFT operation'.
- 'Syntactic error in the TFT operation'.
- 'Semantic errors in packet filter(s)'.
- 'Syntactic errors in packet filters(s)'.
- 'Mandatory IE incorrect'.
- 'Mandatory IE missing'.
- 'Optional IE incorrect'.
- 'Invalid message format'.
- 'Version not supported'.

The Tunnel Endpoint Identifier ~~for~~ Data ~~(~~I~~)~~ field specifies an uplink Tunnel Endpoint Identifier for G-PDUs that is chosen by the GGSN. The SGSN shall include this Tunnel Endpoint Identifier in the GTP header of all subsequent uplink G-PDUs that are related to the requested PDP context. When the source IP address of the Update PDP Context Request changes, this information element shall be included if the Cause contains the value 'Request accepted'.

The Tunnel Endpoint Identifier Control Plane field specifies an uplink Tunnel Endpoint Identifier Control Plane ~~for signalling~~ messages which is chosen by the GGSN. The SGSN shall include this Tunnel Endpoint Identifier in the GTP header of all subsequent uplink control plane messages which are related to the requested PDP context. If the GGSN has already confirmed successful assignment of its Tunnel Endpoint Identifier Control Plane ~~for Signalling~~ to the peer SGSN, this field shall not be present. The GGSN confirms successful assignment of its Tunnel Endpoint Identifier Control Plane ~~for Signalling~~ to the SGSN when it receives any message with its assigned Tunnel Endpoint Identifier Control Plane ~~for Signalling~~ in the GTP header from the SGSN.

The QoS values supplied in the Update PDP Context Request may be negotiated downwards by the GGSN. The negotiated values or the original value from SGSN is inserted in the Quality of Service Profile information element. This information element shall be included if the Cause contains the value 'Request accepted'.

The GGSN may start to forward T-PDUs after the Update PDP Context Response has been sent. The SGSN may start to forward T-PDUs when the Update PDP Context Response has been received. In this case the SGSN shall also be prepared to receive T-PDUs from the GGSN after it has sent an Update PDP Context Request but before an Update PDP Context Response has been received.

The GGSN shall include a GGSN Address for control plane and an GGSN address for user traffic, which may differ from that provided by the underlying network service (e.g. IP). The SGSN shall store these GGSN Addresses and use them when sending subsequent control plane on this GTP tunnel or G-PDUs to the GGSN for the MS. When active contexts are being redistributed due to load sharing, G-PDUs that are in transit across the Gn-interface are in an undetermined state and may be lost. When the source IP address of the Update PDP Context Request changes, the GGSN Address for user traffic shall be included if the Cause contains the value 'Request accepted'.

The GGSN shall include the Recovery information element into the Update PDP Context Response if the GGSN is in contact with the SGSN for the first time or if the GGSN has restarted recently and the new Restart Counter value has not yet been indicated to the SGSN. The SGSN receiving the Recovery information element shall handle it as when an Echo Response message is received but shall consider the PDP context as updated and active if the response cause indicates a successful operation at the GGSN.

The Charging ID is used to identify all charging records produced in SGSN(s) and the GGSN for this PDP context. The Charging ID has been previously generated by the GGSN and is unique for this PDP context. If an inter-SGSN routing area update occurs, it is transferred to the new SGSN as part of each active PDP context. When the source IP address of the Update PDP Context Request changes, this information element shall be included if the Cause contains the value 'Request accepted'.

The Charging Gateway Address is the IP address of the recommended Charging Gateway Functionality to which the SGSN should transfer the Charging Detail Records (CDR) for this PDP Context.

The optional Private Extension contains vendor or operator specific information.

**Table 9: Information Elements in an Update PDP Context Response sent by a GGSN**

| Information element | Presence requirement | Reference |
|---|---|---|
| Cause | Mandatory | 7.7.1 |
| Recovery | Optional | 7.7.11 |
| Tunnel Endpoint Identifier ~~for~~ Data ~~(I)~~ | Conditional | 7.7.13 |
| Tunnel Endpoint Identifier Control Plane | Conditional | 7.7.14 |
| Charging ID | Conditional | 7.7.26 |
| GGSN Address for Control Plane | Conditional | GSN Address 7.7.32 |
| GGSN Address for User Traffic | Conditional | GSN Address 7.7.32 |
| Quality of Service Profile | Conditional | 7.7.34 |
| Charging Gateway Address | Optional | 7.7.43 |
| Private Extension | Optional | 7.7.44 |

The message can also be sent from a SGSN node to a GGSN node as a response of a GGSN-initiated Update PDP Context Request.

If the GGSN receives an Update PDP Context Response with a Cause value other than 'Request accepted', it shall abort the update of the PDP context.

Only the Cause information element and optionally the Recovery information element shall be included in the response if the Cause contains another value than 'Request accepted'.

Possible Cause values are the same as for the Update PDP Context Response sent by a GGSN.

The QoS values supplied in the Update PDP Context Request may be negotiated downwards by the SGSN. The negotiated values or the original value from GGSN is inserted in the Quality of Service Profile information element. This information element shall be included if the Cause contains the value 'Request accepted' and a QoS information element was supplied in the corresponding request message.

The SGSN shall include the Recovery information element into the Update PDP Context Response if the SGSN has restarted recently and the new Restart Counter value has not yet been indicated to the GGSN. The GGSN receiving the

Recovery information element shall handle it as when an Echo Response message is received but shall consider the PDP context as updated and active if the response cause indicates a successful operation at the SGSN.

**Table 10: Information Elements in an Update PDP Context Response sent by a SGSN**

| Information element | Presence requirement | Reference |
|---|---|---|
| Cause | Mandatory | 7.7.1 |
| Recovery | Optional | 7.7.11 |
| Quality of Service Profile | Conditional | 7.7.34 |
| Private Extension | Optional | 7.7.44 |

********** NEXT MODIFICATION **********

## 7.3.7 Error Indication

The SGSN may send an Error Indication to the GGSN if no PDP context exists or the PDP context is inactive for a received G-PDU. The SGSN shall also send an Error Indication to the GGSN if no MM context exists for a received G-PDU.

At the Inter SGSN Routing Area Update and the Inter SRNS Relocation procedures the new SGSN sends an Error Indication to the old SGSN if no active PDP context exists for a received G-PDU.

The GGSN may send an Error Indication to the SGSN if no PDP context exists for a received G-PDU.

The GGSN shall delete its PDP context and may notify the Operation and Maintenance network element when an Error Indication is received.

The SGSN shall indicate to the MS when a PDP context has been deleted due to the reception of an Error Indication message. The MS may then request the re-establishment of the PDP context.

The old SGSN shall delete its PDP context and may notify the Operation and Maintenance network element when an Error Indication is received.

The information elements Tunnel Endpoint Identifier Data I and GSN address shall be the TEID and GSN address respectively, fetched from the G-PDU that triggered this procedure.

The optional Private Extension contains vendor or operator specific information.

**Table 13: Information Elements in an Error Indication**

| Information element | Presence requirement | Reference |
|---|---|---|
| Tunnel Endpoint Identifier Data I | Mandatory | 7.7.13 |
| GSN Address | Mandatory | 7.7.13 |
| Private Extension | Optional | 7.7.44 |

## 7.3.8 PDU Notification Request

When receiving a T-PDU the GGSN checks if a PDP context is established for that PDP address. If no PDP context has been previously established, the GGSN may try to deliver the T-PDU by initiating the Network-Requested PDP Context Activation procedure. The criteria, used by the GGSN to determine whether trying to deliver the T-PDU to the MS or not, may be based on subscription information in the GGSN and are outside the scope of GPRS standardisation.

As part of the Network-Requested PDP Context Activation procedure the GGSN sends a PDU Notification Request message to the SGSN indicated by the HLR. If the GGSN has an active PDP context with different SGSN from the one indicated by the HLR, then the SGSN information shall be obtained from an active PDP context. When receiving this message, the SGSN shall be responsible for requesting the MS to activate the indicated PDP Context.

The IMSI is inserted in the IMSI information element in the PDU Notification Request message.

The End User Address information element contains the PDP type and PDP address that the SGSN shall request the MS to activate.

The Access Point Name information element identifies the access point of packet data network that wishes to connect to the MS.

The Tunnel Endpoint Identifier Control Plane information element shall be a tunnel endpoint identifier Ceontrol plane selected by the GGSN and shall be used by the SGSN in the GTP header of the corresponding PDU Notification Response or PDU Notification Request Reject message. If the GGSN has already confirmed successful assignment of its Tunnel Endpoint Identifier Control Plane ~~for Signalling~~ to the peer SGSN, this field shall not be present. The GGSN confirms successful assignment of its Tunnel Endpoint Identifier Control Plane ~~for Signalling~~ to the SGSN when it receives any message with its assigned Tunnel Endpoint Identifier Control Plane ~~for Signalling~~ in the GTP header from the SGSN.

If the GGSN receives a Create PDP Context Request before the PDU Notification Response, the GGSN shall handle the Create PDP Context Request as normal context activation and ignore the following PDU Notification Response.

If the SGSN receives a PDU Notification Request after a Create PDP Context Request has been sent but before a Create PDP Context Response has been received, the SGSN shall:

1. send a PDU Notification Response with Cause 'Request accepted' without any further processing and then
2. wait for the Create PDP Context Response.

The optional Private Extension contains vendor or operator specific information.

**Table 14: Information Elements in a PDU Notification Request**

| Information element | Presence requirement | Reference |
|---|---|---|
| IMSI | Mandatory | 7.7.2 |
| Tunnel Endpoint Identifier Control Plane | Conditional | 7.7.14 |
| End User Address | Mandatory | 7.7.27 |
| Access Point Name | Mandatory | 7.7.30 |
| Private Extension | Optional | 7.7.44 |

********** NEXT MODIFICATION **********

## 7.3.10 PDU Notification Reject Request

If the PDP context activation proceeds after the PDU Notification Response, but the PDP context was not established, the SGSN sends a PDU Notification Reject Request message. The Cause value indicates the reason why the PDP Context could not be established:

- 'MS Not GPRS Responding'.
- 'MS Refuses'.

When receiving the PDU Notification Reject Request message the GGSN may reject or discard the stored T-PDU(s) depending on the PDP type.

After an unsuccessful activation attempt the GSNs may perform some actions to prevent unnecessary enquiries to the HLR as described in the section Unsuccessful Network-Requested PDP Context Activation procedure in 3G TS 23.060.

The Tunnel Endpoint Identifier in the GTP header of the PDU Notification Reject Request message shall be the same as the Tunnel Endpoint Identifier Control Plane ~~for Signalling~~ information element of the PDU Notification Request that triggered the reject.

The Tunnel Endpoint Identifier Control Plane ~~for Signalling~~ information element shall be a tunnel endpoint identifier Control Plane ~~signalling~~ selected by the SGSN and shall be used by the GGSN in the GTP header of the corresponding PDU Notification Reject Response message. If the SGSN has already confirmed successful assignment of its Tunnel Endpoint Identifier Control Plane ~~for Signalling~~ to the peer GGSN, this field shall not be present. The SGSN confirms successful assignment of its Tunnel Endpoint Identifier Control Plane ~~for Signalling~~ to the GGSN when it receives any message with its assigned Tunnel Endpoint Identifier Control Plane ~~for Signalling~~ in the GTP header from the GGSN.

The End User Address information element contains the PDP type and PDP address of the PDP context that could not be activated.

The Access Point Name shall be the same as the Access Point Name of the received PDU Notification Request message that triggered the reject.

The optional Private Extension contains vendor or operator specific information.

**Table 16: Information Elements in a PDU Notification Reject Request**

| Information element | Presence requirement | Reference |
|---|---|---|
| Cause | Mandatory | 7.7.1 |
| Tunnel Endpoint Identifier Control Plane | Conditional | 7.7.14 |
| End User Address | Mandatory | 7.7.27 |
| Access Point Name | Mandatory | 7.7.30 |
| Private Extension | Optional | 7.7.44 |

********** NEXT MODIFICATION **********

## 7.5.5 SGSN Context Acknowledge

The new SGSN shall send an SGSN Context Acknowledge message to the old SGSN as a response to the SGSN Context Response message. Only after receiving the SGSN Context Acknowledge message, shall the old SGSN start to forward user data packets. SGSN Context Acknowledge indicates to the old SGSN that the new SGSN has correctly received PDP Context information and is ready to receive user data packets identified by the corresponding Tunnel Endpoint Identifier values.

Possible cause values are:

- 'Request accepted'.
- 'System failure'.
- 'Mandatory IE incorrect'.
- 'Mandatory IE missing'.
- 'Optional IE incorrect'.
- 'No resources available'.
- 'Invalid message format'.
- 'Version not supported'.
- 'Authentication failure'.

Only the Cause information element shall be included in the acknowledgement if the Cause contains a value other than 'Request accepted'.

For each active PDP context the new SGSN shall include a Tunnel Endpoint Identifier Data II information element. The Tunnel Endpoint Identifier Data II field specifies a Tunnel Endpoint Identifier which is chosen by the new SGSN for a particular PDP context. The old SGSN shall include this Tunnel Endpoint Identifier ~~I~~in the GTP header of all subsequent G-PDUs which are sent from the old SGSN to the new SGSN and related to the particular PDP context. When active PDP context(s) exist, this information element shall be included if the Cause contains the value 'Request accepted'.

The new SGSN shall include an SGSN Address for user traffic, which may differ from that provided by the underlying network service (e.g. IP). The old SGSN shall store this SGSN Address and use it when sending G-PDUs to the new SGSN for the MS. When active PDP context(s) exist, this information element shall be included if the Cause contains the value 'Request accepted'.

The optional Private Extension contains vendor or operator specific information.

**Table 28: Information Elements in a SGSN Context Acknowledge**

| Information element | Presence requirement | Reference |
|---|---|---|
| Cause | Mandatory | 7.7.1 |
| Tunnel Endpoint Identifier Data II | Conditional | 7.7.15 |
| SGSN Address for user traffic | Conditional | GSN Address 7.7.32 |
| Private Extension | Optional | 7.7.44 |

********** NEXT MODIFICATION **********

### 7.7.13 Tunnel Endpoint Identifier Data I

The Tunnel Endpoint Identifier Data I information element contains the Tunnel Endpoint Identifier for data transmission requested by the receiver of the flow.

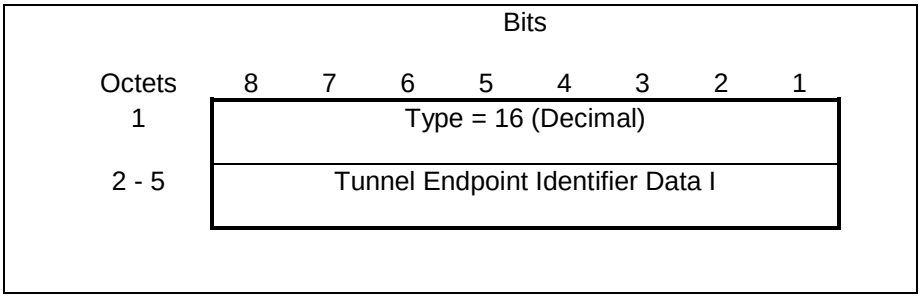


**Figure 21: Tunnel Endpoint Identifier Data I Information Element**

### 7.7.14 Tunnel Endpoint Identifier Control Plane

The Tunnel Endpoint Identifier Control Plane information element contains the Tunnel Endpoint Identifier for control plane requested by the receiver of the flow.

If the receiver has already confirmed successful assignment of its Tunnel Endpoint Identifier Control Plane ~~for Signalling~~ to the transmitter, this information element shall be the same as the value sent before. The receiver confirms successful assignment of its Tunnel Endpoint Identifier Control Plane ~~for Signalling~~ to the transmitter when it receives any message with its assigned Tunnel Endpoint Identifier Control Plane ~~for Signalling~~ in the GTP header from the transmitter.

If the transmitter received the Tunnel Endpoint Identifier Control Plane ~~for Signalling~~ for the first time from the receiver, this information element shall be stored. If the transmitter has already received the Tunnel Endpoint Identifier Control Plane ~~for Signalling~~, this information shall be ignored.

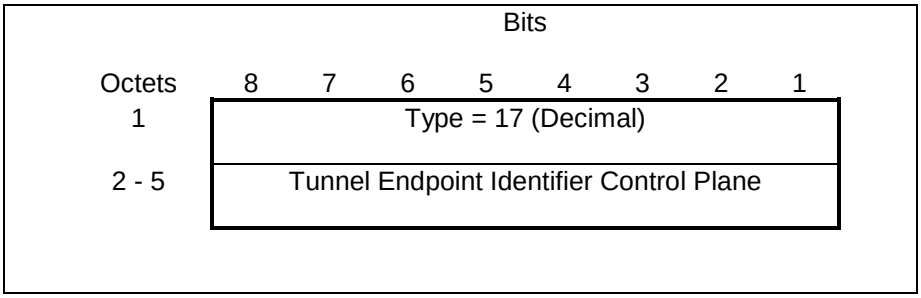


**Figure 22: Tunnel Endpoint Identifier Control Plane Information Element**

********** NEXT MODIFICATION **********

## 8.2 Usage of the GTP-C Header

For control plane messages the GTP header shall be used as follows:

- Version shall be set to decimal 1 (‘001’).
- Protocol Type (PT) shall be set to ‘1’.
- (S) shall be set to ‘1’.
- PN shall be set to ‘0’. A GTP-C receiver shall ignore this flag.
- 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 control plane message excluding the GTP header.

- The Tunnel Endpoint Identifier is set by the sending entity to the value requested by the corresponding entity (SGSN or GGSN); it identifies the MS and its associated context data, 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 ~~for Signalling~~ by the GGSN.

  - 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, except for the case where the GGSN has already been assigned a Tunnel Endpoint Identifier Control Plane ~~for Signalling~~ by the peer SGSN.

  - The Error Indication message where the Tunnel Endpoint Identifier shall be set to all zeros, in case there is no signalling tunnel established for that specific MS.

  - 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 ~~Signalling~~ of the new SGSN.

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

- 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 control plane 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.

- 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 ~~for~~ Data ~~(~~II~~)~~ information element where several occurrences of each type are allowed.

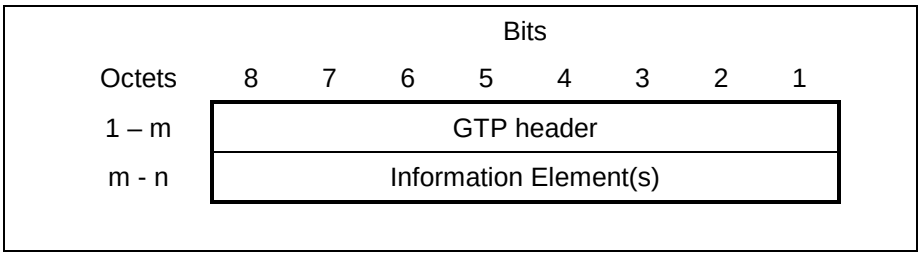


**Figure 61: GTP Header followed by subsequent Information Elements**

**3GPP TSG-CN-WG4 meeting #4**
**Seattle, USA, 28 August - 1 September 2000**

***Document N4-000694***
*e.g. for 3GPP use the format TP-99xxx*
*or for SMG, use the format P-99-xxx*

# CHANGE REQUEST

*Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.*

| 29.060 | CR | 126r2 | Current Version: | 3.5.0 |
|---|---|---|---|---|

*GSM (AA.BB) or 3G (AA.BBB) specification number ↑* *↑ CR number as allocated by MCC support team*

| For submission to: | CN#09 | for approval | X | strategic | | (for SMG use only) |
|---|---|---|---|---|---|---|
| *list expected approval meeting # here ↑* | | for information | | non-strategic | X | |

*Form: CR cover sheet, version 2 for 3GPP and SMG* *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

| **Proposed change affects:** *(at least one should be marked with an X)* | (U)SIM | | ME | | UTRAN / Radio | X | Core Network | X |
|---|---|---|---|---|---|---|---|---|

**Source:** N4 **Date:** 22nd Aug 2000

**Subject:** Sequence number in signalling messages

**Work item:** GPRS

**Category:** *(only one category shall be marked with an X)*

| | | | | | |
|---|---|---|---|---|---|
| F | Correction | X | **Release:** | Phase 2 | |
| A | Corresponds to a correction in an earlier release | | | Release 96 | |
| B | Addition of feature | | | Release 97 | |
| C | Functional modification of feature | | | Release 98 | |
| D | Editorial modification | | | Release 99 | X |
| | | | | Release 00 | |

**Reason for change:**

This is a revised version of CR 126 that was presented in CN4 meeting #3 in Helsinki. In Helsinki it was discussed that it would be useful for signalling messages to always carry the sequence number field (i.e. signalling messages always to be 12 octets long) although the sequence number field is not always interpreted. The sequence number field is not always interpreted since it cannot be used as a transaction identifier for signalling messages without a response being defined.

This CR proposes that all signalling messages in GTP-U and GTP-C shall include the sequence number field. However, for certain messages, i.e. “Version not supported” (GTP-C and GTP-U), “Supported extension headers notification” (GTP-C and GTP-U), and “Error indication” (GTP-C) the sequence number field shall be ignored by the receiver.
In chapter 7.6 words”control plane” have been replaced with “signalling” since GTP-U also has a signalling request/response message pair (i.e. Echo request/response.)

**Clauses affected:** 6, 7.6, 8.2, 9.3.1

**Other specs affected:**

| | | |
|---|---|---|
| Other 3G core specifications | | → List of CRs: |
| Other GSM core specifications | | → List of CRs: |
| MS test specifications | | → List of CRs: |
| BSS test specifications | | → List of CRs: |
| O&M specifications | | → List of CRs: |

**Other comments:**

help.doc

<--------- double-click here for help and instructions on how to create a CR.

# 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.

- 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 GTP-U T-PDUs. It is used as a transaction identity for ~~control plane~~ signalling messages ~~in GTP-C~~ having a response message defined for a request message and as an increasing sequence number for T-PDUs, 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 G-PDU.

| Octets | Bits 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)] | | | | | | | |

(*) 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 SP, 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*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 G-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 |

**Figure 5: Definition of Extension Header Type**

## 7.6 Reliable Delivery of ~~Control Plane~~ Signalling Messages

Each path maintains a queue with ~~control plane~~signalling messages to be sent to the peer. The message at the front of the queue, if it is a request for which a response have been defined, shall be sent with a Sequence Number, and shall be held in a path list until a response is received. Each path has its own list. The Sequence Number shall be unique for each outstanding request message in a single path list. A GSN or RNC may have several outstanding requests while waiting for responses.

The T3-RESPONSE timer shall be started when a ~~control plane~~signalling request message (for which a response have been defined) is sent. A ~~control plane~~signalling message request or response has probably been lost if a response has not been received before the T3-RESPONSE timer expires. The request is then retransmitted if the total number of request attempts is less than N3-REQUESTS times. The timer shall be implemented in the control plane application. The wait time for a response (T3-RESPONSE timer value) and the number of retries (N3-REQUESTS) shall be configurable per procedure. The total wait time shall be shorter than the MS wait time between retries of Attach and RA Update messages.

All received request messages shall be responded to and all response messages associated with a certain request shall always include the same information. Duplicated response messages shall be discarded. A response message without a matching outstanding request should be considered as a duplicate.

The Forward Relocation Complete and Forward SRNS Context messages shall be treated as signalling request messages. The Forward Relocation Complete Acknowledge and Forward SRNS Context Acknowledge messages shall be treated as response messages.

If a GSN or RNC is not successful with the transfer of a ~~control plane~~ signalling message, e.g. a Create PDP Context Request message, it shall inform the upper layer of the unsuccessful transfer so that the controlling upper entity may take the necessary measures.

## 8.2 Usage of the GTP-C Header

For control plane messages the GTP header shall be used as follows:

- Version shall be set to decimal 1 ('001').
- Protocol Type (PT) shall be set to '1'.
- (S) shall be set to '1'.
- PN shall be set to '0'. A GTP-C receiver shall ignore this flag.
- 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 control plane message excluding the GTP header.
- The Tunnel Endpoint Identifier is set by the sending entity to the value requested by the corresponding entity (SGSN or GGSN); it identifies the MS and its associated context data, 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 for Signalling by the GGSN.
  - 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, except for the case where the GGSN has already been assigned a Tunnel Endpoint Identifier for Signalling by the peer SGSN.
  - The Error Indication message where the Tunnel Endpoint Identifier shall be set to all zeros, in case there is no signalling tunnel established for that specific MS.
  - 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 Signalling of the new SGSN.
  - All Location Management messages, where the Tunnel Endpoint Identifier shall be set to all zeros.
- 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 control plane 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, Supported Extension Headers Notification and Error Indication, 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 for Data (II) information element where several occurrences of each type are allowed.

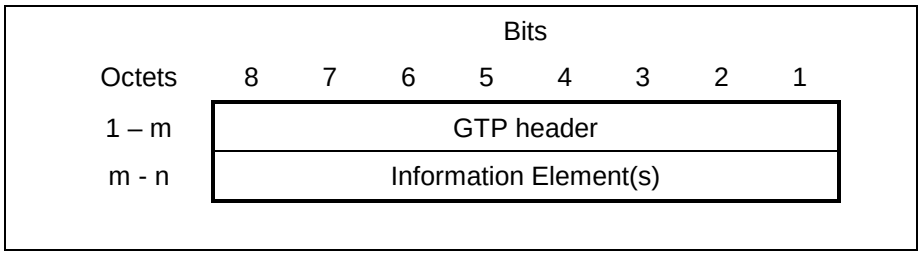


**Figure 61: GTP Header followed by subsequent Information Elements**

### 9.3.1 Usage of the GTP-U Header

The GTP-U header shall be used as follows:

- Version shall be set to decimal 1 (‘001’).
- Protocol Type (PT) shall be set to '1’.
- If the S field is set to '1' the sequence number field is present otherwise it is set to '0'. For GTP-U messages Echo Request, Echo Response, Version Not Supported and Supported Extension Headers Notification, the S field shall be set to ‘1’.
- PN flag: the GTP-U header 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 3 for "Version Non Supported" messages.
- Length: Size of the T-PDU excluding the GTP-U header size.
- Sequence Number: This field is present only if the S field is set to 1. The handling of this field is specified in subclause 9.1.1. It shall be used in order to decide whether or not to discard a received T-PDU, as specified in sub-clause 9.3.1.1 Usage of the Sequence Number. For GTP-U messages Version Not Supported and Supported Extension Headers Notification, the Sequence Number shall be ignored by the receiver.
- N-PDU Number: This field shall be included if and only if the PN flag is set to 1. 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.

**3GPP TSG CN WG4 Meeting #3**
**Helsinki, Finland, 17-21 July 2000**

***Document N4-000484***
*e.g. for 3GPP use the format TP-99xxx*
*or for SMG, use the format P-99-xxx*

# CHANGE REQUEST

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| **29.060** | **CR** | **127** | Current Version: | 3.5.0 |
|---|---|---|---|---|

*GSM (AA.BB) or 3G (AA.BBB) specification number ↑* *↑ CR number as allocated by MCC support team*

| For submission to: CN#09 | for approval | X | strategic | | (for SMG use only) |
|---|---|---|---|---|---|
| *list expected approval meeting # here ↑* | for information | | non-strategic | X | |

*Form: CR cover sheet, version 2 for 3GPP and SMG* *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

| **Proposed change affects:** *(at least one should be marked with an X)* | (U)SIM | | ME | | UTRAN / Radio | | Core Network | X |
|---|---|---|---|---|---|---|---|---|

**Source:** N4 **Date:** 2000-07-17

**Subject:** Clarification of the conditional information elements

**Work item:** GTP enhancements

**Category:** *(only one category shall be marked with an X)*

| | | | | | |
|---|---|---|---|---|---|
| F | Correction | X | **Release:** | Phase 2 | |
| A | Corresponds to a correction in an earlier release | | | Release 96 | |
| B | Addition of feature | | | Release 97 | |
| C | Functional modification of feature | | | Release 98 | |
| D | Editorial modification | | | Release 99 | X |
| | | | | Release 00 | |

**Reason for change:**

CR29.060-117r2 (N4-000347) proposed that SGSN-Initiated Update PDP Context Response include following information elements only at Inter-SGSN Routeing Area Update.

1. Tunnel Endpoint Identifier for Data I (TEID for Data)
2. GGSN Address for User Traffic
3. Charging ID

As a result this CR was approved in TSG CN#8 and has already been incorporated in 29.060 V3.5.0.
However according to the current 29.060 SGSN-Initiated Update PDP Context procedure can be initiated at Inter-SGSN Routeing Area Update, QoS modification or to redistribute active contexts due to load sharing etc. And in the case of redistribution of active contexts above information elements need to be present. It is complicated to strictly specify the presence conditions of these information elements. On the other hand, SGSN-Initiated Update PDP Context Request includes TEID for Data and SGSN address information elements as mandatory, i.e. there is an inconsistency between Update PDP Context request and response. Therefore this CR proposes that these information elements shall be included if the Cause contains the value 'Request accepted'.

If this CR is not approved GSNs can't redistribute contexts due to load sharing, i.e. GTP v1 has less capabilities than GTP v0.

**Clauses affected:** 7.3.4

**Other specs affected:**

| | | |
|---|---|---|
| Other 3G core specifications | | → List of CRs: |
| Other GSM core specifications | | → List of CRs: |
| MS test specifications | | → List of CRs: |
| BSS test specifications | | → List of CRs: |
| O&M specifications | | → List of CRs: |

**Other comments:**

help.doc

<--------- double-click here for help and instructions on how to create a CR.

### 7.3.4 Update PDP Context Response

The message shall be sent from a GGSN node to a SGSN node as a response of an Update PDP Context Request.

If the SGSN receives an Update PDP Context Response with a Cause value other than 'Request accepted', it shall deactivate the PDP context.

Only the Cause information element and optionally the Recovery information element shall be included in the response if the Cause contains another value than 'Request accepted'.

Possible Cause values are:

- 'Request Accepted'.
- 'Non-existent'.
- 'Service not supported'.
- 'System failure'.
- 'Semantic error in the TFT operation'.
- 'Syntactic error in the TFT operation'.
- 'Semantic errors in packet filter(s)'.
- 'Syntactic errors in packet filters(s)'.
- 'Mandatory IE incorrect'.
- 'Mandatory IE missing'.
- 'Optional IE incorrect'.
- 'Invalid message format'.
- 'Version not supported'.

The Tunnel Endpoint Identifier for Data (I) field specifies an uplink Tunnel Endpoint Identifier for G-PDUs that is chosen by the GGSN. The SGSN shall include this Tunnel Endpoint Identifier in the GTP header of all subsequent uplink G-PDUs that are related to the requested PDP context. ~~When the source IP address of the Update PDP Context Request changes, t~~This information element shall be included if the Cause contains the value 'Request accepted'.

The Tunnel Endpoint Identifier Control Plane field specifies an uplink Tunnel Endpoint Identifier for signalling messages which is chosen by the GGSN. The SGSN shall include this Tunnel Endpoint Identifier in the GTP header of all subsequent uplink control plane messages which are related to the requested PDP context. If the GGSN has already confirmed successful assignment of its Tunnel Endpoint Identifier for Signalling to the peer SGSN, this field shall not be present. The GGSN confirms successful assignment of its Tunnel Endpoint Identifier for Signalling to the SGSN when it receives any message with its assigned Tunnel Endpoint Identifier for Signalling in the GTP header from the SGSN.

The QoS values supplied in the Update PDP Context Request may be negotiated downwards by the GGSN. The negotiated values or the original value from SGSN is inserted in the Quality of Service Profile information element. This information element shall be included if the Cause contains the value 'Request accepted'.

The GGSN may start to forward T-PDUs after the Update PDP Context Response has been sent. The SGSN may start to forward T-PDUs when the Update PDP Context Response has been received. In this case the SGSN shall also be prepared to receive T-PDUs from the GGSN after it has sent an Update PDP Context Request but before an Update PDP Context Response has been received.

The GGSN shall include a GGSN Address for control plane and an GGSN address for user traffic, which may differ from that provided by the underlying network service (e.g. IP). The SGSN shall store these GGSN Addresses and use them when sending subsequent control plane on this GTP tunnel or G-PDUs to the GGSN for the MS. When active contexts are being redistributed due to load sharing, G-PDUs that are in transit across the Gn-interface are in an undetermined state and may be lost. ~~When the source IP address of the Update PDP Context Request changes,~~ The

GGSN Address for control plane and the GGSN Address for user traffic shall be included if the Cause contains the value 'Request accepted'.

The GGSN shall include the Recovery information element into the Update PDP Context Response if the GGSN is in contact with the SGSN for the first time or if the GGSN has restarted recently and the new Restart Counter value has not yet been indicated to the SGSN. The SGSN receiving the Recovery information element shall handle it as when an Echo Response message is received but shall consider the PDP context as updated and active if the response cause indicates a successful operation at the GGSN.

The Charging ID is used to identify all charging records produced in SGSN(s) and the GGSN for this PDP context. The Charging ID has been previously generated by the GGSN and is unique for this PDP context. If an inter-SGSN routing area update occurs, it is transferred to the new SGSN as part of each active PDP context. ~~When the source IP address of the Update PDP Context Request changes, t~~This information element shall be included if the Cause contains the value 'Request accepted'.

The Charging Gateway Address is the IP address of the recommended Charging Gateway Functionality to which the SGSN should transfer the Charging Detail Records (CDR) for this PDP Context.

The optional Private Extension contains vendor or operator specific information.

**Table 9: Information Elements in an Update PDP Context Response sent by a GGSN**

| Information element | Presence requirement | Reference |
|---|---|---|
| Cause | Mandatory | 7.7.1 |
| Recovery | Optional | 7.7.11 |
| Tunnel Endpoint Identifier for Data (I) | Conditional | 7.7.13 |
| Tunnel Endpoint Identifier Control Plane | Conditional | 7.7.14 |
| Charging ID | Conditional | 7.7.26 |
| GGSN Address for Control Plane | Conditional | GSN Address 7.7.32 |
| GGSN Address for User Traffic | Conditional | GSN Address 7.7.32 |
| Quality of Service Profile | Conditional | 7.7.34 |
| Charging Gateway Address | Optional | 7.7.43 |
| Private Extension | Optional | 7.7.44 |

The message can also be sent from a SGSN node to a GGSN node as a response of a GGSN-initiated Update PDP Context Request.

If the GGSN receives an Update PDP Context Response with a Cause value other than 'Request accepted', it shall abort the update of the PDP context.

Only the Cause information element and optionally the Recovery information element shall be included in the response if the Cause contains another value than 'Request accepted'.

Possible Cause values are the same as for the Update PDP Context Response sent by a GGSN.

The QoS values supplied in the Update PDP Context Request may be negotiated downwards by the SGSN. The negotiated values or the original value from GGSN is inserted in the Quality of Service Profile information element. This information element shall be included if the Cause contains the value 'Request accepted' and a QoS information element was supplied in the corresponding request message.

The SGSN shall include the Recovery information element into the Update PDP Context Response if the SGSN has restarted recently and the new Restart Counter value has not yet been indicated to the GGSN. The GGSN receiving the Recovery information element shall handle it as when an Echo Response message is received but shall consider the PDP context as updated and active if the response cause indicates a successful operation at the SGSN.

**Table 10: Information Elements in an Update PDP Context Response sent by a SGSN**

| Information element | Presence requirement | Reference |
|---|---|---|
| Cause | Mandatory | 7.7.1 |
| Recovery | Optional | 7.7.11 |
| Quality of Service Profile | Conditional | 7.7.34 |
| Private Extension | Optional | 7.7.44 |

**Document** (Revision of) **N4-000518** ***(N4-000486)***

*e.g. for 3GPP use the format TP-99xxx or for SMG, use the format P-99-xxx*

**3GPP TSG CN WG4 Meeting #3**
**Helsinki, Finland, 17-21 July 2000**

# CHANGE REQUEST

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| 29.060 | CR | 128r1 | Current Version: | 3.5.0 |
|---|---|---|---|---|

*GSM (AA.BB) or 3G (AA.BBB) specification number ↑* *↑ CR number as allocated by MCC support team*

| For submission to: | CN #09 | for approval | X | strategic | | (for SMG use only) |
|---|---|---|---|---|---|---|
| *list expected approval meeting # here ↑* | | for information | | non-strategic | X | |

*Form: CR cover sheet, version 2 for 3GPP and SMG* *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

| **Proposed change affects:** *(at least one should be marked with an X)* | (U)SIM | | ME | X | UTRAN / Radio | | Core Network | X |
|---|---|---|---|---|---|---|---|---|

**Source:** N4 **Date:** 17.July.2000

**Subject:** Enhancement of MS Network capability and GPRS Ciphering Algorithm

**Work item:** GTP enhancements

**Category:** *(only one category shall be marked with an X)*

| | | | | | |
|---|---|---|---|---|---|
| F | Correction | X | **Release:** | Phase 2 | |
| A | Corresponds to a correction in an earlier release | | | Release 96 | |
| B | Addition of feature | | | Release 97 | |
| C | Functional modification of feature | | | Release 98 | |
| D | Editorial modification | | | Release 99 | X |
| | | | | Release 00 | |

**Reason for change:** The MS Network Capability was enhanced to have some more information in N1. The GPRS Ciphering Algorithm was also enhanced to support for more GPRS Encryption Algorithms.

**Clauses affected:** 7.7.28

**Other specs affected:**

| | | | |
|---|---|---|---|
| Other 3G core specifications | | → List of CRs: | 24.008 |
| Other GSM core specifications | | → List of CRs: | |
| MS test specifications | | → List of CRs: | |
| BSS test specifications | | → List of CRs: | |
| O&M specifications | | → List of CRs: | |

**Other comments:** This modification to the 24.008 was proposed in N1-000722 and approved in N1#12 and NP#8.

Then, NP sends the LS(N4-000439) to N4. This CR submits to the LS from NP.

help.doc

<--------- double-click here for help and instructions on how to create a CR.

## 7.7.28 MM Context

The MM Context information element contains the Mobility Management, MS and security parameters that are necessary to transfer between SGSNs at the Inter SGSN Routeing Area Update procedure.

Security Mode indicates the type of security keys (GSM/UMTS) and Authentication Vectors (quintuplets/triplets) that are passed to the new SGSN.

Ciphering Key Sequence Number (CKSN) is described in 3G TS 24.008. Possible values are integers in the range [0; 6]. The value 7 is reserved. The Ciphering Key Sequence Number is applicable to GSM as well as UMTS security key(s).

Used Cipher indicates the GSM ciphering algorithm that is in use.

Kc is the GSM ciphering key currently used by the old SGSN. Kc shall be present if GSM key is indicated in the Security Mode.

CK is the UMTS ciphering key currently used by the old SGSN. CK shall be present if UMTS keys are indicated in the Security Mode.

IK is the UMTS integrity key currently used by the old SGSN. IK shall be present if UMTS keys are indicated in the Security Mode.

The Triplet array contains triplets encoded as the value in the Authentication Triplet information element The Triplet array shall be present if indicated in the Security Mode.

The Quintuplet array contains Quintuplets encoded as the value in the Authentication Quintuplet information element. The Quintuplet shall be present if indicated in the Security Mode.

DRX parameter indicates whether the MS uses DRX mode or not.

MS Network Capability provides the network with information concerning aspects of the MS related to GPRS. MS Network Capability and MS Network Capability Length are coded as in the value part described in 3G TS 24.008.

DRX parameter is ~~and the MS Network Capability are~~ coded as described in 3G TS 24.008, the value part only.

The two octets Container Length holds the length of the Container, excluding the Container Length octets.

Container contains one or several optional information elements as described in the sub-clause ‘Overview’, from the clause ‘General message format and information elements coding’ in 3G TS 24.008.

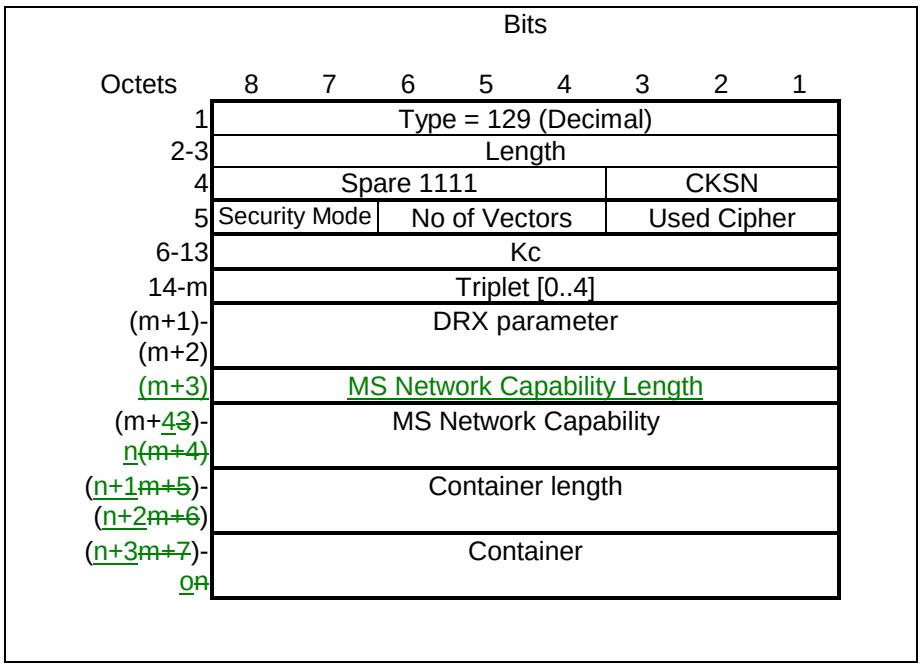


**Figure 40: MM Context Information Element with GSM Key and Triplets**

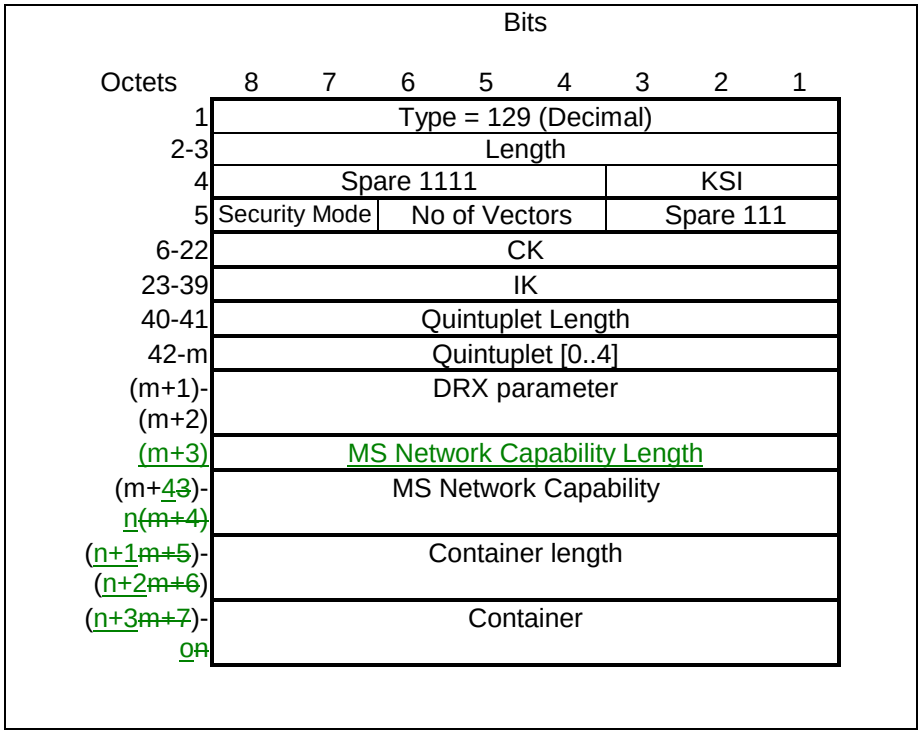


**Figure 41: MM Context Information Element with UMTS Keys and Quintuplets**

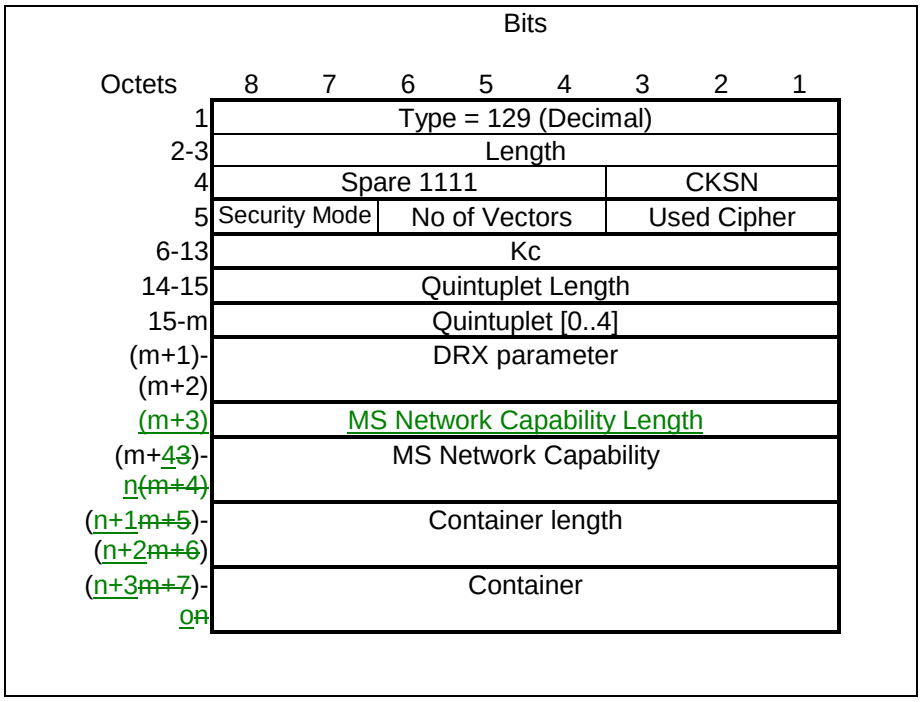


**Figure 42: MM Context Information Element with GSM Keys and UMTS Quintuplets**

**Table 46: Used Cipher Values**

| Cipher Algorithm | Value (Decimal) |
|---|---|
| No ciphering | 0 |
| GEA/1 | 1 |
| GEA/2 | 2 |
| GEA/3 | 3 |
| GEA/4 | 4 |
| GEA/5 | 5 |
| GEA/6 | 6 |
| GEA/7 | 7 |

**Table 47: Security Mode Values**

| Security Type | Value (Decimal) |
|---|---|
| GSM key and triplets | 1 |
| GSM key and quintuplets | 3 |
| UMTS key and quintuplets | 2 |

**3GPP TSG CN WG4 Meeting #3**
**Seattle, USA, 28 August - 1 September 2000**

***Document N4-000699***
*e.g. for 3GPP use the format TP-99xxx*
*or for SMG, use the format P-99-xxx*

# CHANGE REQUEST

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| 29.060 | CR | 139r1 | Current Version: | 3.5.0 |
|---|---|---|---|---|

*GSM (AA.BB) or 3G (AA.BBB) specification number ↑* *↑ CR number as allocated by MCC support team*

| For submission to: | CN#09 | For approval | X | Strategic | | (for SMG use only) |
|---|---|---|---|---|---|---|
| *list expected approval meeting # here ↑* | | for information | | non-strategic | X | |

*Form: CR cover sheet, version 2 for 3GPP and SMG* *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

**Proposed change affects:** (U)SIM [ ] ME [ ] UTRAN / Radio [ ] Core Network [X]
*(at least one should be marked with an X)*

**Source:** N4 **Date:** 28/08/2000

**Subject:** Clarifications on the use of TEID in the Control Plane

**Work item:** GTP enhancements

**Category:** *(only one category shall be marked with an X)*

| | | | | | |
|---|---|---|---|---|---|
| F | Correction | X | **Release:** | Phase 2 | |
| A | Corresponds to a correction in an earlier release | | | Release 96 | |
| B | Addition of feature | | | Release 97 | |
| C | Functional modification of feature | | | Release 98 | |
| D | Editorial modification | | | Release 99 | X |
| | | | | Release 00 | |

**Reason for change:**

Current definition of TEID Control Plane says:

> "If the transmitter has already received the Tunnel Endpoint Identifier for Signalling, this information shall be ignored." (Sec. 7.7.14 in 29.060)

However for some cases (e.g. the Inter-SGSN RA update or redistribution of PDP context due to load sharing), Signalling Tunnel may be re-established, that is, the stored TEID Control Plane may be replaced with new one. Therefore above definition should be aligned with this.

This CR is proposed to align the definition of TEID Control Plane with other sections.

**Clauses affected:** 7.7.14

**Other specs affected:**

| | | |
|---|---|---|
| Other 3G core specifications | [ ] | → List of CRs: |
| Other GSM core specifications | [ ] | → List of CRs: |
| MS test specifications | [ ] | → List of CRs: |
| BSS test specifications | [ ] | → List of CRs: |
| O&M specifications | [ ] | → List of CRs: |

**Other comments:**


help.doc

<--------- double-click here for help and instructions on how to create a CR.

## 7.7.14 Tunnel Endpoint Identifier Control Plane

The Tunnel Endpoint Identifier Control Plane information element contains the Tunnel Endpoint Identifier for control plane requested by the receiver of the flow.

If the receiver has already confirmed successful assignment of its Tunnel Endpoint Identifier for Signalling to the transmitter, this information element shall be the same as the value sent before. The receiver confirms successful assignment of its Tunnel Endpoint Identifier for Signalling to the transmitter when it receives any message with its assigned Tunnel Endpoint Identifier for Signalling in the GTP header from the transmitter.

If ~~the transmitter received~~ the Tunnel Endpoint Identifier for Control Plane is received~~Signalling for the first time~~ from the transmitter~~receiver~~, this information element shall be stored. ~~If the transmitter has already received the Tunnel Endpoint Identifier for Signalling, this information shall be ignored.~~

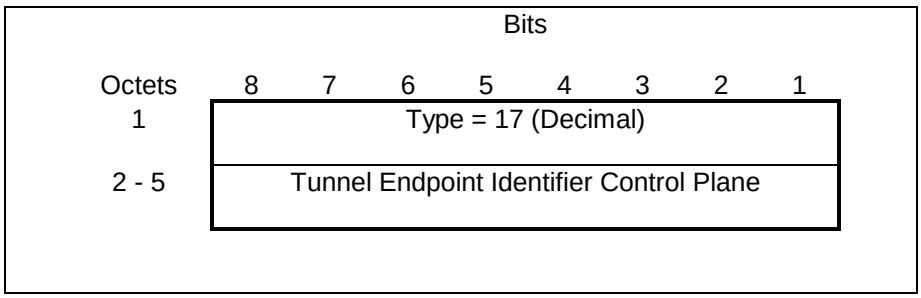


**Figure 22: Tunnel Endpoint Identifier Control Plane Information Element**

**3GPP TSG CN WG4 Meeting #3**
**Seattle, USA, 28 August - 1 September 2000**

***Document* *N4-000606***
*e.g. for 3GPP use the format TP-99xxx*
*or for SMG, use the format P-99-xxx*

# CHANGE REQUEST

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| **29.060** | **CR** | **140** | Current Version: | 3.5.0 |
|---|---|---|---|---|

*GSM (AA.BB) or 3G (AA.BBB) specification number ↑* *↑ CR number as allocated by MCC support team*

| For submission to: | CN#09 | For approval | X | Strategic | | *(for SMG use only)* |
|---|---|---|---|---|---|---|
| *list expected approval meeting # here ↑* | | for information | | non-strategic | X | |

*Form: CR cover sheet, version 2 for 3GPP and SMG* *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

| **Proposed change affects:** *(at least one should be marked with an X)* | (U)SIM | | ME | | UTRAN / Radio | | Core Network | X |
|---|---|---|---|---|---|---|---|---|

**Source:** N4 **Date:** 28/08/2000

**Subject:** Correction on the handling of the PDP Context at unsuccessful PDP Context modification

**Work item:** GTP enhancements

**Category:** *(only one category Shall be marked With an X)*

| | | | | | |
|---|---|---|---|---|---|
| F | Correction | X | **Release:** | Phase 2 | |
| A | Corresponds to a correction in an earlier release | | | Release 96 | |
| B | Addition of feature | | | Release 97 | |
| C | Functional modification of feature | | | Release 98 | |
| D | Editorial modification | | | Release 99 | X |
| | | | | Release 00 | |

**Reason for change:**

Current definition of Update PDP Context Response sent by the GGSN includes following sentence.

"If the SGSN receives an Update PDP Context Response with a Cause value other than 'Request accepted', it shall deactivate the PDP context "

(Sec. 7.3.4 in 29.060)

However current 24.008 says that the PDP context shall be kept active at unsuccessful PDP Context modification, i.e. there is an inconsistency between SM (24.008) and GTP (29.060). And it is not reasonable to deactivate the PDP context at unsuccessful PDP Context modification, e.g. in the case that the GGSN doesn't support a TFT.

Therefore it is proposed that if the Cause value is other than 'Request accepted' the PDP context shall be kept active to align 29.060 with 24.008. This modification is also in line with the definition of Update PDP Context Response sent by the SGSN.

**Clauses affected:** 7.3.4

**Other specs affected:**

| | | |
|---|---|---|
| Other 3G core specifications | | → List of CRs: |
| Other GSM core specifications | | → List of CRs: |
| MS test specifications | | → List of CRs: |
| BSS test specifications | | → List of CRs: |
| O&M specifications | | → List of CRs: |

**Other comments:**

help.doc

<--------- double-click here for help and instructions on how to create a CR.

### 7.3.4 Update PDP Context Response

The message shall be sent from a GGSN node to a SGSN node as a response of an Update PDP Context Request.

If the SGSN receives an Update PDP Context Response with a Cause value other than 'Request accepted', it shall abort the update of~~deactivate~~ the PDP context.

Only the Cause information element and optionally the Recovery information element shall be included in the response if the Cause contains another value than 'Request accepted'.

Possible Cause values are:

- 'Request Accepted'.
- 'Non-existent'.
- 'Service not supported'.
- 'System failure'.
- 'Semantic error in the TFT operation'.
- 'Syntactic error in the TFT operation'.
- 'Semantic errors in packet filter(s)'.
- 'Syntactic errors in packet filters(s)'.
- 'Mandatory IE incorrect'.
- 'Mandatory IE missing'.
- 'Optional IE incorrect'.
- 'Invalid message format'.
- 'Version not supported'.

The Tunnel Endpoint Identifier for Data (I) field specifies an uplink Tunnel Endpoint Identifier for G-PDUs that is chosen by the GGSN. The SGSN shall include this Tunnel Endpoint Identifier in the GTP header of all subsequent uplink G-PDUs that are related to the requested PDP context. When the source IP address of the Update PDP Context Request changes, this information element shall be included if the Cause contains the value 'Request accepted'.

The Tunnel Endpoint Identifier Control Plane field specifies an uplink Tunnel Endpoint Identifier for signalling messages which is chosen by the GGSN. The SGSN shall include this Tunnel Endpoint Identifier in the GTP header of all subsequent uplink control plane messages which are related to the requested PDP context. If the GGSN has already confirmed successful assignment of its Tunnel Endpoint Identifier for Signalling to the peer SGSN, this field shall not be present. The GGSN confirms successful assignment of its Tunnel Endpoint Identifier for Signalling to the SGSN when it receives any message with its assigned Tunnel Endpoint Identifier for Signalling in the GTP header from the SGSN.

The QoS values supplied in the Update PDP Context Request may be negotiated downwards by the GGSN. The negotiated values or the original value from SGSN is inserted in the Quality of Service Profile information element. This information element shall be included if the Cause contains the value 'Request accepted'.

The GGSN may start to forward T-PDUs after the Update PDP Context Response has been sent. The SGSN may start to forward T-PDUs when the Update PDP Context Response has been received. In this case the SGSN shall also be prepared to receive T-PDUs from the GGSN after it has sent an Update PDP Context Request but before an Update PDP Context Response has been received.

The GGSN shall include a GGSN Address for control plane and an GGSN address for user traffic, which may differ from that provided by the underlying network service (e.g. IP). The SGSN shall store these GGSN Addresses and use them when sending subsequent control plane on this GTP tunnel or G-PDUs to the GGSN for the MS. When active contexts are being redistributed due to load sharing, G-PDUs that are in transit across the Gn-interface are in an

undetermined state and may be lost. When the source IP address of the Update PDP Context Request changes, the GGSN Address for user traffic shall be included if the Cause contains the value 'Request accepted'.

The GGSN shall include the Recovery information element into the Update PDP Context Response if the GGSN is in contact with the SGSN for the first time or if the GGSN has restarted recently and the new Restart Counter value has not yet been indicated to the SGSN. The SGSN receiving the Recovery information element shall handle it as when an Echo Response message is received but shall consider the PDP context as updated and active if the response cause indicates a successful operation at the GGSN.

The Charging ID is used to identify all charging records produced in SGSN(s) and the GGSN for this PDP context. The Charging ID has been previously generated by the GGSN and is unique for this PDP context. If an inter-SGSN routing area update occurs, it is transferred to the new SGSN as part of each active PDP context. When the source IP address of the Update PDP Context Request changes, this information element shall be included if the Cause contains the value 'Request accepted'.

The Charging Gateway Address is the IP address of the recommended Charging Gateway Functionality to which the SGSN should transfer the Charging Detail Records (CDR) for this PDP Context.

The optional Private Extension contains vendor or operator specific information.

**Table 9: Information Elements in an Update PDP Context Response sent by a GGSN**

| Information element | Presence requirement | Reference |
|---|---|---|
| Cause | Mandatory | 7.7.1 |
| Recovery | Optional | 7.7.11 |
| Tunnel Endpoint Identifier for Data (I) | Conditional | 7.7.13 |
| Tunnel Endpoint Identifier Control Plane | Conditional | 7.7.14 |
| Charging ID | Conditional | 7.7.26 |
| GGSN Address for Control Plane | Conditional | GSN Address 7.7.32 |
| GGSN Address for User Traffic | Conditional | GSN Address 7.7.32 |
| Quality of Service Profile | Conditional | 7.7.34 |
| Charging Gateway Address | Optional | 7.7.43 |
| Private Extension | Optional | 7.7.44 |

The message can also be sent from a SGSN node to a GGSN node as a response of a GGSN-initiated Update PDP Context Request.

If the GGSN receives an Update PDP Context Response with a Cause value other than 'Request accepted', it shall abort the update of the PDP context.

Only the Cause information element and optionally the Recovery information element shall be included in the response if the Cause contains another value than 'Request accepted'.

Possible Cause values are the same as for the Update PDP Context Response sent by a GGSN.

The QoS values supplied in the Update PDP Context Request may be negotiated downwards by the SGSN. The negotiated values or the original value from GGSN is inserted in the Quality of Service Profile information element. This information element shall be included if the Cause contains the value 'Request accepted' and a QoS information element was supplied in the corresponding request message.

The SGSN shall include the Recovery information element into the Update PDP Context Response if the SGSN has restarted recently and the new Restart Counter value has not yet been indicated to the GGSN. The GGSN receiving the Recovery information element shall handle it as when an Echo Response message is received but shall consider the PDP context as updated and active if the response cause indicates a successful operation at the SGSN.

**Table 10: Information Elements in an Update PDP Context Response sent by a SGSN**

| Information element | Presence requirement | Reference |
|---|---|---|
| Cause | Mandatory | 7.7.1 |
| Recovery | Optional | 7.7.11 |
| Quality of Service Profile | Conditional | 7.7.34 |
| Private Extension | Optional | 7.7.44 |

**3GPP TSG CN WG4 Meeting #3**
**Seattle, USA, 28 August - 1 September 2000**

***Document* N4-000616**
*e.g. for 3GPP use the format TP-99xxx*
*or for SMG, use the format P-99-xxx*

# CHANGE REQUEST

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| 29.060 | CR | 142 | Current Version: | 3.5.0 |
|---|---|---|---|---|

*GSM (AA.BB) or 3G (AA.BBB) specification number ↑* *↑ CR number as allocated by MCC support team*

| For submission to: | CN#09 | For approval | X | Strategic | | (for SMG use only) |
|---|---|---|---|---|---|---|
| *list expected approval meeting # here ↑* | | for information | | non-strategic | X | |

*Form: CR cover sheet, version 2 for 3GPP and SMG* *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

| **Proposed change affects:** *(at least one should be marked with an X)* | (U)SIM | | ME | | UTRAN / Radio | | Core Network | X |
|---|---|---|---|---|---|---|---|---|

**Source:** N4 **Date:** 28/08/2000

**Subject:** Clarifications on the presence condition of TLLI/P-TMSI in SGSN Context request

**Work item:** GTP enhancements

| **Category:** *(only one category Shall be marked With an X)* | | | **Release:** | |
|---|---|---|---|---|
| F | Correction | X | Phase 2 | |
| A | Corresponds to a correction in an earlier release | | Release 96 | |
| B | Addition of feature | | Release 97 | |
| C | Functional modification of feature | | Release 98 | |
| D | Editorial modification | | Release 99 | X |
| | | | Release 00 | |

**Reason for change:**

Current definition of SGSN Context request message includes following two sentences

"One of the TLLI or P-TMSI information fields must be present."
"IMSI shall be included if MS Validated indicates 'Yes' "
(Sec. 7.5.3 in 29.060)

According to current 23.060 ver 3.4.0, when a new SGSN has sent invalid combination of TLLI/P-TMSI and P-TMSI Signature to an old SGSN, the old SGSN responds with the error cause "P-TMSI signature mismatch". After that the new SGSN authenticates the MS and sends the (secondary) SGSN Context Request with MS Validated set to 'Yes'.

In this case TLLI/P-TMSI need not to be included in the (secondary) SGSN Context Request because IMSI shall be included if the MS Validated is set to 'Yes'.

Therefore it is proposed that both TLLI and P-TMSI can be absent in the SGSN Context Request message when MS Validated is set to 'Yes'.

**Clauses affected:** 7.5.3

| **Other specs affected:** | | | |
|---|---|---|---|
| Other 3G core specifications | | → List of CRs: | |
| Other GSM core specifications | | → List of CRs: | |
| MS test specifications | | → List of CRs: | |
| BSS test specifications | | → List of CRs: | |
| O&M specifications | | → List of CRs: | |

**Other comments:**

help.doc

<--------- double-click here for help and instructions on how to create a CR.

### 7.5.3 SGSN Context Request

The new SGSN shall send an SGSN Context Request to the old SGSN to get the MM and PDP Contexts for the MS. The MS is identified by its old RAI and old TLLI/old P-TMSI values. The TLLI/P-TMSI and RAI is a TLLI/P-TMSI and an RAI in the old SGSN. One of the TLLI or P-TMSI information fields must be present unless IMSI is present.

The old SGSN responds with an SGSN Context Response.

The Tunnel Endpoint Identifier Control Plane field specifies a Tunnel Endpoint Identifier for control plane messages, which is chosen by the new SGSN. The old SGSN shall include this Tunnel Endpoint Identifier in the GTP header of all subsequent control plane messages that are sent from the old SGSN to the new SGSN and related to the PDP context(s) requested.

The MS Validated indicates that the new SGSN has successfully authenticated the MS. IMSI shall be included if MS Validated indicates 'Yes'.

The P-TMSI Signature is conditionally provided by the MS to the new SGSN for identification checking purposes as defined in GSM 3G TS 23.060 and 3G TS 24.008. If the MS has provided the P-TMSI Signature, the new SGSN shall include this parameter in the SGSN Context Request message.

The optional Private Extension contains vendor or operator specific information.

**Table 26: Information Elements in a SGSN Context Request**

| Information element | Presence requirement | Reference |
|---|---|---|
| IMSI | Conditional | 7.7.2 |
| Routeing Area Identity (RAI) | Mandatory | 7.7.3 |
| Temporary Logical Link Identifier (TLLI) | Conditional | 7.7.4 |
| Packet TMSI (P-TMSI) | Conditional | 7.7.5 |
| P-TMSI Signature | Optional | 7.7.9 |
| MS Validated | Optional | 7.7.10 |
| Tunnel Endpoint Identifier Control Plane | Mandatory | 7.7.14 |
| Private Extension | Optional | 7.7.44 |

**3GPP Meeting TSG CN WG4**
**Seattle, USA, 28 Aug - 1 Sep 2000**

***Document N4-000702***
*e.g. for 3GPP use the format TP-99xxx*
*or for SMG, use the format P-99-xxx*

# CHANGE REQUEST

*Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.*

| **29.060** | **CR** | **143r2** | Current Version: | 3.5.0 |
|---|---|---|---|---|

*GSM (AA.BB) or 3G (AA.BBB) specification number ↑* *↑ CR number as allocated by MCC support team*

| For submission to: | CN #09 | for approval | X | strategic | | (for SMG use only) |
|---|---|---|---|---|---|---|
| *list expected approval meeting # here ↑* | | for information | | non-strategic | X | |

*Form: CR cover sheet, version 2 for 3GPP and SMG* *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

**Proposed change affects:** *(at least one should be marked with an X)* (U)SIM [ ] ME [ ] UTRAN / Radio [ ] Core Network [X]

**Source:** N4 **Date:** 28-08-2000

**Subject:** Correction on Reliable transmission of signalling messages

**Work item:** GTP enhancements

**Category:** *(only one category shall be marked with an X)*

| | | | | | |
|---|---|---|---|---|---|
| F | Correction | X | **Release:** | Phase 2 | |
| A | Corresponds to a correction in an earlier release | | | Release 96 | |
| B | Addition of feature | | | Release 97 | |
| C | Functional modification of feature | | | Release 98 | |
| D | Editorial modification | | | Release 99 | X |
| | | | | Release 00 | |

**Reason for change:** There are a set of messages (SGSN context transfer messages) for which the procedure for reliable transmission of signalling messages needs to be further specified.

**Clauses affected:** 7.6

**Other specs affected:**

| | | |
|---|---|---|
| Other 3G core specifications | [ ] | → List of CRs: |
| Other GSM core specifications | [ ] | → List of CRs: |
| MS test specifications | [ ] | → List of CRs: |
| BSS test specifications | [ ] | → List of CRs: |
| O&M specifications | [ ] | → List of CRs: |

**Other comments:**

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<--------- double-click here for help and instructions on how to create a CR.

## 7.6 Reliable Delivery of Control Plane Messages

Each path maintains a queue with control plane messages to be sent to the peer. The message at the front of the queue shall be sent with a Sequence Number, and shall be held in a path list until a response is received. Each path has its own list. The Sequence Number shall be unique for each outstanding message in a single path list. A GSN may have several outstanding requests while waiting for responses.

The T3-RESPONSE timer shall be started when a control plane request message is sent. A control plane message request or response has probably been lost if a response has not been received before the T3-RESPONSE timer expires. The request is then retransmitted if the total number of request attempts is less than N3-REQUESTS times. The timer shall be implemented in the control plane application. The wait time for a response (T3-RESPONSE timer value) and the number of retries (N3-REQUESTS) shall be configurable per procedure. The total wait time shall be shorter than the MS wait time between retries of Attach and RA Update messages.

All received request messages shall be responded to and all response messages associated with a certain request shall always include the same information. Duplicated response messages shall be discarded, and, for the SGSN Context Response case, the SGSN Context Acknowledge message shall be sent depending on the content of the received response message. A response message without a matching outstanding request should be considered as a duplicate.

The Forward Relocation Complete and Forward SRNS Context messages shall be treated as signalling request messages. The Forward Relocation Complete Acknowledge and Forward SRNS Context Acknowledge messages shall be treated as response messages.

The SGSN Context Response message needs special treatment by the old SGSN and New SGSN:

The New SGSN must consider this as a regular response to the outstanding SGSN Context Request message, but also copy the sequence number in the header of the SGSN Context Acknowledge it shall send back to the old SGSN depending on the content of the received response message.

The Old SGSN, when it expects the new SGSN to send back a SGSN Context Acknowledge in response to a SGSN Context Response, shall keep track of the SGSN Context Response message sequence number and apply to this message the rules valid for a Request message too.

If a GSN is not successful with the transfer of a control plane message, e.g. a Create PDP Context Request message, it shall inform the upper layer of the unsuccessful transfer so that the controlling upper entity may take the necessary measures.

**3GPP TSG CN WG4 Meeting #4**
**Seattle, USA, 28 August - 1 September 2000**

***Document N4-000679***
*e.g. for 3GPP use the format TP-99xxx*
*or for SMG, use the format P-99-xxx*

# CHANGE REQUEST

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| 29.060 | CR | 144 | Current Version: | 3.5.0 |
|---|---|---|---|---|

*GSM (AA.BB) or 3G (AA.BBB) specification number ↑* *↑ CR number as allocated by MCC support team*

| For submission to: | CN #9 | for approval | X | strategic | | (for SMG use only) |
|---|---|---|---|---|---|---|
| *list expected approval meeting # here ↑* | | for information | | non-strategic | X | |

*Form: CR cover sheet, version 2 for 3GPP and SMG* *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

**Proposed change affects:** (U)SIM [ ] ME [ ] UTRAN / Radio [ ] Core Network [X]
*(at least one should be marked with an X)*

**Source:** N4 **Date:** 25/08/2000

**Subject:** Alignment of the description of tables for Identification Request and SGSN Context Request

**Work item:** GTP enhancements

**Category:** *(only one category shall be marked with an X)*

| | | | | | |
|---|---|---|---|---|---|
| F | Correction | X | **Release:** | Phase 2 | |
| A | Corresponds to a correction in an earlier release | | | Release 96 | |
| B | Addition of feature | | | Release 97 | |
| C | Functional modification of feature | | | Release 98 | |
| D | Editorial modification | | | Release 99 | X |
| | | | | Release 00 | |

**Reason for change:**
P-TMSI Signature that is presented in Identification request message and SGSN Context request message was modified to treat as conditional parameter by CR29.060-031(N2B-99K78, NP-99493) approved in NP#6. However it is still defined to treat as optional parameter.
This CR proposes to alignment of the description of tables for Identification Request and SGSN Context Request.

**Clauses affected:**

**Other specs affected:**

| | | |
|---|---|---|
| Other 3G core specifications | [ ] | → List of CRs: |
| Other GSM core specifications | [ ] | → List of CRs: |
| MS test specifications | [ ] | → List of CRs: |
| BSS test specifications | [ ] | → List of CRs: |
| O&M specifications | [ ] | → List of CRs: |

**Other comments:**


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### 7.5.1 Identification Request

If the MS, at GPRS Attach, identifies itself with P-TMSI and it has changed SGSN since detach, the new SGSN shall send an Identification Request message to the old SGSN to request the IMSI.

The P-TMSI and RAI is a P-TMSI and an RAI in the old SGSN. The P-TMSI Signature is conditionally provided by the MS to the new SGSN for identification checking purposes as defined in GSM 3G TS 23.060and 3G TS 24.008. If the MS has provided the P-TMSI Signature, the new SGSN shall include this parameter in the Identification Request message.

The optional Private Extension contains vendor or operator specific information.

**Table 24: Information Elements in an Identification Request**

| Information element | Presence requirement | Reference |
|---|---|---|
| Routeing Area Identity (RAI) | Mandatory | 7.7.3 |
| Packet TMSI | Mandatory | 7.7.5 |
| P-TMSI Signature | Conditional ~~Optional~~ | 7.7.9 |
| Private Extension | Optional | 7.7.44 |

## *** Next Modification ***

### 7.5.3 SGSN Context Request

The new SGSN shall send an SGSN Context Request to the old SGSN to get the MM and PDP Contexts for the MS. The MS is identified by its old RAI and old TLLI/old P-TMSI values. The TLLI/P-TMSI and RAI is a TLLI/P-TMSI and an RAI in the old SGSN. One of the TLLI or P-TMSI information fields must be present.

The old SGSN responds with an SGSN Context Response.

The Tunnel Endpoint Identifier Control Plane field specifies a Tunnel Endpoint Identifier for control plane messages, which is chosen by the new SGSN. The old SGSN shall include this Tunnel Endpoint Identifier in the GTP header of all subsequent control plane messages that are sent from the old SGSN to the new SGSN and related to the PDP context(s) requested.

The MS Validated indicates that the new SGSN has successfully authenticated the MS. IMSI shall be included if MS Validated indicates ‘Yes’.

The P-TMSI Signature is conditionally provided by the MS to the new SGSN for identification checking purposes as defined in GSM 3G TS 23.060 and 3G TS 24.008. If the MS has provided the P-TMSI Signature, the new SGSN shall include this parameter in the SGSN Context Request message.

The optional Private Extension contains vendor or operator specific information.

**Table 26: Information Elements in a SGSN Context Request**

| Information element | Presence requirement | Reference |
|---|---|---|
| IMSI | Conditional | 7.7.2 |
| Routeing Area Identity (RAI) | Mandatory | 7.7.3 |
| Temporary Logical Link Identifier (TLLI) | Conditional | 7.7.4 |
| Packet TMSI (P-TMSI) | Conditional | 7.7.5 |
| P-TMSI Signature | Conditional ~~Optional~~ | 7.7.9 |
| MS Validated | Optional | 7.7.10 |
| Tunnel Endpoint Identifier Control Plane | Mandatory | 7.7.14 |
| Private Extension | Optional | 7.7.44 |

**3GPP Meeting TSG CN WG4**
**Seattle, USA, 28 Aug - 1 Sep 2000**

***Document* N4-000729**
*e.g. for 3GPP use the format TP-99xxx*
*or for SMG, use the format P-99-xxx*

# CHANGE REQUEST

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| 29.060 | CR | 145r1 | Current Version: | 3.5.0 |
|---|---|---|---|---|

*GSM (AA.BB) or 3G (AA.BBB) specification number ↑* *↑ CR number as allocated by MCC support team*

| For submission to: CN#09 *list expected approval meeting # here ↑* | for approval | X | strategic | | *(for SMG use only)* |
|---|---|---|---|---|---|
| | for information | | non-strategic | X | |

*Form: CR cover sheet, version 2 for 3GPP and SMG* *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

**Proposed change affects:** *(at least one should be marked with an X)* (U)SIM [ ] ME [ ] UTRAN / Radio [ ] Core Network [X]

**Source:** N4 **Date:** 28-08-2000

**Subject:** Correction to the SGSN Context transfer Request and response messages.

**Work item:** GTP enhancements

**Category:** *(only one category shall be marked with an X)*

| | | | | | |
|---|---|---|---|---|---|
| F | Correction | X | **Release:** | Phase 2 | |
| A | Corresponds to a correction in an earlier release | | | Release 96 | |
| B | Addition of feature | | | Release 97 | |
| C | Functional modification of feature | | | Release 98 | |
| D | Editorial modification | | | Release 99 | X |
| | | | | Release 00 | |

**Reason for change:**
In all messages when the TEID-C IE is included it is accompanied by the Associated IP address.

This CR fixes the SGSN context request and response messages so that this general rule is met.

**Clauses affected:** 7.5.3, 7.5.4

**Other specs affected:**

| | | |
|---|---|---|
| Other 3G core specifications | [ ] | → List of CRs: |
| Other GSM core specifications | [ ] | → List of CRs: |
| MS test specifications | [ ] | → List of CRs: |
| BSS test specifications | [ ] | → List of CRs: |
| O&M specifications | [ ] | → List of CRs: |

**Other comments:**

help.doc

<--------- double-click here for help and instructions on how to create a CR.

## 7.5.3 SGSN Context Request

The new SGSN shall send an SGSN Context Request to the old SGSN to get the MM and PDP Contexts for the MS. The MS is identified by its old RAI and old TLLI/old P-TMSI values. The TLLI/P-TMSI and RAI is a TLLI/P-TMSI and an RAI in the old SGSN. One of the TLLI or P-TMSI information fields must be present.

The old SGSN responds with an SGSN Context Response.

The new SGSN shall include a SGSN Address for control plane. The old SGSN shall store this SGSN Address and use it when sending control plane messages for the MS to the new SGSN in the SGSN context transfer procedure.

The Tunnel Endpoint Identifier Control Plane field specifies a Tunnel Endpoint Identifier for control plane messages, which is chosen by the new SGSN. The old SGSN shall include this Tunnel Endpoint Identifier in the GTP header of all subsequent control plane messages that are sent from the old SGSN to the new SGSN and related to the PDP context(s) requested.

The MS Validated indicates that the new SGSN has successfully authenticated the MS. IMSI shall be included if MS Validated indicates 'Yes'.

The P-TMSI Signature is conditionally provided by the MS to the new SGSN for identification checking purposes as defined in GSM 3G TS 23.060 and 3G TS 24.008. If the MS has provided the P-TMSI Signature, the new SGSN shall include this parameter in the SGSN Context Request message.

The optional Private Extension contains vendor or operator specific information.

**Table 26: Information Elements in a SGSN Context Request**

| Information element | Presence requirement | Reference |
|---|---|---|
| IMSI | Conditional | 7.7.2 |
| Routeing Area Identity (RAI) | Mandatory | 7.7.3 |
| Temporary Logical Link Identifier (TLLI) | Conditional | 7.7.4 |
| Packet TMSI (P-TMSI) | Conditional | 7.7.5 |
| P-TMSI Signature | Optional | 7.7.9 |
| MS Validated | Optional | 7.7.10 |
| SGSN Address for Control Plane | Mandatory | 7.7.32 |
| Tunnel Endpoint Identifier Control Plane | Mandatory | 7.7.14 |
| Private Extension | Optional | 7.7.44 |

## 7.5.4 SGSN Context Response

The old SGSN shall send an SGSN Context Response to the new SGSN as a response to a previous SGSN Context Request.

Possible Cause values are:

- 'Request Accepted'.
- 'IMSI not known'.
- 'System failure'.
- 'Mandatory IE incorrect'.
- 'Mandatory IE missing'.
- 'Optional IE incorrect'.
- 'Invalid message format'.
- 'Version not supported'.
- 'P-TMSI Signature mismatch'.

If the Cause contains the value 'Request accepted', all information elements are mandatory, except PDP Context and Private Extension.

If the Cause contains the value ‘P-TMSI Signature mismatch’ the IMSI information element shall be included in the response, otherwise only the Cause information element shall be included in the response.

The old SGSN shall include a SGSN Address for control plane. The new SGSN shall store this SGSN Address and use it when sending control plane messages for the MS to the old SGSN in the SGSN context transfer procedure.

The Tunnel Endpoint Identifier Control Plane field specifies a Tunnel Endpoint Identifier, which is chosen by the old SGSN. The new SGSN shall include this Tunnel Endpoint Identifier in the GTP header of all subsequent control plane messages, which are sent from the new SGSN to the old SGSN and related to the PDP context(s) requested.

The IMSI information element contains the IMSI matching the TLLI or P-TMSI (for GSM or UMTS respectively) and RAI in the SGSN Context Request.

One or several Receive State Variable information elements may be included in the message.

The MM Context contains necessary mobility management and security parameters.

All active PDP contexts in the old SGSN shall be included as PDP Context information elements.

If there is at least one active PDP context, the old SGSN shall start the T3-TUNNEL timer and store the address of the new SGSN in the "New SGSN Address" field of the MM context. The old SGSN shall wait for SGSN Context Acknowledge before sending T-PDUs to the new SGSN. If the old SGSN has one or more active PDP contexts for the subscriber and an SGSN Context Acknowledge message is not received within a time defined by T3-RESPONSE, the old SGSN shall retransmit the SGSN Context Response to the new SGSN as long as the total number of attempts is less than N3-REQUESTS. After N3-REQUESTS unsuccessfully attempts, the old SGSN shall proceed as described in section ‘Reliable delivery of control plane messages’ in case the transmission of a control plane message fails N3-REQUESTS times.

Radio Priority SMS contains the radio priority level for MO SMS transmission, and shall be included if a valid Radio Priority SMS value exists for the MS in the old SGSN.

Radio Priority is the radio priority level that the MS uses when accessing the network for the transmission of uplink user data for a particular PDP context. One Radio Priority IE shall be included per PDP context that has a valid radio priority value assigned to it in the old SGSN.

Packet Flow Id is the packet flow identifier assigned to the PDP context. One Packet Flow Id IE shall be included per PDP context that has a valid packet flow identifier value assigned to it in the old SGSN.

The optional Private Extension contains vendor or operator specific information.

**Table 27: Information Elements in a SGSN Context Response**

| Information element | Presence requirement | Reference |
|---|---|---|
| Cause | Mandatory | 7.7.1 |
| IMSI | Conditional | 7.7.2 |
| SGSN Address for Control Plane | Conditional | 7.7.32 |
| Tunnel Endpoint Identifier Control Plane | Conditional | 7.7.14 |
| Radio Priority SMS | Optional | 7.7.20 |
| Radio Priority | Optional | 7.7.21 |
| Packet Flow Id | Optional | 7.7.22 |
| MM Context | Conditional | 7.7.28 |
| PDP Context | Conditional | 7.7.29 |
| Private Extension | Optional | 7.7.44 |

**3GPP Meeting TSG CN WG4**
**Seattle, USA, 28 Aug - 1 Sep 2000**

***Document* N4-000753**
*e.g. for 3GPP use the format TP-99xxx*
*or for SMG, use the format P-99-xxx*

# CHANGE REQUEST

*Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.*

| 29.060 | CR | 146r2 | Current Version: | 3.5.0 |
|---|---|---|---|---|

*GSM (AA.BB) or 3G (AA.BBB) specification number ↑* *↑ CR number as allocated by MCC support team*

| For submission to: | CN #09 | for approval | X | strategic | | (for SMG use only) |
|---|---|---|---|---|---|---|
| *list expected approval meeting # here ↑* | | for information | | non-strategic | X | |

*Form: CR cover sheet, version 2 for 3GPP and SMG* *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

**Proposed change affects:** (U)SIM [ ] ME [ ] UTRAN / Radio [ ] Core Network [X]
*(at least one should be marked with an X)*

**Source:** N4 **Date:** 28-08-2000

**Subject:** Correction to the SGSN Forward relocation Request and Response messages

**Work item:** GTP enhancements

**Category:** *(only one category shall be marked with an X)*

| | | | | | |
|---|---|---|---|---|---|
| F | Correction | X | **Release:** | Phase 2 | |
| A | Corresponds to a correction in an earlier release | | | Release 96 | |
| B | Addition of feature | | | Release 97 | |
| C | Functional modification of feature | | | Release 98 | |
| D | Editorial modification | | | Release 99 | X |
| | | | | Release 00 | |

**Reason for change:**
In all messages when the TEID-C IE is included it must be accompanied by the Associated IP address.

This CR fixes the SGSN Forward Relocation request and response messages so that this general rule is met

**Clauses affected:** 7.5.6, 7.5.7

**Other specs affected:**

| | | |
|---|---|---|
| Other 3G core specifications | [ ] | → List of CRs: |
| Other GSM core specifications | [ ] | → List of CRs: |
| MS test specifications | [ ] | → List of CRs: |
| BSS test specifications | [ ] | → List of CRs: |
| O&M specifications | [ ] | → List of CRs: |

**Other comments:**

help.doc

<--------- double-click here for help and instructions on how to create a CR.

## 7.5.6 Forward Relocation Request

The old SGSN shall send a Forward Relocation Request to the new SGSN to convey necessary information to perform the SRNS Relocation procedure between new SGSN and Target RNC.

All information elements are mandatory, except PDP Context and Private Extension.

The IMSI information element contains the IMSI of the target MS for SRNS Relocation procedure.

The old SGSN shall include a SGSN Address for control plane. The new SGSN shall store this SGSN Address and use it when sending control plane messages for the MS to the old SGSN in the SRNS Relocation procedure.

The Tunnel Endpoint Identifier Control Plane field specifies a tunnel endpoint identifier, which is chosen by the old SGSN. The new SGSN shall include this Tunnel Endpoint Identifier Control Plane in the GTP header of all subsequent control plane messages, which are sent from the new SGSN to the old SGSN.

The MM Context contains necessary mobility management and security parameters.

All active PDP contexts in the old SGSN shall be included as PDP Context information elements. In case no PDP context is active, this IE shall not be included.

UTRAN transparent container, Target identification and RANAP Cause are information from the source RNC in the old SGSN.

The optional Private Extension contains vendor or operator specific information.

**Table 29: Information Elements in a Forward Relocation Request**

| Information element | Presence requirement | Reference |
|---|---|---|
| IMSI | Mandatory | 7.7.2 |
| SGSN Address for Control plane | Mandatory | 7.7.32 |
| Tunnel Endpoint Identifier Control Plane | Mandatory | 7.7.14 |
| RANAP Cause | Mandatory | 7.7.18 |
| MM Context | Mandatory | 7.7.28 |
| PDP Context | Conditional | 7.7.29 |
| Target Identification | Mandatory | 7.7.37 |
| UTRAN transparent container | Mandatory | 7.7.38 |
| Private Extension | Optional | 7.7.44 |

## 7.5.7 Forward Relocation Response

The new SGSN shall send a Forward Relocation Response to the old SGSN as a response to a previous Forward Relocation Request.

Possible Cause values is:

- 'Request Accepted'.
- 'System failure'.
- 'Mandatory IE incorrect'.
- 'Mandatory IE missing'.
- 'Optional IE incorrect'.
- 'No resources available'.
- 'Invalid message format'.
- 'Version not supported'.
- 'Relocation failure'.

RANAP Cause is mandatory if cause value is contained in RANAP message.

Target RNC Information, UTRAN transparent container and RANAP Cause are information from the target RNC in the new SGSN.

One or more RAB Setup Information parameters shall be set in this message. This information element shall be included if the Cause contains the value 'Request accepted'.

The new SGSN shall include a SGSN Address for control plane. The old SGSN shall store this SGSN Address and use it when sending control plane messages for the MS to the new SGSN in the SRNS Relocation Procedure.

The Tunnel Endpoint Identifier Control Plane field specifies a Tunnel Endpoint Identifier that is chosen by the new SGSN. The old SGSN shall include this Tunnel Endpoint Identifier in the GTP header of all subsequent signalling messages that are sent from the old SGSN to the new SGSN. This information element shall be included if the Cause contains the value 'Request accepted'.

The optional Private Extension contains vendor or operator specific information.

**Table 30: Information Elements in a Forward Relocation Response**

| Information element | Presence requirement | Reference |
|---|---|---|
| Cause | Mandatory | 7.7.1 |
| SGSN Address for Control plane | Conditional | 7.7.32 |
| Tunnel Endpoint Identifier Control Plane | Conditional | 7.7.14 |
| RANAP Cause | Conditional | 7.7.18 |
| UTRAN transparent container | Optional | 7.7.38 |
| RAB Setup Information | Conditional | 7.7.39 |
| Private Extension | Optional | 7.7.44 |

**3GPP Meeting TSG CN WG4**
**Seattle, USA, 28 Aug - 1 Sep 2000**

***Document* N4-000718**
*e.g. for 3GPP use the format TP-99xxx*
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# CHANGE REQUEST

*Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.*

| 29.060 | CR | 147 | Current Version: | 3.5.0 |
|---|---|---|---|---|

*GSM (AA.BB) or 3G (AA.BBB) specification number ↑* *↑ CR number as allocated by MCC support team*

| For submission to: | CN #09 | for approval | X | strategic | | (for SMG use only) |
|---|---|---|---|---|---|---|
| *list expected approval meeting # here ↑* | | for information | | non-strategic | X | |

*Form: CR cover sheet, version 2 for 3GPP and SMG* *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

**Proposed change affects:** (U)SIM [ ] ME [ ] UTRAN / Radio [ ] Core Network [X]
*(at least one should be marked with an X)*

**Source:** N4 **Date:** 28-08-2000

**Subject:** Clarification or the handling of response messages

**Work item:** GTP enhancements

**Category:** *(only one category shall be marked with an X)*

| | | | | | |
|---|---|---|---|---|---|
| F | Correction | X | **Release:** | Phase 2 | |
| A | Corresponds to a correction in an earlier release | | | Release 96 | |
| B | Addition of feature | | | Release 97 | |
| C | Functional modification of feature | | | Release 98 | |
| D | Editorial modification | | | Release 99 | X |
| | | | | Release 00 | |

**Reason for change:**
The source IP address of an IP packet is an IP address of the network interface it originates from. It does not make sense to mandate the use of the same physical interface for a response message as the one used to receive a request. In fact, the current spec prevents this or mandates the use of IP address spoofing, which is not a good practice (and also it may face ingress filtering problems in GPRS networks).

**Clauses affected:** 10.1.2.2

**Other specs affected:**

| | | |
|---|---|---|
| Other 3G core specifications | [ ] | → List of CRs: |
| Other GSM core specifications | [ ] | → List of CRs: |
| MS test specifications | [ ] | → List of CRs: |
| BSS test specifications | [ ] | → List of CRs: |
| O&M specifications | [ ] | → List of CRs: |

**Other comments:**


help.doc

<--------- double-click here for help and instructions on how to create a CR.

### 10.1.2.2 Response Messages

The IP Source Address shall be an IP address of the source GSN from which the message is originating. ~~The IP Source Address shall be copied from the IP Destination Address of the corresponding request message.~~

The IP Destination Address shall be copied from the IP Source Address of the GTP request message to which this GSN/RNC is replying.

**3GPP Meeting TSG CN WG4**
**Seattle, USA, 28 Aug - 1 Sep 2000**

***Document* N4-000719**
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# CHANGE REQUEST

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| 29.060 | CR | 148 | Current Version: | 3.5.0 |
|---|---|---|---|---|

*GSM (AA.BB) or 3G (AA.BBB) specification number ↑* *↑ CR number as allocated by MCC support team*

| For submission to: | CN #09 | for approval | X | strategic | | (for SMG use only) |
|---|---|---|---|---|---|---|
| *list expected approval meeting # here ↑* | | for information | | non-strategic | X | |

*Form: CR cover sheet, version 2 for 3GPP and SMG* *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

**Proposed change affects:** (U)SIM [ ] ME [ ] UTRAN / Radio [ ] Core Network [X]
*(at least one should be marked with an X)*

**Source:** N4 **Date:** 28-08-2000

**Subject:** Clarification on SGSN context acknowledge message

**Work item:** GTP enhancements

**Category:** *(only one category shall be marked with an X)*

| | | | | |
|---|---|---|---|---|
| F | Correction | X | **Release:** Phase 2 | |
| A | Corresponds to a correction in an earlier release | | Release 96 | |
| B | Addition of feature | | Release 97 | |
| C | Functional modification of feature | | Release 98 | |
| D | Editorial modification | | Release 99 | X |
| | | | Release 00 | |

**Reason for change:** The SGSN context Acknowledge message needs clarification since the current specification bears ambiguity on its usage.

**Clauses affected:** 7.5.4

**Other specs affected:**

| | | |
|---|---|---|
| Other 3G core specifications | [ ] | → List of CRs: |
| Other GSM core specifications | [ ] | → List of CRs: |
| MS test specifications | [ ] | → List of CRs: |
| BSS test specifications | [ ] | → List of CRs: |
| O&M specifications | [ ] | → List of CRs: |

**Other comments:**

help.doc

<--------- double-click here for help and instructions on how to create a CR.

## 7.5.5 SGSN Context Acknowledge

The new SGSN shall send an SGSN Context Acknowledge message to the old SGSN as a response to the SGSN Context Response message. Only after receiving the SGSN Context Acknowledge message, shall the old SGSN start to forward user data packets. SGSN Context Acknowledge indicates to the old SGSN that the new SGSN has correctly received PDP Context information and is ready to receive user data packets identified by the corresponding Tunnel Endpoint Identifier values. This message shall not be sent if no PDP contexts are active for the MS (that is no PDP context information was transferred in the SGSN context response message) or the SGSN Context Request was rejected.

Possible cause values are:

- 'Request accepted'.
- 'System failure'.
- 'Mandatory IE incorrect'.
- 'Mandatory IE missing'.
- 'Optional IE incorrect'.
- 'No resources available'.
- 'Invalid message format'.
- 'Version not supported'.
- 'Authentication failure'.

Only the Cause information element shall be included in the acknowledgement if the Cause contains a value other than 'Request accepted'.

For each active PDP context the new SGSN shall include a Tunnel Endpoint Identifier Data II information element. The Tunnel Endpoint Identifier Data II field specifies a Tunnel Endpoint Identifier which is chosen by the new SGSN for a particular PDP context. The old SGSN shall include this Tunnel Endpoint Identifier l in the GTP header of all subsequent G-PDUs which are sent from the old SGSN to the new SGSN and related to the particular PDP context. When active PDP context(s) exist, this information element shall be included if the Cause contains the value 'Request accepted'.

The new SGSN shall include an SGSN Address for user traffic, which may differ from that provided by the underlying network service (e.g. IP). The old SGSN shall store this SGSN Address and use it when sending G-PDUs to the new SGSN for the MS. When active PDP context(s) exist, this information element shall be included if the Cause contains the value 'Request accepted'.

The optional Private Extension contains vendor or operator specific information.

**Table 28: Information Elements in a SGSN Context Acknowledge**

| Information element | Presence requirement | Reference |
|---|---|---|
| Cause | Mandatory | 7.7.1 |
| Tunnel Endpoint Identifier Data II | Conditional | 7.7.15 |
| SGSN Address for user traffic | Conditional | GSN Address 7.7.32 |
| Private Extension | Optional | 7.7.44 |