3GPP TSG_CN#7   **NP-000069**

ETSI SMG3 Plenary Meeting #7,
Madrid, Spain
13th – 15th March 2000

Agenda item: **5.2.3**

Source: **TSG_N WG2**

Title: **CRs to 3G Work Item GTP enhancements**

Introduction:

This document contains **"20"** CRs on **Work Item GTP enhancements,** that have been agreed by **TSG_N WG2,** and are forwarded to **TSG_N Plenary** meeting #7 for approval.

TDoc	SPEC	CR	REV	CAT	Rel	Old vers	New vers	SUBJECT
N2B000095	29.060	036	1	C	R99	3.3.0		Change the attribution of the PDP Context IE
N2B000015	29.060	037		C	R99	3.3.0		Add cause value
N2B000016	29.060	038		F	R99	3.3.0		Addition of NSAPI to GGSN-initiated Update PDP Context
N2B000111	29.060	045	1	F	R99	3.3.0		Removal of Anonymous Access
N2B000112	29.060	046	1	F	R99	3.3.0		Clarification of Authentication Type and Import of Parameters
N2B000060	29.060	048		F	R99	3.3.0		Clarification of Information Elements
N2B000351	29.060	050	2	F	R99	3.3.0		Clarification on Protocol Type in GTP Header
N2B000350	29.060	052	2	B	R99	3.3.0		Method for GTP extension headers support
N2B000115	29.060	053	2	B	R99	3.3.0		The addition of the conditional description of the GTP parameters
N2B000107	29.060	056		D	R99	3.3.0		Change of naming when referring to primary and secondary contexts
N2B000352	29.060	067	1	C	R99	3.3.0		Distribution of security data
N2B000353	29.060	069	1	C	R99	3.3.0		New cause codes for for TFT and packet filter errors
N2B000264	29.060	070		F	R99	3.3.0		IP v6 support in GTP
N2B000408	29.060	072	3	F	R99	3.3.0		Clarification on the use of TEID in the GTP header
N2B000269	29.060	075		D	R99	3.3.0		Changing references from GSM to 3G
N2B000270	29.060	076		D	R99	3.3.0		New table for Information Elements
N2B000263	29.060	077		C	R99	3.3.0		Forward SRSN Context CR
N2B000354	29.060	078	1	C	R99	3.3.0		PDCP sequence numbers in SRNC relocation and inter-system handover
N2B000293	29.060	079		C	R99	3.3.0		Removal of TCP support in the packet domain PLMN backbone network
N2B000349	29.060	081		F	R99	3.3.0		Addition of PDP Context Identifier to PDP Context Information Element

3GPP TSG CN2 Meeting
Kyoto, Japan, 17th-21st Jan. 2000

Document **N2B000095**
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	036r1	Current Version:	3.3.0

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

For submission to:	CN#07	for approval	X	strategic		(for SMG
list expected approval meeting # here ↑		for information		non-strategic	X	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: (U)SIM [ ]   ME [ ]   UTRAN / Radio [ ]   Core Network [X]
(at least one should be marked with an X)

Source:	N2		**Date:**	6th Jan. 2000

Subject:	Change the attribution of the PDP Context IE

Work item:	GTP Enhancements

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

Reason for change:	In R3#9 Paris Meeting, it was agreed that SRNS relocation procedure can be executed when there is only Iu signalling connection (R3-99J08). This means that there is a possibility of SRNS Relocation procedure executed even when no active PDP Context exists. Therefore, the PDP Context IE within Forward Relocation Request message needs to be 'Conditional'.

Clauses affected:	7.5.6

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:	

7.5.6   Forward Relocation Request

The old SGSN shall send a Forward Relocation Request to the new SGSN to inform nesessary 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 Tunnel Endpoint Identifier Signalling field specifies a tunnel endpoint identifier, which is chosen by the old SGSN. The new SGSN shall include this Tunnel Endpoint Identifier Signalling in the GTP header of all subsequent signalling 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 informed from the source RNC in the old SGSN.

The optional Private Extension contains vendor or operator specific information.

Table 32: Information elements in a Forward Relocation Request

Information element	Presence requirement	Reference
IMSI	Mandatory	7.7.2
Tunnel Endpoint Identifier Signalling	Mandatory	7.7.14
MM Context	Mandatory	7.7.18
PDP Context	ConditionalMandatory	7.7.19
Target Identification	Mandatory	7.7.31
UTRAN transparent container	Mandatory	7.7.32
RANAP Cause	Mandatory	7.7.33
Private Extension	Optional	7.7.26

CHANGE REQUEST

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29.060	**CR**	**037**	Current Version:	**3.3.0**	

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

For submission to:	CN#07	for approval	**X**	strategic		*(for SMG*
list expected approval meeting # here ↑		for information		non-strategic	**X**	*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: (U)SIM ☐   ME ☐   UTRAN / Radio ☐   Core Network **X**
(at least one should be marked with an X)

Source:	N2	**Date:**	6th Jan. 2000

Subject:	Add new cause value

Work item:	GTP Enhancements

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

Reason for change:	The CR016r1 (N2-99E72) that adds the Forward Relocation messages to the GTP has been approved in the CN#6 plenary meeting. This CR is created since the following problems are found after the CR016r1 approval.

- In case the SRNS relocation failure occurs (ex. No resource available for SRNS relocation in the target RNC), the cause value to be set in the Forward Relocation Response message is ambiguous. This CR creates the new cause value "Relocation failure" and puts sufficient explanation to the cause IE.

- The editorial mistakes in the section 7.5.7 are corrected in this CR at the same time.

Clauses affected:	7.5.7, 7.7.1

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:	

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'

The Cause and RANAP Cause information element shall be included in the response if the Cause contains another value than 'Request accepted'.

All information elements are mandatory, except Private Extension, if the Cause contains the value 'Request accepted'.

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

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

Single number or prural number of Target RNC Information parameter shall be set in this message.

The optional Private Extension contains vendor or operator specific information.

Table 33: Information elements in a Forward Relocation Response

Information element	Presence requirement	Reference
Cause	Mandatory	7.9.1
Target RNC Information	Conditional	7.9.31
UTRAN transparent container	Optional	7.9.29
RANAP Cause	Conditional	7.9.30
Private Extension	Optional	7.9.25

7.7.1 Cause

In a request, the Cause Value indicates the reason for the request. The Cause shall be included in the request message.

In a response, the Cause Value indicates the acceptance or the rejection of the corresponding request. In addition, the Cause Value may indicate what was the reason for the corresponding request. The Cause value shall be included in the response message.

'Request accepted' is returned when a GSN has accepted a signalling request.

'Non-existent' indicates a non-existent or an inactive PDP context.

'IMSI not known' indicates a non-existent MM context.

'MS is GPRS Detached' indicates an idle MM context.

'MS is not GPRS Responding' and 'MS Refuses' may be used by SGSN to reject a Network-Requested PDP Context Activation.

'Version not supported' is returned when the recipient does not recognise the version number in the request message.

'Request IMSI', 'Request IMEI', 'Request IMSI and IMEI' and 'No identity needed' are used by GGSN to notify SGSN what to do.

'No resources available' is a generic temporary error condition e.g. all dynamic PDP addresses occupied or no memory available.

'Service not supported' is a generic error indicated that the GSN do not support the requested service.

'User authentication failed' indicates that the external packet network has rejected the user's service request.

'System failure' is a generic permanent error condition.

'Roaming restriction' indicates that the SGSN cannot activate the requested PDP context because of the roaming restrictions.

'P-TMSI Signature mismatch' is returned either if the P-TMSI Signature stored in the old SGSN does not match the value sent by the MS via the new SGSN or if the MS does not provide the P-TMSI Signature to the new SGSN while the old SGSN has stored the P-TMSI Signature for that MS.

'Invalid message format', 'Mandatory IE incorrect', 'Mandatory IE missing' and 'Optional IE incorrect' are indications of protocol errors described in the section Error handling.

'GPRS connection suspended' indicates that the GPRS activities of the mobile station are suspended.

'Authentication failure' indicates that the user authentication failed in the new SGSN.

'Context not found' indicates that the PDP Context referenced in an Active Secondary Context Request message was not found in the receiving GGSN.

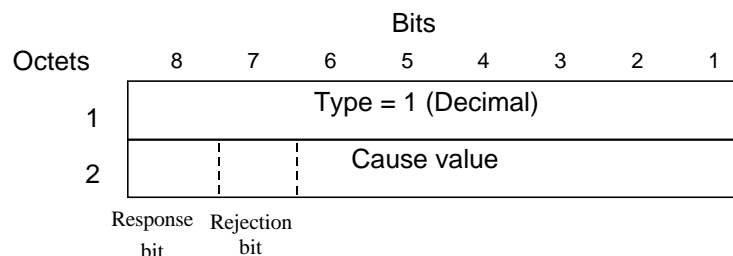'Relocation failure' indicates that the SRNS relocation failed in the new SGSN side.

Figure 9: Cause information element

Table 37: Cause values

Cause			Value (Decimal)
request		Request IMSI	0
		Request IMEI	1
		Request IMSI and IMEI	2
		No identity needed	3
		MS Refuses	4
		MS is not GPRS Responding	5
		For future use	6-48
		Cause values reserved for GPRS charging protocol use (see GTP' in GSM 12.15)	49-63
For future use			64-127
response	acc	Request accepted	128
		For future use	129-176
		Cause values reserved for GPRS charging protocol use (see GTP' in GSM 12.15)	177-191
	rej	Non-existent	192
		Invalid message format	193
		IMSI not known	194
		MS is GPRS Detached	195
		MS is not GPRS Responding	196
		MS Refuses	197
		Version not supported	198
		No resources available	199
		Service not supported	200
		Mandatory IE incorrect	201
		Mandatory IE missing	202
		Optional IE incorrect	203
		System failure	204
		Roaming restriction	205
		P-TMSI Signature mismatch	206
		GPRS connection suspended	207
		Authentication failure	208
		User authentication failed	209
		Context not found	210
		All dynamic PDP addresses are occupied	211
		No memory is available	212
		Relocation failure	213
		For future use	2143-240
		Cause values reserved for GPRS charging protocol use (see GTP' in GSM 12.15)	241-255

NOTE: With this coding, bits 8 and 7 of the Cause Value respectively indicate whether the message was a request or a response, and whether the request was accepted or rejected.

3G 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 **038**   Current Version: 3.3.0

3G specification number ↑   *↑ CR number as allocated by 3G support team*

For submission to TSG CN#07   For approval **X** *(only one box should*
list TSG meeting no. here ↑   For information ☐ *be marked with an X)*

Form: 3G CR cover sheet, version 1.0   The latest version of this form is available from: ftp://ftp.3gpp.org/Information/3GCRF-xx.rtf

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Proposed change affects: USIM ☐   ME ☐   UTRAN ☐   Core Network **X**
(at least one should be marked with an X)

| **Source:** | N2 | | **Date:** | 17/01/2000 |

Subject: Addition of NSAPI to GGSN-initiated Update PDP Context request

3G Work item: GPRS

Category: F Correction **X**
  A Corresponds to a correction in a 2G specification ☐
(only one category   B Addition of feature ☐
Shall be marked   C Functional modification of feature ☐
With an X)   D Editorial modification ☐

Reason for change: In the last N2 meeting, all CRs for 29.060 were merged into one CR. This CR corrects the misalignment among these original CRs and existing defined messages.
1. In the definition of GGSN-initiated Update PDP Context Request message, NSAPI is missing. However in GTP v1 NSAPI is required to identify which PDP context to be modified. Beside,
2. Recovery information element should be added for "GGSN-initiated Update PDP Context Request" message and "Update PDP Context Response sent by a SGSN" message to align with SGSN-Initiated PDP Context Modification Procedure.

Clauses affected: 7.3.3, 7.3.4

Other specs Affected: Other 3G core specifications ☐ → List of CRs:
  Other 2G 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.

7.3.3   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 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 Signalling field specifies a downlink Tunnel Endpoint Identifier 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 signalling messages which are related to the requested PDP context.

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 signalling 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 signalling 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 optional Private Extension contains vendor or operator specific information.

Table 6: Information elements in an SGSN-initiated Update PDP Context Request

Information element	Presence requirement	Reference
Recovery	Optional	7.7.11
Tunnel Endpoint Identifier Data I	Mandatory	7.7.13
Tunnel Endpoint Identifier Signalling	Mandatory	7.7.14
SGSN Address for signalling	Mandatory	GSN Address 7.7.22
SGSN Address for user traffic	Mandatory	GSN Address 7.7.22
Quality of Service Profile	Mandatory	7.7.25
Private Extension	Optional	7.7.26
TFT	Optional	7.7.28
NSAPI	Mandatory	7.7.30

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 7: Information elements in a GGSN-initiated Update PDP Context Request

Information element	Presence requirement	Reference
End User Address	Optional	7.7.17
Quality of Service Profile	Optional	7.7.25
Private Extension	Optional	7.7.26
Recovery	Optional	7.7.11
NSAPI	Mandatory	7.7.30

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'

- 'Mandatory IE incorrect'

- 'Mandatory IE missing'

- 'Optional IE incorrect'

- 'Invalid message format'

- 'Version not supported'

The Tunnel Endpoint Identifierl Data I field specifies an uplink Tunnel Endpoint Identifier for G-PDUs which 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 Signalling 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 signalling messages which are related to the requested PDP context.

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'.

If a connection-less path is to be used to tunnel T-PDUs for the given PDP context or a reliable connection-oriented path is to be used and a connection already exists, the GGSN may start to forward T-PDUs after the Update PDP Context Response has been sent and 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 a Update PDP Context Request but before an Update PDP Context Response has been received.

If a reliable connection-oriented path is to be used to tunnel T-PDUs for the given PDP context and a connection does not exist between the GSN pair, the SGSN shall establish a connection and the GGSN shall wait for the connection before forwarding of T-PDUs may start.

Only one connection shall be used between any given GSN-pair, and this connection shall be used to tunnel end user traffic in both directions.

The GGSN shall include a GGSN Address for signalling 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 signalling 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.

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.

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 8: 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 Data I	Conditional	7.7.13
Tunnel Endpoint Identifier Signalling	Conditional	7.7.14
Charging ID	Conditional	7.7.16
GGSN Address for signalling	Conditional	GSN Address 7.7.22
GGSN Address for user traffic	Conditional	GSN Address 7.7.22
Charging Gateway Address	Optional	7.7.24
Quality of Service Profile	Conditional	7.7.25
Private Extension	Optional	7.7.26

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 9: Information elements in an Update PDP Context Response sent by a SGSN

Information element	Presence requirement	Reference
Cause	Mandatory	7.7.1
Quality of Service Profile	Conditional	7.7.25
Private Extension	Optional	7.7.26
Recovery	Optional	7.7.11

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	045r1	Current Version:	3.3.0

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

For submission to:	CN#07	for approval	X	strategic		*(for SMG*
list expected approval meeting # here ↑		for information		non-strategic	X	*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: (U)SIM ☐   ME ☐   UTRAN / Radio ☐   Core Network **X**
(at least one should be marked with an X)

Source:	N2		**Date:**	11 Jan 2000

Subject:	Removal of Anonymous Access

Work item:	GTP Enhancements

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

Reason for change:	It was decided by CN plenary in December 99 to remove Anonymous Access.

Clauses affected:	7.1 7.3.7-7.3.10

Other specs affected:	Other 3G core specifications		→ List of CRs:	23.060
	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:	After the removal the chapters must be aligned by the editor.

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

3 Definitions and abbreviations

3.1 Definitions

~~**MM Context ID:** IMSI or equivalent for use in conjunction with Anonymous Access (please refer to section GTP Header).~~

7 GTP Messages and Message Formats

7.1 Signalling Message Formats

GTP defines a set of signalling messages between two associated GSNs or an SGSN and an RNC. The signalling messages to be used are defined in the table below. The three columns to the right define which parts (GTP-C, GTP-U or GTP') that send or receive the specific message type.

Table 1: Signalling messages in GTP

Message Type value (Decimal)	Signalling message	Reference	GTP-C	GTP-U	GTP'
0	For future use. Shall not be sent. If received, shall be treated as an Unknown message.				
1	Echo Request	7.2.1	X	X	
2	Echo Response	7.2.2	X	X	
3	Version Not Supported	7.2.3	X	X	
4	Node Alive Request	GSM 12.15			X
5	Node Alive Response	GSM 12.15			X
6	Redirection Request	GSM 12.15			X
7	Redirection Response	GSM 12.15			X
8-15	For future use. Shall not be sent. If received, shall be treated as an Unknown message.				
16	Create PDP Context Request	7.3.1	X		
17	Create PDP Context Response	7.3.2	X		
18	Update PDP Context Request	7.3.3	X		
19	Update PDP Context Response	7.3.4	X		
20	Delete PDP Context Request	7.3.5	X		
21	Delete PDP Context Response	7.3.6	X		
~~22~~	~~Create AA PDP Context Request~~	~~7.3.7~~	~~X~~		
~~23~~	~~Create AA PDP Context Response~~	~~7.3.8~~	~~X~~		
~~24~~	~~Delete AA PDP Context Request~~	~~7.3.9~~	~~X~~		
~~25~~	~~Delete AA PDP Context Response~~	~~7.3.10~~	~~X~~		
<u>22-25</u>	<u>For future use. Shall not be sent if received, shall be treated as an Unknown message</u>				
26	Error Indication	7.3.11	X		
27	PDU Notification Request	7.3.12	X		
28	PDU Notification Response	7.3.13	X		
29	PDU Notification Reject Request	7.3.14	X		
30	PDU Notification Reject Response	7.3.15	X		
31	For future use. Shall not be sent. If received, shall be treated as an Unknown message.				
32	Send Routeing Information for GPRS Request	7.4.1	X		
33	Send Routeing Information for GPRS Response	7.4.2	X		
34	Failure Report Request	7.4.3	X		
35	Failure Report Response	7.4.4	X		
36	Note MS GPRS Present Request	7.4.5	X		
37	Note MS GPRS Present Response	7.4.6	X		
38-47	For future use. Shall not be sent. If received, shall be treated as an Unknown message.				
48	Identification Request	7.5.1	X		
49	Identification Response	7.5.2	X		
50	SGSN Context Request	7.5.3	X		
51	SGSN Context Response	7.5.4	X		
52	SGSN Context Acknowledge	7.5.5	X		
53	Forward Relocation Request	7.5.6	X		
54	Forward Relocation Response	7.5.7	X		
55	Forward Relocation Complete	7.5.8	X		
56	Relocation Cancel Request	7.5.9	X		
57	Relocation Cancel Response	7.5.10	X		
58-239	For future use. Shall not be sent. If received, shall be treated as an Unknown message.				
240	Data Record Transfer Request	GSM 12.15			X
241	Data Record Transfer Response	GSM 12.15			X
242-254	For future use. Shall not be sent. If received, shall be treated as an Unknown message.				
255	T-PDU	9.3.1		X	

7.3.7 Create AA PDP Context Request

A Create AA PDP Context Request shall be sent from a SGSN node to a GGSN node as a part of the GPRS Anonymous Access PDP Context Activation procedure. It shall be used to create a tunnel between a PDP Context in an SGSN and a PDP Context in a GGSN. The GGSN IP address where the SGSN sends the Create AA PDP Context Request is the first IP address in the list of IP addresses provided by the DNS server. After sending the Create AA 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. If the procedure is not successfully completed, the SGSN repeats the Create AA 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 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 Signalling field specifies a downlink Tunnel Endpoint Identifier 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 signalling messages which are related to the requested PDP context.

The Quality of Service Profile information element shall be the QoS values to be negotiated by the MS and SGSN at Anonymous Access PDP Context activation.

The SGSN shall include a Recovery information element into the Create AA 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 AA PDP Context Request message element shall handle it in the same way as when receiving an Echo Response message. The Create AA PDP Context Request message shall be considered as a valid activation request for a new AA context of the indicated PDP type.

The Selection mode IE shall be set to either 'MS provided APN, subscription not verified' or 'Network provided APN, subscription not verified' depending on the origin of the APN which is included in the message.

The SGSN shall include an SGSN Address for signalling 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 signalling on this GTP tunnel or G-PDUs to the SGSN for the MS.

The End User Address contains the requested PDP Type with the PDP Address field left empty. 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 NSAPI information element uniquely identifies the PDP Context to be created.

The optional Protocol Configuration Options information element is applicable for the end user protocol 'IP' only. The GGSN may discard the Protocol Configuration Options information element or may use it for user authentication and configuration, depending on configuration data.

The optional Private Extension contains vendor or operator specific information.

Table 12: Information elements in a Create AA PDP Context Request

Information element	Presence requirement	Reference
Recovery	Optional	7.7.11
Selection mode	Mandatory	7.7.12
Tunnel Endpoint Identifier Data I	Mandatory	7.7.13
Tunnel Endpoint Identifier Signalling	Mandatory	7.7.14
End User Address	Mandatory	7.7.17
Access Point Name	Mandatory	7.7.20
Protocol Configuration Options	Optional	7.7.21
SGSN Address for signalling	Mandatory	GSN Address 7.7.22
SGSN Address for user traffic	Mandatory	GSN Address 7.7.22
Quality of Service Profile	Mandatory	7.7.25
Private Extension	Optional	7.7.26

7.3.8   Create AA PDP Context Response

The message shall be sent from a GGSN node to a SGSN node as a response of a Create AA PDP Context Request. When the SGSN receives a Create AA 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.

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'.

Possible Cause values are:

- 'Request Accepted'

- 'No resources available'

- 'Service not supported'

- 'User authentication failed'

- 'System failure'

- 'Mandatory IE incorrect'

- 'Mandatory IE missing'

- 'Optional IE incorrect'

- 'Invalid message format'

- 'Version not supported'

The Tunnel Endpoint Identifier Data I field specifies an uplink Tunnel Endpoint Identifier for G-PDUs which 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 Signalling 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 signalling messages which are related to the requested PDP context.

The GGSN shall include a GGSN Address for signalling 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 signalling on this tunnel or G-PDUs to the GGSN for the MS.

The QoS values supplied in the Create AA 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.

If a connection-less path is to be used to tunnel T-PDUs for the given PDP context or a reliable connection-oriented path is to be used and a connection already exists, the GGSN may start to forward T-PDUs after the Create AA PDP Context

Response has been sent and the SGSN may start to forward T-PDUs when the Create AA 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 AA PDP Context Request but before a Create AA PDP Context Response has been received.

If a reliable connection oriented path is to be used to tunnel T-PDUs for the given PDP context and a connection does not exist between the GSN pair, the SGSN shall establish a connection and the GGSN shall wait for the connection before forwarding of T-PDUs may start.

Only one connection shall be used between any given GSN pair, and this connection shall be used to tunnel end user traffic in both directions.

The GGSN shall include the Recovery information element into the Create AA 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 AA PDP context being created as active if the response indicates a successful AA 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 PDP Address field in the End User Address information element contains the dynamic PDP Address allocated by the GGSN. 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 optional Private Extension contains vendor or operator specific information.

Table 13: Information elements in a Create AA PDP Context Response

Information element	Presence requirement	Reference
Cause	Mandatory	7.7.1
Recovery	Optional	7.7.11
Tunnel Endpoint Identifier Data I	Conditional	7.7.13
Tunnel Endpoint Identifier Signalling	Conditional	7.9.14
Charging ID	Conditional	7.7.16
End User Address	Conditional	7.7.17
Protocol Configuration Options	Optional	7.7.21
GGSN Address for signalling	Conditional	GSN Address 7.7.22
GGSN Address for user traffic	Conditional	GSN Address 7.7.22
Charging Gateway Address	Optional	7.7.24
Quality of Service Profile	Conditional	7.7.25
Private Extension	Optional	7.7.26

7.3.9 Delete AA PDP Context Request

A Delete AA PDP Context Request shall be sent from a SGSN node to a GGSN node as part of the GPRS PDP Anonymous Access Context Deactivation procedure. The GGSN may also send the request to the SGSN if it detects malicious usage of the service. The request shall be used to deactivate an activated PDP Context.

The Cause information element indicates whether the SGSN shall request the real identities (i.e. IMSI or IMEI) of the anonymous MS. One of the following Cause values shall be used:

- 'Request IMSI'

- 'Request IMEI'

- 'Request IMSI and IMEI'

- 'No identity needed'.

The NSAPI information element unambiguously identifies a specific PDP Context in the receiving GSN.

The optional Private Extension contains vendor or operator specific information.

Table 14: Information elements in a Delete AA PDP Context Request

Information element	Presence requirement	Reference
Cause	Mandatory	7.7.1
NSAPI	Mandatory	7.7.30
Private Extension	Optional	7.7.26

7.3.10　Delete AA PDP Context Response

The message shall be sent as a response of a Delete AA PDP Context Request.

Possible Cause values are:

- 'Request Accepted'

- 'Mandatory IE incorrect'

- 'Mandatory IE missing'

- 'Optional IE incorrect'

- 'Invalid message format'

If the received Delete AA PDP Context Response contains a cause value other than 'Request accepted', the PDP context shall be kept active.

The optional Private Extension contains vendor or operator specific information.

Table 15: Information elements in a Delete AA PDP Context Response

Information element	Presence requirement	Reference
Cause	Mandatory	7.7.1
Private Extension	Optional	7.7.26

3GPP TSG CN2 Meeting #13
Kyoto, Japan, 17-21 Jan 2000

Document **N2B000112**
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**	**046r1**	Current Version: **3.3.0**

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

For submission to:	TSG N#7	for approval	**X**		strategic		*(for SMG*
list expected approval meeting # here ↑		for information			non-strategic	**X**	*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: (U)SIM ☐   ME ☐   UTRAN / Radio ☐   Core Network **X**
(at least one should be marked with an X)

Source:	N2		**Date:**	19Jan 2000

Subject: Clarification of Authentication Type and import of parameters

Work item: GTP enhancements

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

Reason for change:	Referring to 7.7.18 MM Context in figure 31, 32 and table 45 Security should be changed to Authentication Type according to the textual description. The field DRX parameter and MS Network Capability were missing, see version 3.2.0.

Clauses affected: 7.7.18

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:	

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

7.7.18   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 Update procedure.

The Authentication Type indicates the Authentication mechanism whichthat is the GSM or UMTS.

The Ciphering Key Sequence Number (CKSN) is described in GSM 04.08. Possible values are integers in the range [0; 6]. The value 7 is reserved. The Ciphering Key Sequence Number shall be presented if Authentication Type is GSM.

The Key Set Identifier (KSI) is described in UMTS 23.060. Possible values are integer in the range [0; 6]. The value 7 is reserved. The Key Set Identifier shall be presented if Authentication Type is UMTS.

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

Kc is the ciphering key currently used by the old SGSN. Kc shall be presented if Authentication Type is GSM.

CK is the ciphering key currently used by the old SGSN. CK shall be presented if Authentication Type is UMTS.

IK is the integrity key currently used by the old SGSN. IK shall be presented if Authentication Type is UMTS.

The Triplet array contains triplets encoded as the value in the Authentication Triplet information element The Triplet array shall be presented if Authentication Type is GSM.

The Quintuplet array contains Quintuplets encoded as the value in the Authentication Quintuplet information element. The Quintuplet shall be presented if Authentication Type is UMTS.

The Triplet array contains triplets encoded as the value in the Authentication Triplet information element.

The 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.

The DRX parameter and the MS Network Capability are coded as described in GSM 04.08, the value part only. excluding IEI..

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

The 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 GSM 04.08.

Octets	Bits							
	8	7	6	5	4	3	2	1
1	Type=129 (Decimal)							
2-3	Length							
4	Spare 11111					CKSN		
5	Authentication Type	No of Vectors				Used Cipher		
6-13	Kc							
14-m	Triplet [0..4]							
(m+1)-(m+2)	DRX parameter							
(m+3)-(m+4)	MS Network Capability							

Octets								
	(m+5)-(m+6)	Container length						
	(m+7)-n	Container						

Figure 31: MM Context element in GSM

Octets	Bits							
	8	7	6	5	4	3	2	1
1	Type=129 (Decimal)							
2-3	Length							
4	Spare 11111				KSI			
5	Authentication Type	No of Vectors		Used Cipher				
6-22	CK							
23-39	IK							
40-41	Quintuplet Length							
42-m	Quintuplet [0..4]							
(m+1)-(m+2)	DRX parameter							
(m+3)-(m+4)	MS Network Capability							
(m+5)-(m+6)	Container length							
(m+7)-n	Container							

Figure 32: MM Context element in UMTS

Table 44: Used Cipher values

Cipher Algorithm	Value (Decimal)
No ciphering	0
GEA/1	1

Table 45: Authentication~~Security~~ Type Values

~~Security~~ AuthenticationType	Value (Decimal)
GSM	3
UMTS	2

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**	**048**	Current Version:	**3.3.0**

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

For submission to:	**TSG N#07**	for approval	**X**	strategic		*(for SMG*
list expected approval meeting # here ↑		for information		non-strategic	**X**	*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 **X**

Source:	N2		**Date:**	12-Jan-2000

Subject:	Correction of IE types and order

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:

IE type values 18 and 134 are allocated more than once:
- TEID II and TFT uses type=18
- MSISDN, QOS Profile, Authentication Quintuplet and Target Identification uses type=134

The value allocated for RANAP Cause (136) is within the range for a TLV IE (Type, Length, Value), but the IE is only TV (Type, Value).
The range for TV elements is 1-127 and the range for TLV elements is 128-255.
TFT is of type TLV and must have a type in the range 128-255.

The length field shall be 2 octets for a TLV element, the Authentication Quintuplet is defined with only 1 octet for the length.

The information elements shall be sorted with the Type fields in ascending order in the signalling messages. It is recommended to follow that order for the clause numbering, too.

Clauses affected:	7.7.16-34 (and implicit 7.3.x, 7.4.x and 7.5.x)

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:

Correcting the order and the references in the signalling message tables in subclauses for 7.3, 7.4 and 7.5 should be for the editor to take care of. The figure numbers and the section numbering in this CR will also be changed when implementing other approved CRs.

help.doc

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

7.7.15   Tunnel Endpoint Identifier Data II

The Tunnel Endpoint Identifier Data II information element contains the Tunnel Endpoint Identifier for data transmission between old and new SGSN for a particular PDP context and is requested by the new SGSN.

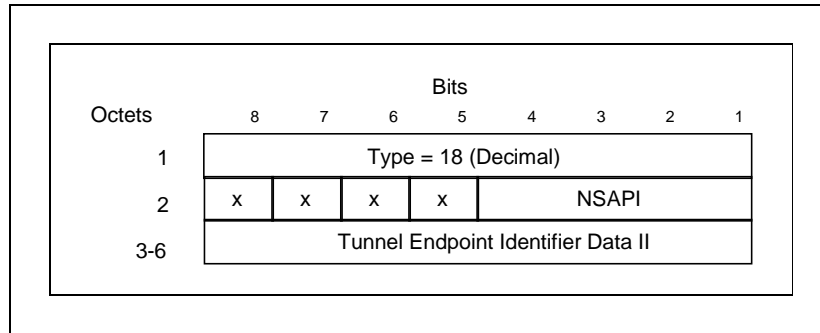The spare bits x indicate unused bits which shall be set to 0 by the sending side and which shall not be evaluated by the receiving side.

	Bits							
Octets	8	7	6	5	4	3	2	1
1	Type = 18 (Decimal)							
2	x	x	x	x	NSAPI			
3-6	Tunnel Endpoint Identifier Data II							

Figure 23: Tunnel Endpoint Identifier Data II information element

7.7.16   Teardown Ind

The Teardown Ind information element, when included in the Delete PDP Context Request, indicate that the message applies to all PDP contexts that share the same PDP address.

	Bits							
Octets	8	7	6	5	4	3	2	1
1	Type = 19 (Decimal)							
2	1	1	1	1	1	1	1	Teardown Ind
	Spare							
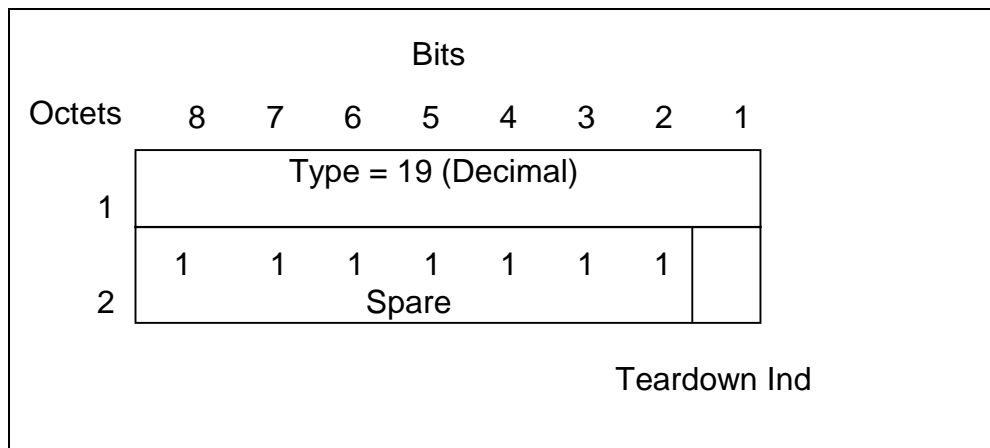
Figure 24: Teardown Ind information element

Table 48: Teardown Ind

Teardown Ind	Value
No	0
Yes	1

7.7.17   NSAPI

The NSAPI information element contains an NSAPI identifying a PDP Context in a mobility management context specified by the Tunnel Endpoint Identifier Signalling.
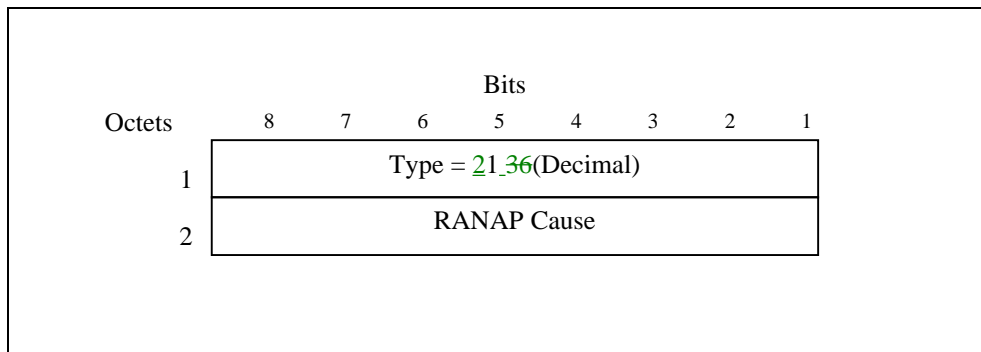
The spare bits x indicate unused bits, which shall be set to 0 by the sending side, and the sending side shall not evaluate them.

	Bits							
Octets	8	7	6	5	4	3	2	1
1	Type = 20 (Decimal)							
2	x	x	x	x	NSAPI			
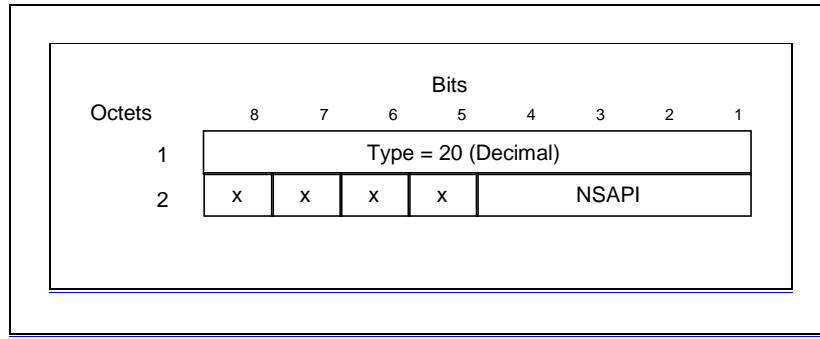
Figure 25: NSAPI information element

7.7.18 RANAP Cause

The RANAP Cause information element contains the cause as defined in TS 25.413.

	Bits							
Octets	8	7	6	5	4	3	2	1
1	Type = 21 ~~36~~(Decimal)							
2	RANAP Cause							

Figure 26: RANAP Cause information element

7.7.2~~6~~3 MS International PSTN/ISDN Number (MSISDN)

The MS international ISDN numbers are allocated from the CCITT Recommendation E.164 numbering plan, see GSM 03.03. The MSISDN is coded according to the contents of ISDN-AddressString data type defined in 3G TS 29.002. The MSISDN shall be in international format and the "nature of address indicator" shall indicate "international number".

Octets	Bits							
	8	7	6	5	4	3	2	1
1	Type = 134 (Decimal)							
2-3	Length							
4-n	MSISDN							
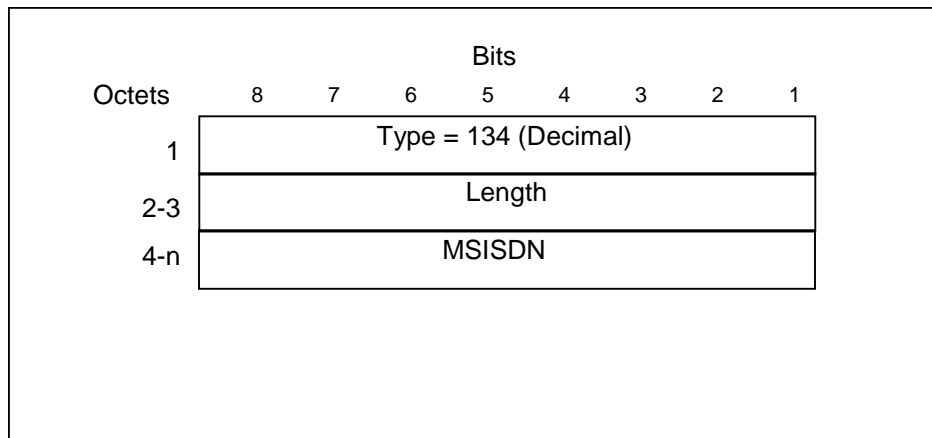
Figure 37: MSISDN information element

7.7.24 Charging Gateway Address

The Charging Gateway Address information element contains an IP address of a Charging Gateway.

Octets	Bits							
	8	7	6	5	4	3	2	1
1	Type = 251 (Decimal)							
2-3	Length = 4 (Decimal)							
4-7	IPv4 Address							
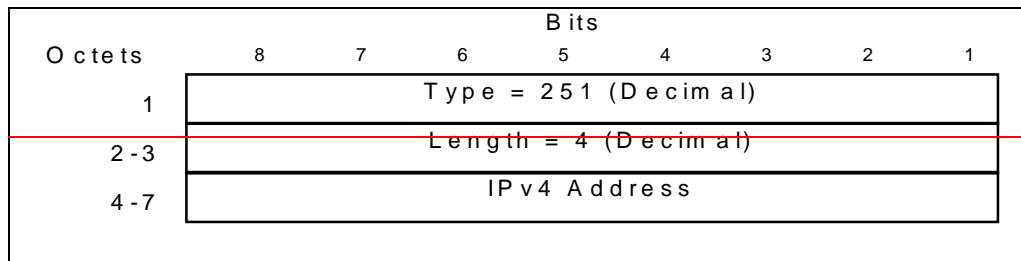
Figure 38: Charging Gateway Address information element

7.7.~~25~~27 Quality of Service (QoS) Profile

The Quality of Service (QoS) Profile shall include the values of the defined QoS parameters. The content of the QoS profile is described in TS 23.060. Octets 4 – n carry the value part (i.e. excluding the IEI and length) of the Quality of Service profile IE which is specified in TS 24.008. The minimum length of the QoS profile (i.e. octets 4 – n) is 3 octets; the maximum length is 15 octets.
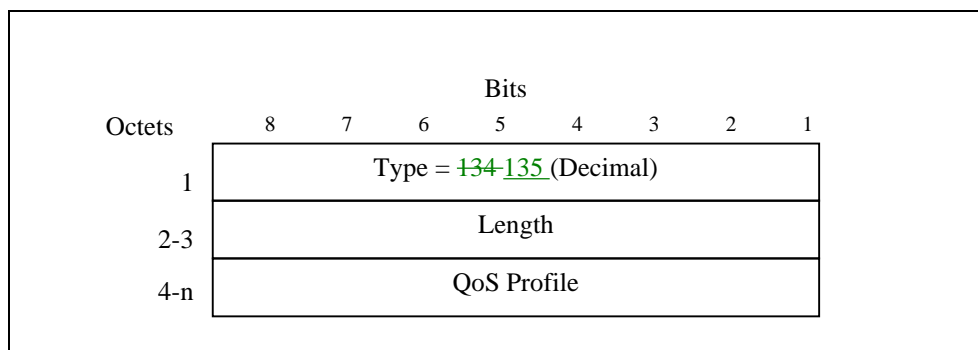
Octets	Bits							
	8	7	6	5	4	3	2	1
1	Type = ~~134~~ 135 (Decimal)							
2-3	Length							
4-n	QoS Profile							

Figure ~~39~~38: Quality of Service (QoS) Profile information element

7.7.26 Private Extension

The Private Extension information element contains vendor specific information. The Extension Identifier is a value defined in the Private Enterprise number list in the most recent "Assigned Numbers" RFC (RFC 1700 or later).

This is an optional information element that may be included in any signalling message. A signalling message may include more than one information element of the Private Extension type.
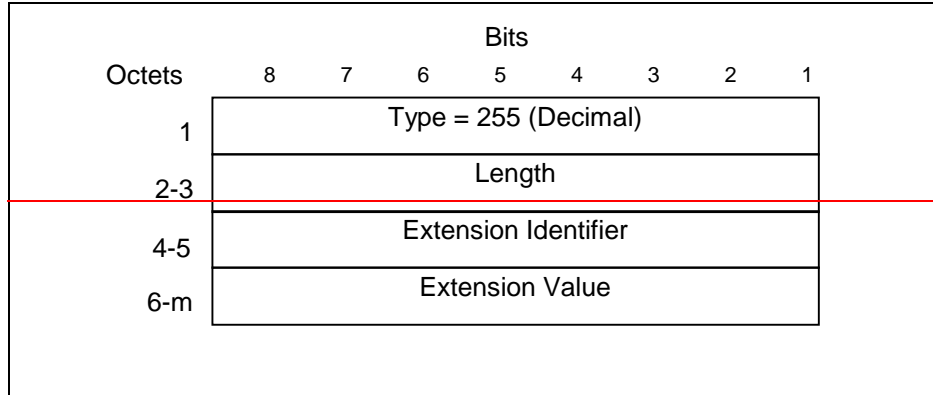
	Bits							
Octets	8	7	6	5	4	3	2	1
1	Type = 255 (Decimal)							
2-3	Length							
4-5	Extension Identifier							
6-m	Extension Value							

Figure 40: Private Extension information element

7.7.2728 Authentication Quintuplet

An Authentication Quintuplet consists of a Random challenge (RAND), an Expected user response (XRES), a Cipher key (CK), an Integrity key (IK), an Authentication token (AUTN) (see UMTS TS 33.102).

	Bits							
Octets	8	7	6	5	4	3	2	1
1	Type = 134136(Decimal)							
2-3	Length							
34-1920	RAND							
2021	XRES Length							
2122-m	XRES							
m+1-m+17	CK							
m+18-m+36	IK							
m+37	AUTN Length							
m+38-n	AUTN							
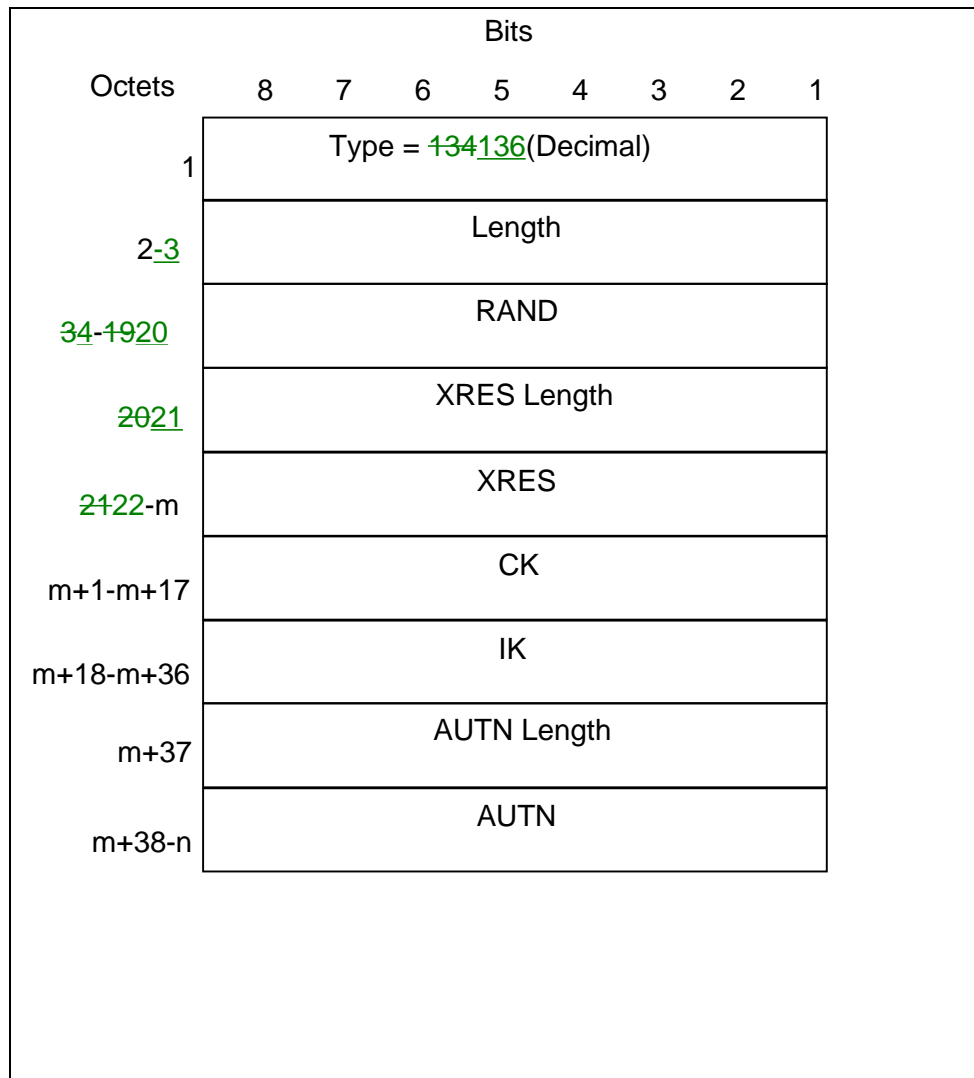
Figure 4139: Authentication Quintuplet information element

7.7.2829 Traffic Flow Template (TFT)

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

The content and the coding of the TFT is defined in GSM 04.08.

```
                              Bits
        Octets   8   7   6   5   4   3   2   1
                 ┌─────────────────────────────────┐
                 │      Type = 18 137 (Decimal)     │
           1     │                                  │
                 ├─────────────────────────────────┤
          2-3    │             Length               │
                 ├─────────────────────────────────┤
          4-n    │  TFT (Entire GSM 04.08 TFT value part) │
                 │                                  │
                 └─────────────────────────────────┘

          The TFT value part is described in GSM

          03.60 and defined in GSM 04.08
```
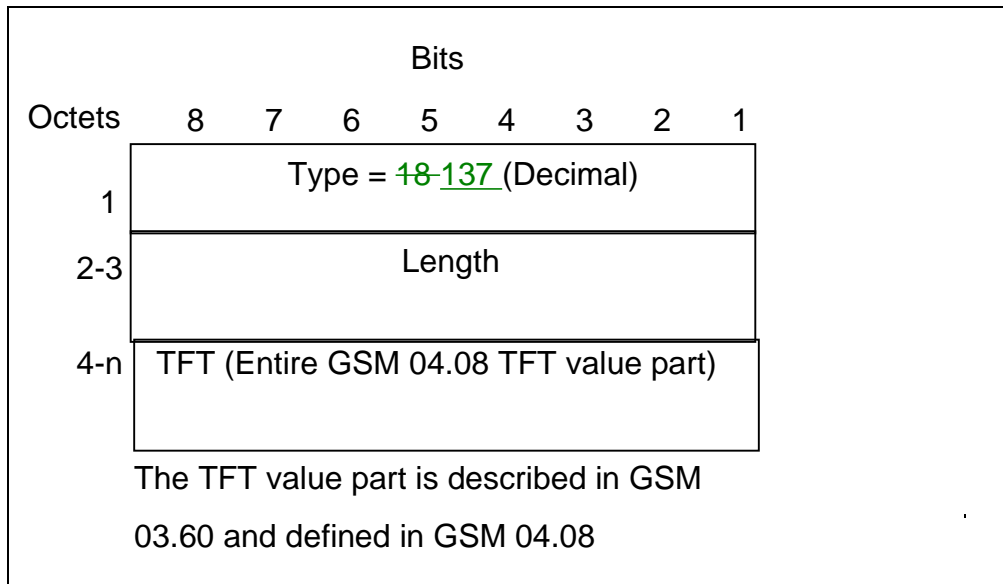
Figure 42 40: Traffic Flow Template information element

7.7.29   Teardown Ind

The Teardown Ind information element, when included in the Delete PDP Context Request, indicate that the message applies to all PDP contexts that share the same PDP address.

```
                              Bits
       Octets     8   7   6   5   4   3   2   1
                  ┌─────────────────────────────────┐
                  │       Type = 19 (Decimal)        │
            1     │                                  │
                  ├───────────────────────────┬──────┤
                  │  1   1   1   1   1   1   1 │      │
            2     │            Spare          │      │
                  └───────────────────────────┴──────┘

                                        Teardown Ind
```
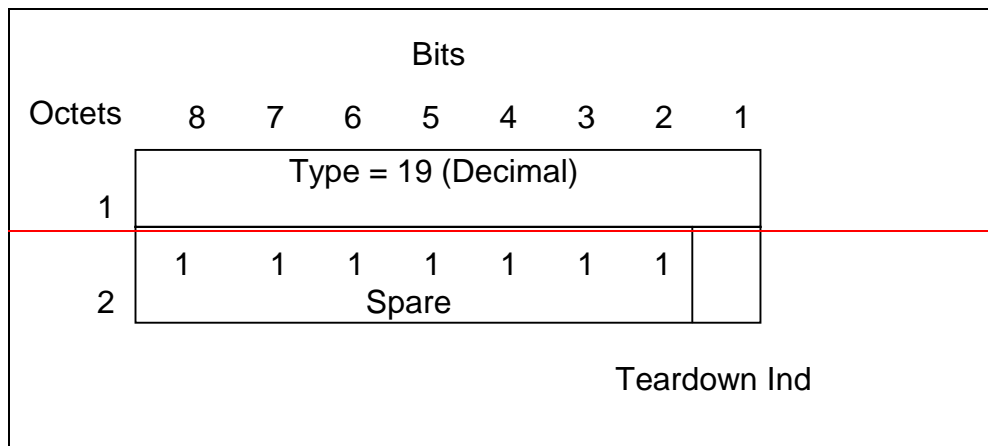
Figure 43: Teardown Ind information element

Table 48: Teardown Ind

Teardown Ind	Value
No	0
Yes	1

7.7.30   NSAPI

The NSAPI information element contains an NSAPI identifying a PDP Context in a mobility management context specified by the Tunnel Endpoint Identifier Signalling.

The spare bits x indicate unused bits, which shall be set to 0 by the sending side, and the sending side shall not evaluate them.

Octets	Bits							
	8	7	6	5	4	3	2	1
1	Type = 20 (Decimal)							
2	x	x	x	x	NSAPI			
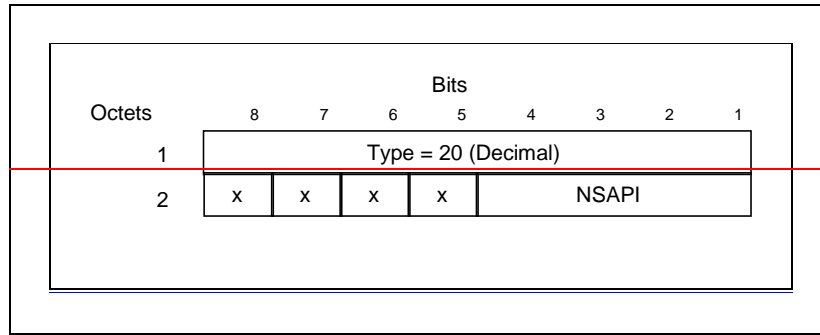
~~Figure 44: NSAPI information element~~

7.7.~~31~~30 Target Identification

The Target Identification information element contains the identification of a target RNC as defined in TS 25.413

Octets	Bits							
	8	7	6	5	4	3	2	1
1	Type = ~~134~~ 138 (Decimal)							
2-3	Length							
4-n	Target Identification							
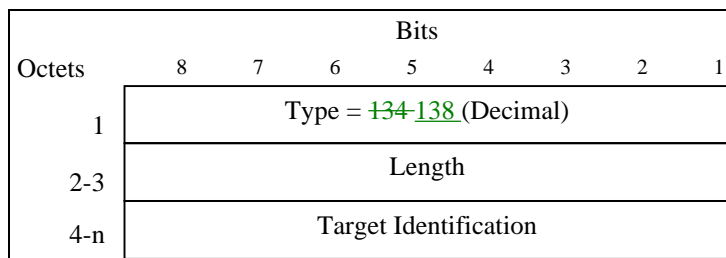
Figure ~~45~~41: Target Identification information element

7.7.~~32~~31 UTRAN transparent container

The UTRAN transparent container information element contains the radio-related information. The contents of this information element are only used by RNC so that GSN does not refer the contents.

Octets	Bits							
	8	7	6	5	4	3	2	1
1	Type = ~~135~~ 139 (Decimal)							
2-3	Length							
4-n	UTRAN transparent field							
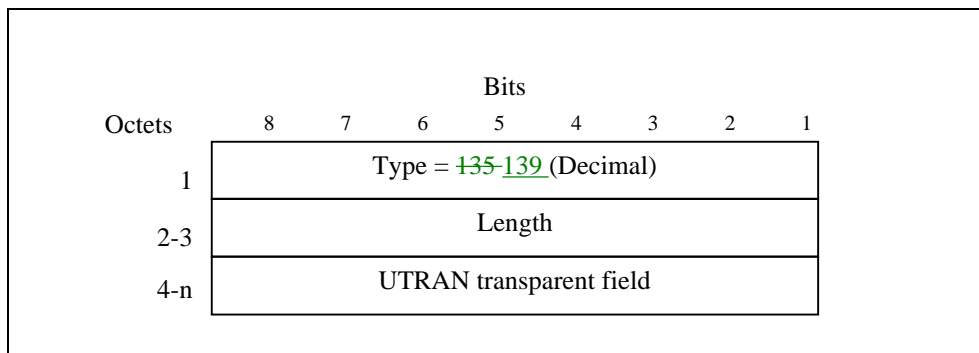
Figure ~~46~~42: UTRAN transparent container information element

~~7.7.33 RANAP Cause~~

~~The RANAP Cause information element contains the cause as defined in TS 25.413.~~

					Bits				
Octets	8	7	6	5	4	3	2	1
1				Type = 136(Decimal)					
2				RANAP Cause					
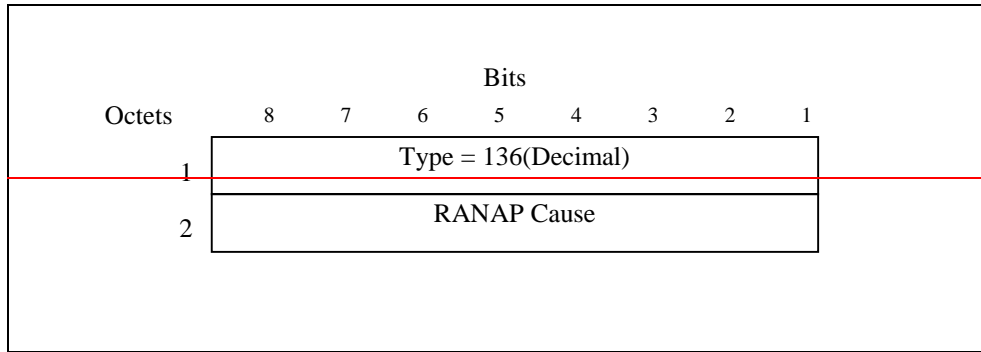
Figure 47: RANAP Cause information element

7.7.3432 Target RNC Information

The Target RNC Information information element contains the RNC Tunnel Endpoint Identifier and RNC IP address for data transmission from source RNC to target RNC.

The spare bits x indicate unused bits, which shall be set to 0 by the sending side and which shall not be evaluated by the receiving side.

The format of the RNC IP address is the same as the GSN address as defined in TS 23.003.

					Bits				
Octets	8	7	6	5	4	3	2	1
1				Type = 137 140 (Decimal)					
2-3				Length					
4	x	x	x	x		NSAPI			
5-8				Tunnel Endpoint Identifier Data					
9-n				RNC IP Address					
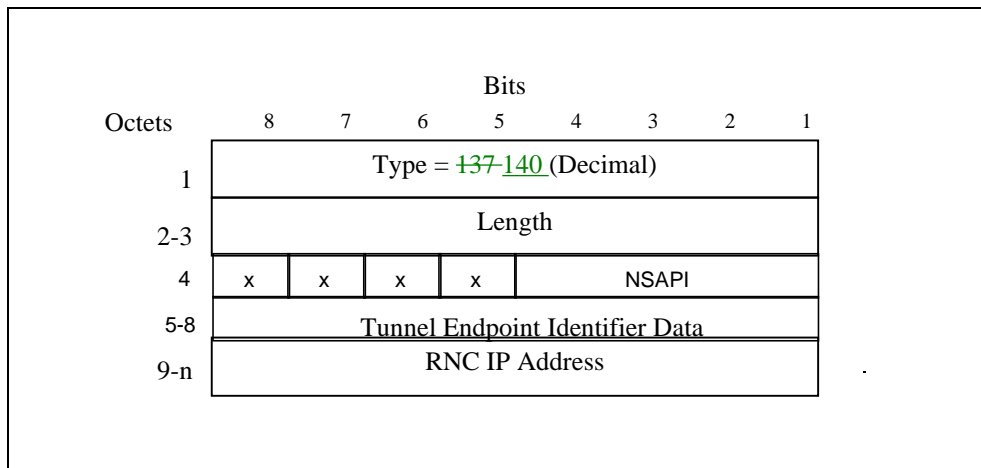
Figure 4843: Target RNC Information information element

7.7.33 Charging Gateway Address

The Charging Gateway Address information element contains an IP address of a Charging Gateway.

					Bits				
Octets	8	7	6	5	4	3	2	1
1				Type = 251 (Decimal)					
2-3				Length = 4 (Decimal)					
4-7				IPv4 Address					
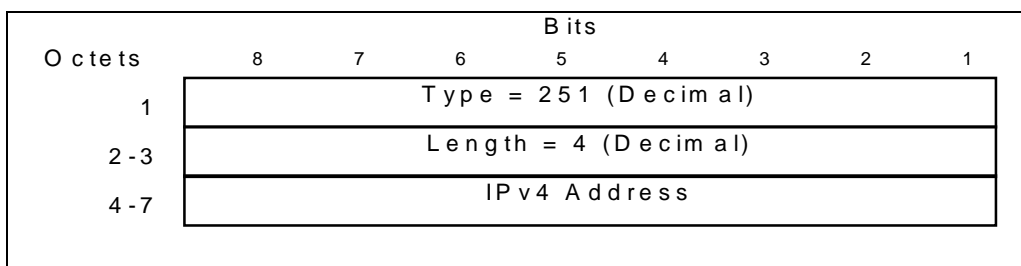
Figure 44: Charging Gateway Address information element

7.7.34   Private Extension

The Private Extension information element contains vendor specific information. The Extension Identifier is a value defined in the Private Enterprise number list in the most recent "Assigned Numbers" RFC (RFC 1700 or later).

This is an optional information element that may be included in any signalling message. A signalling message may include more than one information element of the Private Extension type.

	Bits							
Octets	8	7	6	5	4	3	2	1
1	Type = 255 (Decimal)							
2-3	Length							
4-5	Extension Identifier							
6-m	Extension Value							
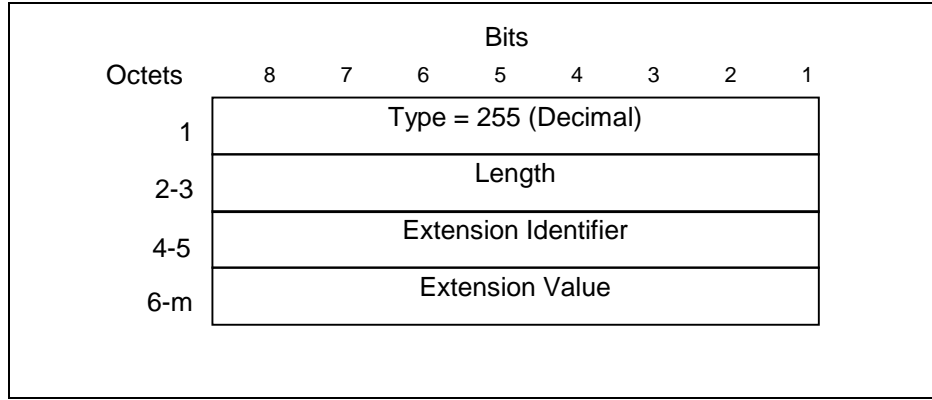
Figure 45: Private Extension information element

3GPP TSG CN2 SWGB Meeting
Milan, Italy, 14-16 Feb 2000

Document **N2B000351**
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 | **050r2** | Current Version: | **3.3.0** |

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

For submission to:	**TSG CN#07**	for approval	**X**	strategic		*(for SMG*
list expected approval meeting # here ↑		for information		non-strategic	**X**	*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: (U)SIM ☐   ME ☐   UTRAN / Radio ☐   Core Network **X**
(at least one should be marked with an X)

Source:	N2		**Date:**	15 Feb 2000

Subject:	Clarification of Protocol Type in GTP header

Work item:	GPRS

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

Reason for change:	In chapter 6 of 29.060 v3.3.0, paragraph 4, the long form name of the PT bit was written wrongly. Instead of "Payload Type" it should have been be "Protocol Type".
	The main point of this CR is to correct the actual PT bit value to be the correct one, because currently it is in the v3.3.0 of the 29.060 the opposite way it has been defined already a year ago in several specifications.
	The PT bit value is correctly defined in the GSM 09.60 v7.3.0, chapter 6, paragraph 3:
	"PT (Protocol Type) bit indicates whether the message is a GTP message (when PT is '1') or a GTP' message (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. "
	Some other purely editorial changes are also done in section 6.

Clauses affected:	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:	

6   GTP header

The GTP header shall be 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 unused fields shall not be evaluated by the receiver.

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 section 10.1.1, "Different GTP versions". The version number shall be set to '1'.

- Protocol Type ~~Payload Type~~ (PT): Tthis 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.

- Message Type: this field indicates the type of GTP message. The valid values of the message type are defined in section 7.1~~x.x~~ for both GTP-C and ~~y.y for~~ GTP-U.

- Length: Tthis 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: Tthis field is an optional field in GTP-U. It is used as a transaction identity for signalling messages in GTP-C and as an increasing sequence number for T-PDUs, transmitted via GTP-U tunnels, when transmission order must be preserved.

- N-PDU Number: Tthis field is used at the Inter SGSN Routeing Area Update procedure and some SRNS relocation 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, while for UMTS to GSM/GPRS, a sequence number derived from the RLC sequence number is present.)

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

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

(*) 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 fields 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 23.

NEXT MODIFICATION

8.2   Usage of the GTP Header

For signalling messages the GTP header shall be used as follows:

- Version shall be set to decimal 1 ('001').

- Protocol Type Payload Type (PT) shall be set to '0'1'.

NEXT MODIFICATION

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 Payload Type (PT) shall be set to '0''1'.

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Milano, Italy, 14 - 16 Feb 2000

Document **N2B000350**

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**	**052r2**		Current Version:	**3.3.0**	

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

For submission to:	TSG CN#07	for approval	**X**	strategic		*(for SMG*
list expected approval meeting # here ↑		for information		non-strategic	**X**	*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: (U)SIM [ ]   ME [ ]   UTRAN / Radio [**X**]   Core Network [**X**]
(at least one should be marked with an X)

Source:	N2		**Date:**	2000-01-10

Subject:	Method for GTP extension headers support

Work item:	GTP enhancements

Category: F Correction

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

(only one category shall be marked with an X)

Reason for change:	It is possible that not every GPRS support nodes are upgraded to the support of mandatory GTP extension headers at the same time. Therefore, some mechanism is necessary in order to cope with transient lack of support of some mandatory Extension header in some nodes.

Clauses affected:	6, 7.4, 7.7, 13.1

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:	

6 GTP header

[…]

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 send an Error notification message to the source of the message.~~

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

*********************************** next change*********************************

7.3.X Supported Extension Headers Notification

This message indicates a list of supported Extension Headers that the GTP entity on the identified IP address can support. This message is sent only in case a GTP entity was required to interpret a mandatory Extension Header but the GSN or RNC was not yet upgraded to support that extension header. The GTP endpoint at the GSN or RNC sending this message is marked as not enabled to support some extension headers (as derived from the supported extension header list). The GSN may retry to use all the extension headers with that node, in an attempt to verify it has been upgraded. Implementors should avoid repeated attempts to use unknown extension headers with an endpoint that has signalled its inability to interpret them.

Table 4: Information elements in Supported Extension Headers Notification

Information element	Presence requirement	Reference
Supported Extension header list	Mandatory	7.7.xx

*********************************** next change*********************************

7.7.1 Cause

In a request, the Cause Value indicates the reason for the request. The Cause shall be included in the request message.

In a response, the Cause Value indicates the acceptance or the rejection of the corresponding request. In addition, the Cause Value may indicate what was the reason for the corresponding request. The Cause value shall be included in the response message.

'Request accepted' is returned when a GSN has accepted a signalling request.

'Non-existent' indicates a non-existent or an inactive PDP context.

'IMSI not known' indicates a non-existent MM context.

'MS is GPRS Detached' indicates an idle MM context.

'MS is not GPRS Responding' and 'MS Refuses' may be used by SGSN to reject a Network-Requested PDP Context Activation.

'Version not supported' is returned when the recipient does not recognise the version number in the request message.

'Request IMSI', 'Request IMEI', 'Request IMSI and IMEI' and 'No identity needed' are used by GGSN to notify SGSN what to do.

'No resources available' is a generic temporary error condition e.g. all dynamic PDP addresses occupied or no memory available.

'Service not supported' is a generic error indicated that the GSN do not support the requested service.

'User authentication failed' indicates that the external packet network has rejected the user's service request.

'System failure' is a generic permanent error condition.

'Roaming restriction' indicates that the SGSN cannot activate the requested PDP context because of the roaming restrictions.

'P-TMSI Signature mismatch' is returned either if the P-TMSI Signature stored in the old SGSN does not match the value sent by the MS via the new SGSN or if the MS does not provide the P-TMSI Signature to the new SGSN while the old SGSN has stored the P-TMSI Signature for that MS.

'Invalid message format', 'Mandatory IE incorrect', 'Mandatory IE missing' and 'Optional IE incorrect' are indications of protocol errors described in the section Error handling.

'GPRS connection suspended' indicates that the GPRS activities of the mobile station are suspended.

'Authentication failure' indicates that the user authentication failed in the new SGSN.

'Context not found' indicates that the PDP Context referenced in an Active Secondary Context Request message was not found in the receiving GGSN.

'Unknown mandatory extension header' signals in a response message that the corresponding request included an extension header for which comprehension was required but unknown to the receiving end.

Figure 9: Cause information element

Table 37: Cause values

Cause			Value (Decimal)
request		Request IMSI	0
		Request IMEI	1
		Request IMSI and IMEI	2
		No identity needed	3
		MS Refuses	4
		MS is not GPRS Responding	5
		For future use	6-48
		Cause values reserved for GPRS charging protocol use (see GTP' in GSM 12.15)	49-63
For future use			64-127
response	acc	Request accepted	128
		For future use	129-176
		Cause values reserved for GPRS charging protocol use (see GTP' in GSM 12.15)	177-191
	rej	Non-existent	192
		Invalid message format	193
		IMSI not known	194
		MS is GPRS Detached	195
		MS is not GPRS Responding	196
		MS Refuses	197
		Version not supported	198
		No resources available	199
		Service not supported	200
		Mandatory IE incorrect	201
		Mandatory IE missing	202
		Optional IE incorrect	203
		System failure	204
		Roaming restriction	205
		P-TMSI Signature mismatch	206
		GPRS connection suspended	207
		Authentication failure	208
		User authentication failed	209
		Context not found	210
		All dynamic PDP addresses are occupied	211
		No memory is available	212
		Unknown mandatory extension header	213
		For future use	214-240
		Cause values reserved for GPRS charging protocol use (see GTP' in GSM 12.15)	241-255

NOTE: With this coding, bits 8 and 7 of the Cause Value respectively indicate whether the message was a request or a response, and whether the request was accepted or rejected.

Table 38: Use of the Cause values

Cause 8	value bits 7	Result
0	0	Request
0	1	For future use (Note)
1	0	Acceptance
1	1	Rejection

NOTE: The value '01' is for future use and shall not be sent. If received in a response, it shall be treated as a rejection.

********************************** next change**********************************

7.7.xx   Extension Header type list

This information element contains a list of 'n' Extension Header Types. The length field is set to the number of extension header types included.

```
                            Bits
        Octets    8   7   6   5   4   3   2   1
                 +-------------------------------+
          1      |      Type = xx (Decimal)      |
                 +-------------------------------+
          2      |       Length (value= n)       |
                 +-------------------------------+
        3-n+2    |      Extension types list     |
                 +-------------------------------+
```
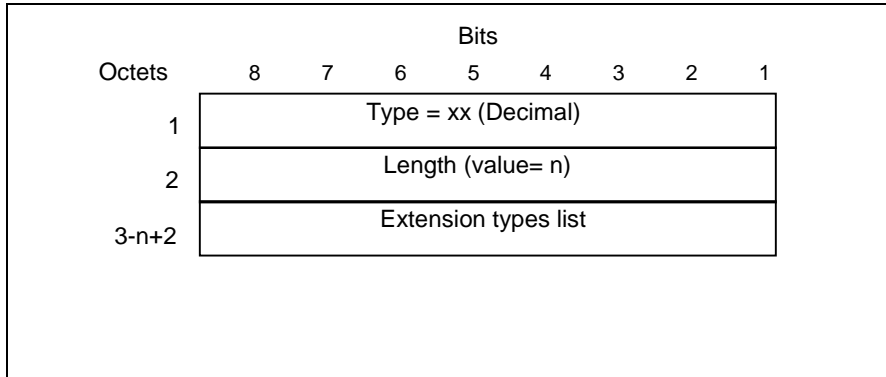
Figure xx: Extension Header Type List information element

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**	**053r2**	Current Version:	**3.3.0**

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

For submission to:	**CN#07**	for approval	**X**	strategic		*(for SMG*
list expected approval meeting # here ↑		for information		non-strategic	**X**	*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

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

Source:	NTT Software		**Date:**	2000-01-18

Subject:	The addition of the conditional description of the GTP parameters

Work item:	GTP Enhancements

Category: F   Correction
        A   Corresponds to a correction in an earlier release
(only one category   B   Addition of feature   **X**
shall be marked   C   Functional modification of feature
with an X)   D   Editorial modification

Release: Phase 2
Release 96
Release 97
Release 98
Release 99   **X**
Release 00

Reason for change:	Contents of a change of CR (S2-99E67) of TS 23.060 are received. When Release 99 QoS Profile is used, the Reordering required parameter of GTP isn't used. And, when Release 99 QoS Profile is used, the Reordering required field of PDP Context isn't used.

Clauses affected:	7.3.2, 7.7.19

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.

7.3.2　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'

- 'Service not supported'

- 'User authentication failed'

- 'System failure'

- '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. 'Service not supported' indicates e.g. when the GGSN does not support the PDP type, PDP address or Access Point Name. '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 Data I field specifies an uplink Tunnel Endpoint Identifierl for G-PDUs which 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 Signalling 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 signalling messages which are related to the requested PDP context.

The GGSN shall include a GGSN Address for signalling 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 signalling 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. 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.

If a connection-less path is to be used to tunnel T-PDUs for the given PDP context or a reliable connection-oriented path is to be used and a connection already exists, the GGSN may start to forward T-PDUs after the Create PDP Context Response has been sent and 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.

If a reliable connection-oriented path is to be used to tunnel T-PDUs for the given PDP context and a connection does not exist between the GSN pair, the SGSN shall establish a connection and the GGSN shall wait for the connection before forwarding of T-PDUs may start.

Only one connection shall be used between any given GSN-pair, and this connection shall be used to tunnel end user traffic in both directions.

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, i.e. 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 Reordering Required shall be ignored by receiving entity.

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 a 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 5: 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 Data I	Conditional	7.7.13
Tunnel Endpoint Identifier Signalling	Conditional	7.7.14
Charging ID	Conditional	7.7.16
End user address	Conditional	7.7.17
Protocol Configuration Options	Optional	7.7.21
GGSN Address for signalling	Conditional	GSN Address 7.7.22
GGSN Address for user traffic	Conditional	GSN Address 7.7.22
Charging Gateway Address	Optional	7.7.24
Quality of Service Profile	Conditional	7.7.25
Private Extension	Optional	7.7.26

**** Next Modified Section ****

7.7.19   PDP Context

The PDP Context information element contains the Session Management parameters, defined for an external packet data network address, that are necessary to transfer between SGSNs at the Inter SGSN Routeing Area Update procedure.

NSAPI is an integer value in the range [0; 15].

The NSAPI points out the affected PDP context.

The SAPI indicates the LLC SAPI which is associated with the NSAPI.

Transaction Identifier is the 4 bit Transaction Identifier used in the GSM 04.08 Session Management messages which control this PDP Context.

Reordering Required (Order) indicates whether the SGSN shall reorder T-PDUs before delivering the T-PDUs to the MS. When the Quality of Service Negotiated (QoS Neg) is Release 99, the Reordering Required (Order) shall be ignored by receiving entity.

VPLMN Address Allowed (VAA) indicates whether the MS is allowed to use the APN in the domain of the HPLMN only, or additionally the APN in the domain of the VPLMN.

QoS Sub Length, QoS Req Length and QoS Neg Length represent respectively the lengths of the QoS Sub, QoS Req and QoS Neg fields, excluding the QoS Length octet.

Quality of Service Subscribed (QoS Sub), Quality of Service Requested (QoS Req) and Quality of Service Negotiated (QoS Neg) are encoded as described in section 'Quality of Service (QoS) Profile'.

The Sequence Number Down is the number of the next T-PDU that shall be sent from the new SGSN to the MS. The number is associated to the Sequence Number from the GTP Header of an encapsulated T-PDU.

The Sequence Number Up is the number that new SGSN shall use as the Sequence Number in the GTP Header for the next encapsulated T-PDU from the MS to the GGSN.

The Send N-PDU Number is used only when acknowledged peer-to-peer LLC operation is used for the PDP context. The Send N-PDU Number is the N-PDU number to be assigned by SNDCP to the next downlink N-PDU received from the GGSN. It shall be set to 255 if unacknowledged peer-to-peer LLC operation is used for the PDP context.

The Receive N-PDU Number is used only when acknowledged peer-to-peer LLC operation is used for the PDP context. The Receive N-PDU Number is the N-PDU number expected by SNDCP from the next uplink N-PDU to be received from the MS. It shall be set to 255 if unacknowledged peer-to-peer LLC operation is used for the PDP context.

The Uplink Tunnel Endpoint Identifier Signalling is the Tunnel Endpoint Identifier used between the old SGSN and the GGSN in uplink direction for signalling purpose. It shall be used by the new SGSN within the GTP header of the Update PDP Context Request message.

The PDP Type Organization and PDP Type Number are encoded as in the End User Address information element.

The PDP Address Length represents the length of the PDP Address field, excluding the PDP Address Length octet.

The PDP Address is an octet array with a format dependent on the PDP Type. The PDP Address is encoded as in the End User Address information element if the PDP Type is IPv4, IPv6 or X.25.

The GGSN Address Length represents the length of the GGSN Address field, excluding the GGSN Address Length octet.

The old SGSN includes the GGSN Address for signalling that it has received from GGSN at PDP context activation or update.

The APN is the APN in use in the old SGSN. I.e. the APN sent in the Create PDP Context request message.

The spare bits x indicate unused bits which shall be set to 0 by the sending side and which shall not be evaluated by the receiving side.

1	Type = 130 (Decimal)
2-3	Length
4	Res-rved | AA | Res-rved | rder | NSAPI
5	X | X | X | X | SAPI
6	QoS Sub Length
7 - (q+6)	QoS Sub [3..15]
q+7	QoS Req Length
(q+8)-(2q+7)	QoS Req [3..15]
2q+8	QoS Neg. Length
(2q+9)-(3q+8)	QoS Neg [3..15]
(3q+9)-(3q+10)	Sequence Number Down (SND)
(3q+11)-(3q+12)	Sequence Number Up (SNU)
3q+13	Send N-PDU Number
3q+14	Receive N-PDU Number
(3q+15)-(3q+18)	Uplink Tunnel Endpoint Identifier Signalling
3q+19	Spare 1 1 1 1 | PDP Type Organization
3q+20	PDP Type Number
3q+21	PDP Address Length
(3q+22)-m	PDP Address [1..63]
m+1	GGSN Address for signalling Length
(m+2)-n	GGSN Address for signalling [4..16]
n+1	APN length
(n+2)-o	APN
o+1	Spare (sent as 0 0 0 0) | Transaction Identifier

Figure 33: PDP Context information element

Table 46: Reordering Required values

Reordering Required	Value (Decimal)
No	0
Yes	1

Table 47: VPLMN Address Allowed values

VPLMN Address Allowed	Value (Decimal)
No	0
Yes	1

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	056	Current Version:	3.3.0

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

For submission to:	CN#07	for approval	X	strategic		*(for SMG*
list expected approval meeting # here ↑		for information		non-strategic	X	*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: (U)SIM ☐   ME ☐   UTRAN / Radio ☐   Core Network **X**
(at least one should be marked with an X)

Source:	N2		**Date:**	18 Jan. 2000

Subject:	Change of naming when referring to primary and secondary contexts.

Work item:	GTP Enhancements

Category:

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

Reason for change:	The LS 30 from S2 requests the change of naming when referring to primary and secondary PDP contexts. All these contexts should be treated equally, except than one of them must define the PDP address and APN.

Clauses affected:	7.3.1

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:	

7.3.1   Create PDP Context Request

For contexts created by the Secondary PDP Context Activation Prosedure ~~secondary PDP contexts~~ 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. ~~of the primary PDP context to associate the secondary PDP context with and a TFT to be used for packet filtering by GGSN~~.

The Secondary PDP Context Activation Prosedure 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 Prosedure, ~~creating a secondary PDP context~~, the Selection mode, MSISDN, End User Address, Access Point Name and Protocol Configuration Options information elements shall not be included in the message.

Table 4: 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	Mandatory	7.7.12
Tunnel Endpoint Identifier Data I	Mandatory	7.7.13
Tunnel Endpoint Identifier Signalling	Mandatory	7.7.14
End User Address	Conditional	7.7.17
Access Point Name	Conditional	7.7.20
Protocol Configuration Options	Conditional	7.7.21
SGSN Address for signalling	Mandatory	GSN Address 7.7.22
SGSN Address for user traffic	Mandatory	GSN Address 7.7.22
MSISDN	Conditional	7.7.23
Quality of Service Profile	Mandatory	7.7.25
Private Extension	Optional	7.7.26
TFT	Conditional	7.7.28
NSAPI	Mandatory	7.7.30
~~Primary~~ Linked NSAPI	Conditional	7.7.30

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 | **067r1** | Current Version: | 3.3.0 |

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

| For submission to: | CN#07 | for approval | X | strategic | | *(for SMG* |
| list expected approval meeting # here ↑ | | for information | | non-strategic | X | *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: (U)SIM ☐   ME ☐   UTRAN / Radio ☐   Core Network **X**
(at least one should be marked with an X)

| **Source:** | N2 | | **Date:** | 15 Febr 2000 |

| **Subject:** | Distribution of security data |

| **Work item:** | GTP Enhancements |

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

| **Reason for change:** | Transfer of GSM security context and unused UMTS authentication vectors (quintuplets) between R99+ SGSNs needed. |

| **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:** | |

help.doc

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

7.7.18   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 Update procedure.

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

The Ciphering Key Sequence Number (CKSN) is described in GSM 04.08. 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). ~~shall be presented if Authentication Type is GSM.~~

~~The Key Set Identifier (KSI) is described in UMTS 23.060. Possible values are integer in the range [0; 6]. The value 7 is reserved. The Key Set Identifier shall be presented if Authentication Type is UMTS.~~

The 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~~ed if Authentication Type is GSM~~ GSM keys is indicated in the Security Mode.

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

IK is the UMTS integrity key currently used by the old SGSN. IK shall be present~~ed if Authentication Type is UMTS~~ 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 presented if ~~Authentication Type is GSM.~~indicated in the Security Mode.

The Quintuplet array contains Quintuplets encoded as the value in the Authentication Quintuplet information element. The Quintuplet shall be presented if ~~Authentication Type is UMTS~~ indicated in the Security Mode.

The Triplet array contains triplets encoded as the value in the Authentication Triplet information element.

The 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.

The DRX parameter and the MS Network Capability are coded as described in GSM 04.08.

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

The 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 GSM 04.08.

	Bits							
Octets	8	7	6	5	4	3	2	1
1	Type = 129 (Decimal)							
2-3	Length							
4	spare 1 1 1 1 1					CKSN		
5	Security		No of Vectors			Used Cipher		
6-13	Kc							
14-m	Triplet [0..4]							
(m+1)-(m+2)	Container length							
(m+3)-n	Container							
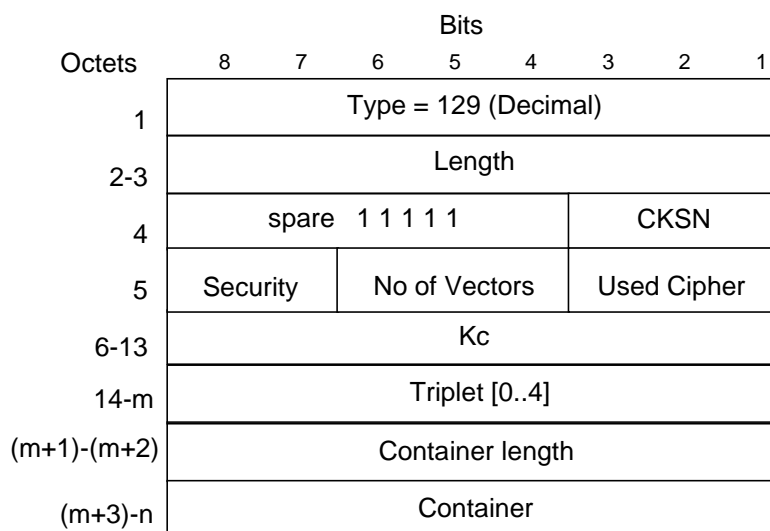
Figure 31: MM Context element ~~in~~ with GSM keys and triplets

	Bits

Octets	8	7	6	5	4	3	2	1
1	Type = 129 (Decimal)
2-3	Length
4	spare 1 1 1 1 1	KSI CKSN
5	Security	No of Vectors	Used Cipher
6-22	CK
23-39	IK
40-41	Quintuplet Length
42-m	Quintuplet [0..4]
(m+1)-(m+2)	Container length
(m+3)-n	Container

Figure 32: MM Context element in with UMTS keys and quintuplets

	Bits

Octets	8	7	6	5	4	3	2	1
1	Type = 129 (Decimal)
2-3	Length
4	spare 1 1 1 1 1	CKSN
5	Security	No of Vectors	Used Cipher
6-13	Kc
14-15	Quintuplet Length
16-m	Quintuplet [0..4]
(m+1)-(m+2)	Container length
(m+3)-n	Container

Figure 33: MM Context element with GSM keys and UMTS quintuplets

Table 44: Used Cipher values

Cipher Algorithm	Value (Decimal)
No ciphering	0
GEA/1	1

Table 45: Security ~~Type~~ Mode Values

Security ~~Type~~ Mode	Value (Decimal)
GSM key and triplets	1~~3~~
GSM key and quintuplets	3~~2~~
UMTS key and quintuplets	2

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**	**069r1**		Current Version:	**3.3.0**	

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

For submission to: **CN#07**   for approval **X**   strategic ☐   *(for SMG*
list expected approval meeting # here ↑   for information ☐   non-strategic **X**   *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: (U)SIM ☐   ME ☐   UTRAN / Radio ☐   Core Network **X**
(at least one should be marked with an X)

Source: N2   **Date:**   16ᵗʰ Feb 2000

Subject: New cause codes for for TFT and packet filter errors

Work item: GTP enhancements

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

Reason for change: 24.008 CR 113r1 (tdoc N1-000184), approved by CN1 in Abiko, defines the cause codes that shall be used for abnormal conditions involving TFTs. To be able to notify the MS of the abnormal conditions, which may be detected in GGSN, this CR introduces four new cause codes in 29.060.

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:

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'

- 'Service not supported'

- 'User authentication failed'

- 'System failure'

- 'Semantic error in the TFT operation'

- 'Syntactical 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. 'Service not supported' indicates e.g. when the GGSN does not support the PDP type, PDP address or Access Point Name. '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 Data I field specifies an uplink Tunnel Endpoint Identifierl for G-PDUs which 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 Signalling 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 signalling messages which are related to the requested PDP context.

The GGSN shall include a GGSN Address for signalling 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 signalling 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. 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.

If a connection-less path is to be used to tunnel T-PDUs for the given PDP context or a reliable connection-oriented path is to be used and a connection already exists, the GGSN may start to forward T-PDUs after the Create PDP Context Response has been sent and 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.

If a reliable connection-oriented path is to be used to tunnel T-PDUs for the given PDP context and a connection does not exist between the GSN pair, the SGSN shall establish a connection and the GGSN shall wait for the connection before forwarding of T-PDUs may start.

Only one connection shall be used between any given GSN-pair, and this connection shall be used to tunnel end user traffic in both directions.

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, i.e. if reordering is required by the GGSN the SGSN and the GGSN shall perform reordering of incoming T-PDUs on this path.

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 a 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 5: 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 Data I	Conditional	7.7.13
Tunnel Endpoint Identifier Signalling	Conditional	7.7.14
Charging ID	Conditional	7.7.16
End user address	Conditional	7.7.17
Protocol Configuration Options	Optional	7.7.21
GGSN Address for signalling	Conditional	GSN Address 7.7.22
GGSN Address for user traffic	Conditional	GSN Address 7.7.22
Charging Gateway Address	Optional	7.7.24
Quality of Service Profile	Conditional	7.7.25
Private Extension	Optional	7.7.26

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'

- 'Syntactical 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 Identifierl Data I field specifies an uplink Tunnel Endpoint Identifier for G-PDUs which 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 Signalling 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 signalling messages which are related to the requested PDP context.

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'.

If a connection-less path is to be used to tunnel T-PDUs for the given PDP context or a reliable connection-oriented path is to be used and a connection already exists, the GGSN may start to forward T-PDUs after the Update PDP Context Response has been sent and 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 a Update PDP Context Request but before an Update PDP Context Response has been received.

If a reliable connection-oriented path is to be used to tunnel T-PDUs for the given PDP context and a connection does not exist between the GSN pair, the SGSN shall establish a connection and the GGSN shall wait for the connection before forwarding of T-PDUs may start.

Only one connection shall be used between any given GSN-pair, and this connection shall be used to tunnel end user traffic in both directions.

The GGSN shall include a GGSN Address for signalling 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 signalling 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.

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.

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 8: 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 Data I	Conditional	7.7.13
Tunnel Endpoint Identifier Signalling	Conditional	7.7.14
Charging ID	Conditional	7.7.16
GGSN Address for signalling	Conditional	GSN Address 7.7.22
GGSN Address for user traffic	Conditional	GSN Address 7.7.22
Charging Gateway Address	Optional	7.7.24
Quality of Service Profile	Conditional	7.7.25
Private Extension	Optional	7.7.26

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 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.

Table 9: Information elements in an Update PDP Context Response sent by a SGSN

Information element	Presence requirement	Reference
Cause	Mandatory	7.7.1
Quality of Service Profile	Conditional	7.7.25
Private Extension	Optional	7.7.26

7.7.1   Cause

In a request, the Cause Value indicates the reason for the request. The Cause shall be included in the request message.

In a response, the Cause Value indicates the acceptance or the rejection of the corresponding request. In addition, the Cause Value may indicate what was the reason for the corresponding request. The Cause value shall be included in the response message.

'Request accepted' is returned when a GSN has accepted a signalling request.

'Non-existent' indicates a non-existent or an inactive PDP context.

'IMSI not known' indicates a non-existent MM context.

'MS is GPRS Detached' indicates an idle MM context.

'MS is not GPRS Responding' and 'MS Refuses' may be used by SGSN to reject a Network-Requested PDP Context Activation.

'Version not supported' is returned when the recipient does not recognise the version number in the request message.

'Request IMSI', 'Request IMEI', 'Request IMSI and IMEI' and 'No identity needed' are used by GGSN to notify SGSN what to do.

'No resources available' is a generic temporary error condition e.g. all dynamic PDP addresses occupied or no memory available.

'Service not supported' is a generic error indicated that the GSN do not support the requested service.

'User authentication failed' indicates that the external packet network has rejected the user's service request.

'System failure' is a generic permanent error condition.

'Roaming restriction' indicates that the SGSN cannot activate the requested PDP context because of the roaming restrictions.

'P-TMSI Signature mismatch' is returned either if the P-TMSI Signature stored in the old SGSN does not match the value sent by the MS via the new SGSN or if the MS does not provide the P-TMSI Signature to the new SGSN while the old SGSN has stored the P-TMSI Signature for that MS.

'Semantic error in the TFT operation', 'Syntactical error in the TFT operation', 'Semantic errors in packet filter(s)' and 'Syntactic errors in packet filters(s) are indications of abnormal cases involving TFTs. The abnormal TFT cases and the use of the cause codes are defined in TS 24.008.

'Invalid message format', 'Mandatory IE incorrect', 'Mandatory IE missing' and 'Optional IE incorrect' are indications of protocol errors described in the section Error handling.

'GPRS connection suspended' indicates that the GPRS activities of the mobile station are suspended.

'Authentication failure' indicates that the user authentication failed in the new SGSN.

'Context not found' indicates that the PDP Context referenced in an Active Secondary Context Request message was not found in the receiving GGSN.

Octets	Bits							
	8	7	6	5	4	3	2	1
1	Type = 1 (Decimal)							
2	Cause value							

Response bit   Rejection bit

Figure 9: Cause information element

Table 37: Cause values

Cause			Value (Decimal)
request		Request IMSI	0
		Request IMEI	1
		Request IMSI and IMEI	2
		No identity needed	3
		MS Refuses	4
		MS is not GPRS Responding	5
		For future use	6-48
		Cause values reserved for GPRS charging protocol use (see GTP' in GSM 12.15)	49-63
For future use			64-127
response	acc	Request accepted	128
		For future use	129-176
		Cause values reserved for GPRS charging protocol use (see GTP' in GSM 12.15)	177-191
	rej	Non-existent	192
		Invalid message format	193
		IMSI not known	194
		MS is GPRS Detached	195
		MS is not GPRS Responding	196
		MS Refuses	197
		Version not supported	198
		No resources available	199
		Service not supported	200
		Mandatory IE incorrect	201
		Mandatory IE missing	202
		Optional IE incorrect	203
		System failure	204
		Roaming restriction	205
		P-TMSI Signature mismatch	206
		GPRS connection suspended	207
		Authentication failure	208
		User authentication failed	209
		Context not found	210
		All dynamic PDP addresses are occupied	211
		No memory is available	212
		Semantic error in the TFT operation	213
		Syntactical error in the TFT operation	214
		Semantic errors in packet filter(s)	215
		Syntactic errors in packet filters(s)	216
		For future use	2173-240
		Cause values reserved for GPRS charging protocol use (see GTP' in GSM 12.15)	241-255

NOTE: With this coding, bits 8 and 7 of the Cause Value respectively indicate whether the message was a request or a response, and whether the request was accepted or rejected.

Table 38: Use of the Cause values

Cause 8	value bits 7	Result
0	0	Request
0	1	For future use (Note)
1	0	Acceptance
1	1	Rejection

NOTE: The value '01' is for future use and shall not be sent. If received in a response, it shall be treated as a rejection.

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**	**070**	Current Version:	**3.3.0**

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

For submission to:	**CN#07**	for approval	**X**	strategic		*(for SMG*
list expected approval meeting # here ↑		for information		non-strategic	**X**	*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:	(U)SIM		ME		UTRAN / Radio	**X**	Core Network	**X**
(at least one should be marked with an X)								

Source:	N2	**Date:**	2000-02-07

Subject:	IPv6 support as optional in Iu and Gn

Work item:	GTP Enhancements

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

Reason for change:	Alignment of SA2 decision (CR23060-100r1, Tdoc S2-000215) to make IPv6 support optional.

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:	

help.doc

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

13   IP, the networking technology used by GTP

13.1   IP version

~~In this, the first phase of GPRS, Internet Protocol version 4 (IPv4) shall be the networking technology on which GTP tunneling shall be based.~~. The IPv4 (RFC 791) protocol shall be supported, IPv6 (RFC 2460) support is optional.

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	**072r3**	Current Version:	**3.3.0**

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

For submission to:	**CN#7**	for approval	**X**	strategic		*(for SMG*
list expected approval meeting # here ↑		for information		non-strategic	**X**	*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: (U)SIM ☐   ME ☐   UTRAN / Radio ☐   Core Network **X**
(at least one should be marked with an X)

Source:	N2		**Date:**	2000-02-24

Subject:	Clarification on the use of TEID in the GTP header

Work item:	GTP Enhancements

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

Reason for change:	This CR is intended to clarify the use of the Tunnel Endpoint Identifier (TEID) in the GTP-C header (section 8.2).
	➢ The TEID for signalling IE is made conditional in the *Create PDP Context Request/Response, PDU Notification Request* and *Update PDP Context Request/Response* messages, depending on if there already exists a GTP tunnel for signalling or not.
	➢ A TEID for signalling IE is added to the *Forward Relocation Response* message to be used in subsequent signalling.
	➢ In addition it is stated how the TEID shall be set in the *Location Management* messages, the *Echo Request/Response* and the *Forward Relocation Request* Messages. For the *PDU Notification Request* message this only applies when there is no existing signalling tunnel for this specific MS.
	Further, it is clarified in section 9.3.1 how the TEID is used in the GTP-U header in the user plane.

Clauses affected:	7.3.1, 7.3.2, 7.3.3, 7.3.4, 7.3.12, 7.5.7, 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:	

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 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 Signalling field specifies a downlink Tunnel Endpoint Identifier 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 signalling messages which are related to the requested PDP context. This field shall not be present if there already exists a signalling tunnel for the given MS between the peer GSNs.

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 signalling 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 signalling 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 secondary PDP contexts the SGSN shall include the NSAPI of the primary PDP context to associate the secondary PDP context with and a TFT to be used for packet filtering by GGSN. When creating a secondary PDP context, the Selection mode, 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 optional Private Extension contains vendor or operator specific information.

Table 4: 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	Mandatory	7.7.12
Tunnel Endpoint Identifier Data I	Mandatory	7.7.13
Tunnel Endpoint Identifier Signalling	~~Mandatory~~Conditional	7.7.14
End User Address	Conditional	7.7.17
Access Point Name	Conditional	7.7.20
Protocol Configuration Options	Conditional	7.7.21
SGSN Address for signalling	Mandatory	GSN Address 7.7.22
SGSN Address for user traffic	Mandatory	GSN Address 7.7.22
MSISDN	Conditional	7.7.23
Quality of Service Profile	Mandatory	7.7.25
Private Extension	Optional	7.7.26
TFT	Conditional	7.7.28
NSAPI	Mandatory	7.7.30
Primary NSAPI	Conditional	7.7.30

*** *Next Change* ***

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'

- 'Service not supported'

- 'User authentication failed'

- 'System failure'

- '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. 'Service not supported' indicates e.g. when the GGSN does not support the PDP type, PDP address or Access Point Name. '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 Data I field specifies an uplink Tunnel Endpoint Identifierl for G-PDUs which 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 Signalling 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 signalling messages which are related to the requested PDP context. This field shall not be present if there already exists a signalling tunnel for the given MS between the peer GSNs.

The GGSN shall include a GGSN Address for signalling 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 signalling 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. 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.

If a connection-less path is to be used to tunnel T-PDUs for the given PDP context or a reliable connection-oriented path is to be used and a connection already exists, the GGSN may start to forward T-PDUs after the Create PDP Context Response has been sent and 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.

If a reliable connection-oriented path is to be used to tunnel T-PDUs for the given PDP context and a connection does not exist between the GSN pair, the SGSN shall establish a connection and the GGSN shall wait for the connection before forwarding of T-PDUs may start.

Only one connection shall be used between any given GSN-pair, and this connection shall be used to tunnel end user traffic in both directions.

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, i.e. if reordering is required by the GGSN the SGSN and the GGSN shall perform reordering of incoming T-PDUs on this path.

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 a 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 5: 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 Data I	Conditional	7.7.13
Tunnel Endpoint Identifier Signalling	Conditional	7.7.14
Charging ID	Conditional	7.7.16
End user address	Conditional	7.7.17
Protocol Configuration Options	Optional	7.7.21
GGSN Address for signalling	Conditional	GSN Address 7.7.22
GGSN Address for user traffic	Conditional	GSN Address 7.7.22
Charging Gateway Address	Optional	7.7.24
Quality of Service Profile	Conditional	7.7.25
Private Extension	Optional	7.7.26

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 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 Signalling field specifies a downlink Tunnel Endpoint Identifier 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 signalling messages which are related to the requested PDP context. This field shall not be present if there already exists a signalling tunnel for the given MS between the peer GSNs.

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 signalling 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 signalling 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 optional Private Extension contains vendor or operator specific information.

Table 6: Information elements in an SGSN-initiated Update PDP Context Request

Information element	Presence requirement	Reference
Recovery	Optional	7.7.11
Tunnel Endpoint Identifier Data I	Mandatory	7.7.13
Tunnel Endpoint Identifier Signalling	Mandatory	7.7.14
SGSN Address for signalling	~~Mandatory~~Conditional	GSN Address 7.7.22
SGSN Address for user traffic	Mandatory	GSN Address 7.7.22
Quality of Service Profile	Mandatory	7.7.25
Private Extension	Optional	7.7.26
TFT	Optional	7.7.28
NSAPI	Mandatory	7.7.30

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 optional Private Extension contains vendor or operator specific information.

Table 7: Information elements in a GGSN-initiated Update PDP Context Request

Information element	Presence requirement	Reference
End User Address	Optional	7.7.17
Quality of Service Profile	Optional	7.7.25
Private Extension	Optional	7.7.26

*** *Next Change* ***

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'

- 'Mandatory IE incorrect'

- 'Mandatory IE missing'

- 'Optional IE incorrect'

- 'Invalid message format'

- 'Version not supported'

The Tunnel Endpoint Identifierl Data I field specifies an uplink Tunnel Endpoint Identifier for G-PDUs which 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 Signalling 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 signalling messages which are related to the requested PDP context. This field shall not be present if there already exists a signalling tunnel for the given MS between the peer GSNs.

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'.

If a connection-less path is to be used to tunnel T-PDUs for the given PDP context or a reliable connection-oriented path is to be used and a connection already exists, the GGSN may start to forward T-PDUs after the Update PDP Context Response has been sent and 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 a Update PDP Context Request but before an Update PDP Context Response has been received.

If a reliable connection-oriented path is to be used to tunnel T-PDUs for the given PDP context and a connection does not exist between the GSN pair, the SGSN shall establish a connection and the GGSN shall wait for the connection before forwarding of T-PDUs may start.

Only one connection shall be used between any given GSN-pair, and this connection shall be used to tunnel end user traffic in both directions.

The GGSN shall include a GGSN Address for signalling 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 signalling 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.

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.

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 8: 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 Data I	Conditional	7.7.13
Tunnel Endpoint Identifier Signalling	Conditional	7.7.14
Charging ID	Conditional	7.7.16
GGSN Address for signalling	Conditional	GSN Address 7.7.22
GGSN Address for user traffic	Conditional	GSN Address 7.7.22
Charging Gateway Address	Optional	7.7.24
Quality of Service Profile	Conditional	7.7.25
Private Extension	Optional	7.7.26

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 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.

Table 9: Information elements in an Update PDP Context Response sent by a SGSN

Information element	Presence requirement	Reference
Cause	Mandatory	7.7.1
Quality of Service Profile	Conditional	7.7.25
Private Extension	Optional	7.7.26

*** *Next Change* ***

7.3.12   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, i.e. the current location of the MS. 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 Signalling information element shall be a tunnel endpoint identifier signalling 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. This field shall not be present if there already exists a signalling tunnel for the given MS between the peer GSNs.

If the GGSN receives a Create PDP Context Request before the PDU Notification Response, the GGSN shall handle the Create PDP Context Request as a 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 only send a PDU Notification Response with Cause 'Request accepted' without any further processing and then wait for the Create PDP Context Response.

The optional Private Extension contains vendor or operator specific information.

Table 17: Information elements in a PDU Notification Request

Information element	Presence requirement	Reference
IMSI	Mandatory	7.7.2
Tunnel Endpoint Identifier Signalling	~~Mandatory~~Conditional	7.7.14
End User Address	Mandatory	7.7.17
Access Point Name	Mandatory	7.7.20
Private Extension	Optional	7.7.26

*** *Next Change* ***

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'.

The Cause and RANAP Cause information element shall be included in the response if the Cause contains another value than 'Request accepted'.

All information elements are mandatory, except Private Extension, if the Cause contains the value 'Request accepted'.

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

~~Tansparent~~Transparent container and RANAP Cause are informed from the target RNC in the new SGSN.

Single number or ~~prural~~plural number of Target RNC Information parameter shall be set in this message.

The Tunnel Endpoint Identifier Signalling 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.

The optional Private Extension contains vendor or operator specific information.

Table 33: Information elements in a Forward Relocation Response

Information element	Presence requirement	Reference
Cause	Mandatory	7.7.1
Private Extension	Optional	7.7.26
UTRAN transparent container	Optional	7.7.32
RANAP Cause	Conditional	7.7.33
Target RNC Information	Conditional	7.7.34
Tunnel Endpoint Identifier Signalling	Conditional	7.7.xx

*** Next Change ***

8.2   Usage of the GTP-C Header

For signalling messages the GTP header shall be used as follows:

- Version shall be set to decimal 1 ('001').

- Payload Type (PT) shall be set to '0'.

- (S) shall be set to '0'.

- SNN shall be set to '0'.-   Message Type shall be set to the unique value that is used for each type of signalling message. Valid message types are marked with a x in the GTP-C column in Table 1.

- Length shall be the length, in octets, of the signalling message excluding the GTP header.

- The Tunnel Endpoint Identifier is set by the sending entity to the value requested value by the corresponding entity (SGSN or GGSN) and points out the mobility management context (e.g. the MS and its associated context data), except for the following cases:

  • The first Create PDP Context Request message for a given MS sent to a specific GGSN shall have the Tunnel Endpoint Identifier set to all zeros, since this will be the message that establishes the tunnel in the signalling plane for this specific MS. One exception is the Network Initiated PDP context activation procedure, where the TEID in the Create PDP Context Request shall be set to the TEID requested in the PDU Notification Request.

  • 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 and 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 a signalling tunnel is already established for that specific MS.

  • 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 or a tunnel. Within a given set of contiguous Sequence Numbers from 0 to 65535, a given Sequence Number shall, if used, unambiguously define a GTP signalling request message sent on the path or tunnel (see section Reliable delivery of signalling messages). The Sequence Number in a signalling response message shall be copied from the signalling request message that the GSN is replying to.

- SNDCP N-PDU Number shall not be present.

The GTP header may be followed by subsequent information elements dependent on the type of signalling message. Only one information element of each type is allowed in a single signalling message, except for the Authentication Triplet, the PDP Context and the Tunnel Endpoint Identifier Data II information element where several occurrences of each type are allowed.
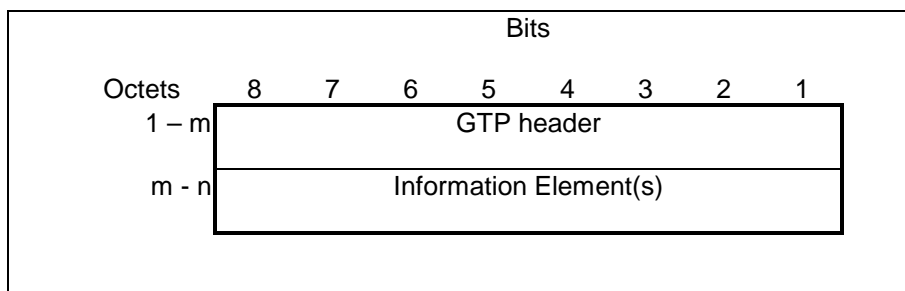
	Bits							
Octets	8	7	6	5	4	3	2	1
1 – m	GTP header							
m - n	Information Element(s)							

Figure 50: GTP header followed by subsequent Information Elements

<div style="text-align:center;">

*** *Next Change* ***

</div>

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').

- Payload Type (PT) shall be set to '0'.

- If the S field is set to '1' the sequence number field is present otherwise it is set to '0'.

- SNN flag: The GTP-U header includes the optional SNDCP N-PDU Number field if the SNN 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 section 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.

- SNDCP N-PDU Number: This field shall be included if and only if the SNN flag is set to 1. In this case, it is used by the old SGSN (or RNC), 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 SNDCP, or if the T-PDU is to be transferred using unacknowledged peer-to-peer LLC operation, then SNN 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 MM and PDP contexts.

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Milano, Italy, 14th-16st Feb. 2000

Document *N2B000269*

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	075	Current Version:	3.3.0

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

For submission to:	CN#07	for approval	X	strategic		(for SMG
list expected approval meeting # here ↑		for information		non-strategic	X	*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: (U)SIM [ ]   ME [ ]   UTRAN / Radio [ ]   Core Network [X]
(at least one should be marked with an X)

Source:	N2		**Date:**	18 Jan. 2000

Subject:	Changing references from GSM specifications to 3G TS

Work item:	GTP Enhancements

Category:

(only one category shall be marked with an X)

				Release:		
F	Correction				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:	The TS 29.060 3.3.0 still contains references to GSM specifications which have been substituted by 3GPP TSs.

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:	

7.3.13   PDU Notification Response

The message is sent by a SGSN to GGSN as a response of a PDU Notification Request.

The Cause value 'Request accepted' indicates if the PDP context activation will proceed. The PDP context activation procedure will not proceed for other Cause values.

Possible Cause values are:

- 'Request Accepted'

- 'No resources available'

- 'Service not supported'

- 'System failure'

- 'IMSI not known'

- 'MS is GPRS Detached'

- 'GPRS connection suspended'

- 'Mandatory IE incorrect'

- 'Mandatory IE missing'

- 'Optional IE incorrect'

- 'Invalid message format'

- 'Version not supported'

- 'Roaming restriction'

After an unsuccessful activation attempt the GSNs may perform some actions to prevent unnecessary enquires to the HLR as described in the section Unsuccessful Network-Requested PDP Context Activation procedure in GSM 03.603G TS 23.060.

7.3.14   PDU Notification Reject Request

After an unsuccessful activation attempt the GSNs may perform some actions to prevent unnecessary enquires to the HLR as described in the section Unsuccessful Network-Requested PDP Context Activation procedure in GSM 03.603G TS 23.060.

7.4   Location Management messages

The optional Location Management messages are defined to support the case when Network-Requested PDP Context Activation procedures are used and a GGSN does not have a SS7 MAP interface, i.e. a Gc interface. GTP is then used to transfer signalling messages between the GGSN and a GTP-MAP protocol-converting GSN in the GPRS backbone network. The GTP-MAP protocol-converting GSN converts the signalling messages described in this section between GTP and MAP. The MAP messages are sent to and received from the HLR. The GTP-MAP protocol-converting function is described in GSM 03.603G TS 23.060. The MAP protocol describing the corresponding procedures and messages is described in GSM 09.023G TS 29.002. This alternative method is illustrated in Figure 7.

7.5   Mobility Management messages

The Mobility Management messages are the signalling messages, defined in GSM 03.603G TS 23.060 and 3G TS 24.00804.08, that are sent between SGSNs at the GPRS Attach and Inter SGSN Routeing Update procedures. The new SGSN derives the address of the old SGSN from the old routeing area identity. The address translation mechanism is implementation specific. Some possible translation mechanisms are found in Annex A.

Generally, the purpose of the signalling is to transfer data associated with the MS from the old SGSN to the new SGSN.

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 03.60~~3G TS 23.060 and 3G TS 24.008~~04.08~~. If the MS has provided the P-TMSI Signature, the new SGSN shall include this parameter in the Identification Request message.

7.5.3   SGSN Context Request

The P-TMSI Signature is conditionally provided by the MS to the new SGSN for identification checking purposes as defined in ~~GSM 03.60~~3G TS 23.060 and 3G TS 24.008~~04.08~~. If the MS has provided the P-TMSI Signature, the new SGSN shall include this parameter in the SGSN Context Request message.

7.7.8   MAP Cause

The MAP Cause is a value that the GTP-MAP protocol-converting GSN relays transparently from HLR to the GGSN. The possible MAP Cause values for the appropriate messages are described in ~~GSM 09.02~~3G TS 29.002.

7.7.9   P-TMSI Signature

The P-TMSI Signature information element is provided by the MS in the Routing Area Update Request and Attach Request messages to the SGSN for identification checking purposes. The content and the coding of the P-TMSI Signature information element is defined in ~~GSM 04.08~~3G TS 24.008.

7.7.18   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 Update procedure.

The Authentication Type indicates the Authentication mechanism that is the GSM or UMTS.

The Ciphering Key Sequence Number (CKSN) is described in ~~GSM 04.08~~3G TS 24.008. Possible values are integers in the range [0; 6]. The value 7 is reserved. The Ciphering Key Sequence Number shall be presented if Authentication Type is GSM.

The DRX parameter and the MS Network Capability are coded as described in ~~GSM 04.08~~3G TS 24.008.

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

The 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 ~~GSM 04.08~~3G TS 24.008.

7.7.19   PDP Context

The PDP Context information element contains the Session Management parameters, defined for an external packet data network address, that are necessary to transfer between SGSNs at the Inter SGSN Routeing Area Update procedure.

NSAPI is an integer value in the range [0; 15].

The NSAPI points out the affected PDP context.

The SAPI indicates the LLC SAPI which is associated with the NSAPI.

Transaction Identifier is the 4 bit Transaction Identifier used in the ~~GSM 04.08~~3G TS 24.008 Session Management messages which control this PDP Context.

7.7.20   Access Point Name

The Access Point Name is sent from the GGSN in the Network-requested PDP Context Activation procedure that is used to identify the access point of the packet data network that wishes to connect to the MS.

The Access Point Name is information from the MS or SGSN , that may be used by the GGSN to differentiate between accesses to different external packet data networks using the same PDP Type.

The Access Point Name contains a logical name which is the APN Network Identifier (see ~~GSM 03.60~~3G TS 23.060). It is coded as in the value part defined in ~~GSM 04.08~~3G TS 24.008 (i.e. the ~~GSM 04.08~~3G TS 24.008 IEI and ~~GSM 04.08~~3G TS 24.008 octet length indicator are not included).

7.7.21   Protocol Configuration Options

The Protocol Configuration Options contains external network protocol options that may be necessary to transfer between the GGSN and the MS. The content and the coding of the Protocol Configuration is defined in octet 3-z of the Protocol Configuration Options in ~~GSM 04.08~~3G TS 24.008.

7.7.22   GSN Address

The GSN Address information element contains the address of a GSN as defined in ~~GSM 03.03~~3G TS 23.003. The Address Type and Address Length fields from 03.03 are not included in the GSN Address field.

7.7.23   MS International PSTN/ISDN Number (MSISDN)

The MS international ISDN numbers are allocated from the CCITT Recommendation E.164 numbering plan, see ~~GSM 03.03~~3G TS 23.003. The MSISDN is coded according to the contents of ISDN-AddressString data type defined in 3G TS 29.002. The MSISDN shall be in international format and the "nature of address indicator" shall indicate "international number".

7.7.28   Traffic Flow Template (TFT)

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

The content and the coding of the TFT is defined in ~~GSM 04.08~~3G TS 24.008.

9.4   Tunnelling between SGSNs

T-PDUs, stored in the old SGSN and not yet sent to the MS, shall be tunnelled to the new SGSN as a part of the Inter SGSN Routeing Update procedure described in ~~GSM 03.60~~3G TS 23.060. Some T-PDUs may still be on their way from the GGSN to the old SGSN because they have been sent before the tunnels change. These T-PDUs shall also be tunnelled to the new SGSN.

11.4   Restoration and Recovery

All GSNs shall maintain in non-volatile memory a Restart Counter of local significance. A GSN that restarts shall change the Restart Counter value immediately after the restart procedure has been completed. The value shall be incremented by 1 modulo 256 (see ~~TS GSM 03.07~~ 3G TS 23.007).

All GSNs shall also maintain in volatile memory a Restart Counter for each GSN that it is in contact with. The Restart Counters stored for all GSNs that it is in contact with shall be cleared after the restart procedure has been completed (see ~~TS GSM 03.07~~ 3G TS 23.007).

3GPP TSG CN2 Meeting
Milano, Italy, 14th-16st Feb. 2000

Document *N2B000270*

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**	**076**		Current Version:	**3.3.0**

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

For submission to:	**CN#07**	for approval	**X**	strategic		*(for SMG*
list expected approval meeting # here ↑		for information		non-strategic	**X**	*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: (U)SIM ☐   ME ☐   UTRAN / Radio ☐   Core Network **X**
(at least one should be marked with an X)

Source:	N2		**Date:**	11 Febr 2000

Subject:	New table for Information Elements

Work item:	GTP Enhancements

Category: F   Correction
          A   Corresponds to a correction in an earlier release
(only one category   B   Addition of feature
shall be marked   C   Functional modification of feature
with an X)   D   Editorial modification   **X**

Release: Phase 2
          Release 96
          Release 97
          Release 98
          Release 99   **X**
          Release 00

Reason for change:	Some references to the first version of GTP must be changed. A table showing all the Information Elements is introduced.

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:

7.7 Information elements

A signalling message may contain several information elements. The TLV (Type, Length, Value) or TV (Type, Value) encoding format shall be used for the GTP information elements. The information elements shall be sorted, with the Type fields in ascending order, in the signalling messages. The Length field contains the length of the information element excluding the Type and Length field.

For all the length fields, bit 8 of the lowest numbered octet is the most significant bit and bit 1 of the highest numbered octet is the least significant bit.

Within information elements, certain fields may be described as spare. These bits shall be transmitted with the value defined for them. To allow for future features, the receiver shall not evaluate these bits.

The most significant bit in the Type field is set to 0 when the TV format is used and set to 1 for the TLV format.
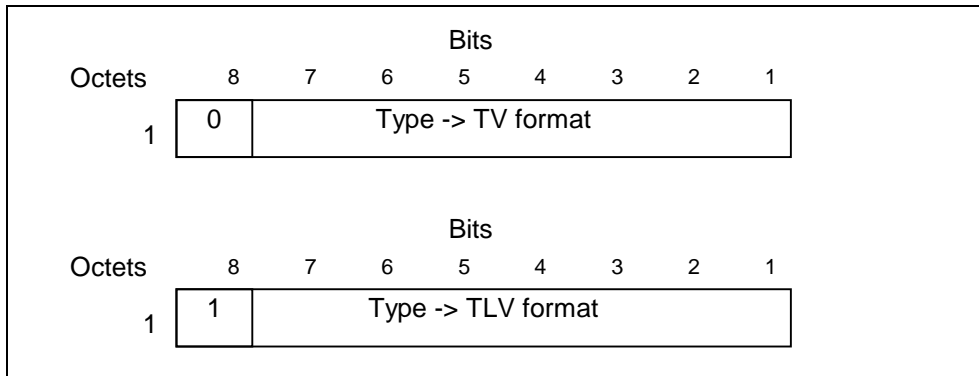
Figure 8: Type field for TV and TLV format

NOTE: Type values 6, 7 and 10 (Decimal) are currently not used.

The following TLV Information Element type number ranges are reserved for GPRS charging protocol use (see GTP' in GSM 12.15): 239-250; 252-254.

The following TV Information Element type number range is reserved for GPRS charging protocol use (see GTP' in GSM 12.15): 117-127.

Table xx: Information Elements

IE Type Value	Format	Information Element	Reference
1	TV	Cause	7.7.1
2	"	International Mobile Subscriber Identity (IMSI)	7.7.2
3	"	Routeing Area Identity (RAI)	7.7.3
4	"	Temporary Logical Link Identity (TLLI)	7.7.4
5	"	Packet TMSI (P-TMSI)	7.7.5
6-7	Spare		
8	"	Reordering Required	7.7.6
9	"	Authentication Triplet	7.7.7
10	Spare		
11	"	MAP Cause	7.7.8
12	"	P-TMSI Signature	7.7.9
13	"	MS Validated	7.7.10
14	"	Recovery	7.7.11
15	"	Selection Mode	7.7.12
16	"	Tunnel Endpoint Identifier Data I	7.7.13
17	"	Tunnel Endpoint Identifier Signalling	7.7.14
18	"	Tunnel Endpoint Identifier Data II	7.7.15
19	"	Teardown Ind	7.7.16
20	"	NSAPI	7.7.17
21	"	RANAP Cause	7.7.18
117-126	Reserved for the GPRS charging protocol (see GTP' in GSM 12.15)		
127	"	Charging ID	7.7.19
128	TLV	End User Address	7.7.20
129	"	MM Context	7.7.21
130	"	PDP Context	7.7.22
131	"	Accss Point Name	7.7.23
132	"	Protocol Configuration Options	7.7.24
133	"	GSN Address	7.7.25
134	"	MS International PSTN/ISDN Number (MSISDN)	7.7.26
135	"	Quality of Service Profile	7.7.27
136	"	Authentication Quintuplet	7.7.28
137	"	Traffic Flow Template	7.7.29
138	"	Target Identification	7.7.30
139	"	UTRAN Transparent Container	7.7.31
140	"	Target RNC Information	7.7.32
239-250	Reserved for the GPRS charging protocol (see GTP' in GSM 12.15)		
251	"	Charging Gateway Address	7.7.33
252-254	Reserved for the GPRS charging protocol (see GTP' in GSM 12.15)		
255	"	Private Extension	7.7.34

8.2　Usage of the GTP Header

For signalling messages the GTP header shall be used as follows:

- Version shall be set to decimal 1 ('001').

- Payload Type (PT) shall be set to '0'.

- (S) shall be set to '10'.

- PNSNN shall be set to '0'.

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

- Length shall be the length, in octets, of the signalling message excluding the GTP header.

- The Tunnel Endpoint Identifier is set to the requested value and points out the mobility management context (e.g. the MS), except for the following cases:

- The first Create PDP Context Request message sent to a specific GGSN shall have the Tunnel Endpoint Identifier set to all zeros, since this will be the message that establishes the tunnel in the signalling plane.

- 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 Version Not Supported message where the Tunnel Endpoint Identifier shall be set to all zeros.

- Sequence Number shall be a message number valid for a path or a tunnel. Within a given set of contiguous Sequence Numbers from 0 to 65535, a given Sequence Number shall, if used, unambiguously define a GTP signalling request message sent on the path or tunnel (see section Reliable delivery of signalling messages). The Sequence Number in a signalling response message shall be copied from the signalling request message that the GSN is replying to.

- ~~SNDCP~~ N-PDU Number shall not be present.

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').

- Payload Type (PT) shall be set to '0'.

- If the S field is set to '1' the sequence number field is present otherwise it is set to '0'.

- PN~~SNN~~ flag: The GTP-U header includes the ~~optional SNDCP~~ N-PDU Number field if the PN~~SNN~~ 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 section 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.

- ~~SNDCP~~ N-PDU Number: This field shall be included if and only if the ~~SN~~PNN flag is set to 1. In this case, it is used by the old SGSN (or RNC), 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 P~~SN~~DCP, or if the T-PDU is to be transferred using unacknowledged peer-to-peer LLC operation, then PN~~SN~~N shall be set to 0.

- TEID: Contains the tunnel identifier for the tunnel to which this T-PDU belongs. The TEID shall be used by the receiving to find the MM and PDP contexts.

10.1   UDP/IP

UDP/IP is the only path protocol defined to transfer GTP signalling messages in ~~this,~~ the ~~first~~ version 1 of GTP. UDP/IP is also the recommended choice as a connection-less path to tunnel connection-less T-PDUs. A User Datagram Protocol (UDP) compliant with STD 0006 shall be used.

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29.060	**CR**	**077**		Current Version:	**3.3.0**	

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

For submission to:	CN#07	for approval	X	strategic		*(for SMG*
list expected approval meeting # here ↑		for information		non-strategic	X	*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: (U)SIM ☐   ME ☐   UTRAN / Radio ☐   Core Network **X**
(at least one should be marked with an X)

Source:	N2		**Date:**	4ᵗʰ Feb 2000

Subject:	Forward SRNS Context

Work item:	GTP Enhancements

Category: F   Correction   **Release:**
          A   Corresponds to a correction in an earlier release
(only one category   B   Addition of feature
shall be marked   C   Functional modification of feature   **X**
with an X)   D   Editorial modification

Release:	
Phase 2	
Release 96	
Release 97	
Release 98	
Release 99	**X**
Release 00	

Reason for change:	To support hard handover via CN a new GTP- C message is introduced, Forward SRNS Context.

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:	This is a revised version of CR 047 (tdoc N2B000059) presented at CN2 in Kyoto. To align the CR with the approved 23.060 CR 109r1 (tdoc S2-000226), the format of the PDCP sequence number IEs has been changed from 12bits to 8bits and the descriptive text has been modified accordingly.

7.5.11   Forward SRNS Context

The Forward SRNS Context message is used in case of hard handover with switch in CN. When the old SGSN receives the RANAP message Forward SRNS Context, the old SGSN shall send a Forward SRNS Context message to the new SGSN. The new SGSN shall forward the message to the target RNC using the corresponding RANAP message.

For each RAB context in the received RANAP message, the old SGSN shall include a RAB Context IE in the GTP-C Forward SRNS Context message.

Table 37: Information elements in a Forward SRNS Context

Information element	Presence requirement	Reference
RAB Context	Mandatory	7.x.x
Private Extension	Optional	7.7.26

7.x.x   RAB Context

The RAB context information element contains sequence number status for one RAB in RNC, which corresponds to one PDP context in CN. The RAB contexts are transferred between the RNCs via the SGSNs at inter SGSN hard handover.

NSAPI identifies the PDP context and the associated RAB for which the RAB context IE is intended.

DL GTP-U Sequence Number is the number for the next downlink GTP-U T-PDU to be sent to the MS.

UL GTP-U Sequence Number is the number for the next uplink GTP-U T-PDU to be tunneled to the GGSN.

DL PDCP Sequence Number is the number for the next downlink PDCP-PDU to be sent to the MS.

UL PDCP Sequence Number is the number for the next uplink PDCP-PDU to be received from the MS.

1	Type = xx (Decimal)	
2	Spare (0 0 0 0)	NSAPI
3-4	DL GTP-U Sequence Number	
5-6	UL GTP-U Sequence Number	
7	DL PDCP Sequence Number	
8	UL PDCP Sequence Number	

Figure xx: RAB Context Information Element

3GPP TSG CN WG2 SWGB Meeting
Milan, Italy, 14-16 Feb 2000

Document **N2B000354**

Revised N1-000236

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

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29.060	**CR**	**078r1**	Current Version:	**3.3.0**

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

For submission to:	**CN#07**	for approval	**X**	strategic		*(for SMG*
list expected approval meeting # here ↑		for information		non-strategic	**X**	*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:　　(U)SIM ☐　　ME ☐　　UTRAN / Radio ☐　　Core Network **X**
(at least one should be marked with an X)

Source:	N2		**Date:**	15.2.2000

Subject:	PDCP sequence numbers in SRNC relocation and inter-system handover

Work item:	GTP enhancements

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

Reason for change:	3GPP TSG RAN WG2 has adopted the working assumption of using PDCP sequence numbers instead of RLC sequence numbers. Therefore, this CR proposes to align SRNC relocation procedure and inter-system handover with this.

Clauses affected:	6, 6.1.1

Other specs affected:	Other 3G core specifications	**X**	→ List of CRs:	23.060
	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:	

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

6. GTP header

The GTP header shall be 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 unused fields shall not be evaluated by the receiver.

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 section 10.1.1, "Different GTP versions". The version number shall be set to '1'.

- Payload Type (PT) this bit is used as a protocol discriminator between GTP and GTP'. 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.

- Message Type: this field indicates the type of GTP message. The valid values of the message type are defined in section x.x for GTP-C and y.y for 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. It is used as a transaction identity for signalling messages in GTP-C 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 SRNS relocation procedures or 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 or SRNC. 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, while for UMTS to GSM/GPRS, a sequence number derived from the RLCPDCP sequence number is present.)

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

Bits

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

(*) 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 fields shall be present when any one or more of the SP, PN and E flags are set.

Figure 2: Outline of GTP header

The format of GTP Extension Headers is depicted in Figure 3. The Extension Header Length field specifies the length of the particular Extension header in 4 octects 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 send an Error notification message to the source of the message.

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

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

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

An Endpoint Receiver is the ultimate receiver of the GTP-PDU (eg an RNC or the GGSN for the GTP-U plane). An Intermediate Node is a node which handles GTP but is not the ultimate endpoint (eg 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~~	~~RLC PDU number~~

Figure 5: Definition of Extension Header types

6.1   Extension headers

6.1.1   ~~RLC PDU Number~~

~~This extension header is transmitted, for example, at SRNS relocation time to provide the RLC frame number of not yet acknowledged N-PDUs. It's 4 octets long, and therefore the Length field has value 1. The spare bits shall be set to 1 by the sender and they shall not be evaluated by the receiving end.~~
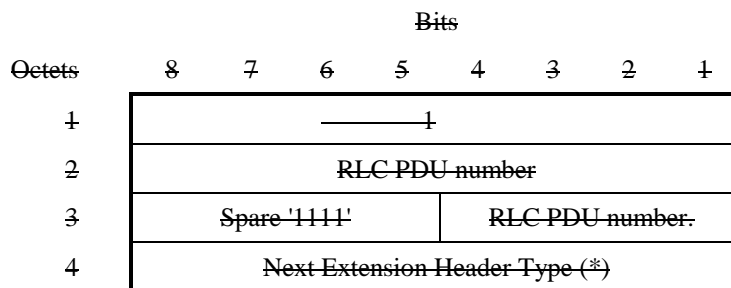
~~(*) The value of this field is 0 if no other Extension header follows.~~

~~Figure 6: RLC PDU number Extension Header~~

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29.060	**CR**	**079**	Current Version:	**3.3.0**

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

For submission to:	**CN#07**	for approval	**X**		strategic		*(for SMG*
list expected approval meeting # here ↑		for information			non-strategic	**X**	*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: (U)SIM ☐ ME ☐ UTRAN / Radio **X** Core Network **X**
(at least one should be marked with an X)

Source:	N2		**Date:**	10-02-2000

Subject:	Removal of TCP support in the packet domain PLMN backbone network

Work item:	GTP enhancements

Category:

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	**X**		Release 98	
D	Editorial modification			Release 99	**X**
				Release 00	

(only one category shall be marked with an X)

Reason for change:	Change following the approval in S2 of S2 CR 23.060#099 "Removal of TCP support in the packet domain PLMN backbone network"

Clauses affected:	Contents,2,3, 9.2.1.1.1, 9.2.1.2.1;10.2;13.2

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

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Contents

************************************** next change*********************************

2 Normative references

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

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

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

- For a non-specific reference, the latest version applies.

- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

- For this Release 1998 document, references to GSM documents are for Release 1998 versions (version 7.x.y).

[1] GSM 01.04: "Digital cellular telecommunications system (Phase 2+); Abbreviations and acronyms".

[2] GSM 03.03: "Digital cellular telecommunications system (Phase 2+); Numbering, addressing and identification".

[3] GSM 03.07: "Digital cellular telecommunications system (Phase 2+); Restoration Procedures".

[4] GSM 03.20: "Digital cellular telecommunications system (Phase 2+); Security related network functions"

[5] GSM 03.60: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Service Description; Stage 2".

[6] GSM 03.64: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Overall description of the GPRS Radio Interface; Stage 2"

[7] GSM 04.08: "Digital cellular telecommunications system (Phase 2+); Mobile radio interface layer 3 - specification".

[8] GSM 04.64: "Digital cellular telecommunications system (Phase 2+); Mobile Station - Serving GPRS Support Node (MS-SGSN) Logical Link Control (LLC) Layer Specification".

[9] GSM 09.02: "Digital cellular telecommunications system (Phase 2+); Mobile Application Part (MAP) specification".

[10] TS 25.413: " UTRAN Iu interface RANAP signalling ".

[11] STD 0005: "Internet Protocol", J. Postel.

[12] STD 0006: "User Datagram Protocol", J. Postel.

[13] ~~STD 0007: "Transmission Control Protocol", J. Postel.~~

[14] RFC 1700: "Assigned Numbers", J. Reynolds and J. Postel.

[15] RFC 2181: "Clarifications to the DNS Specification", R. Elz and R. Bush.

[16] ITU-T Recommendation X.25: "Interface between data terminal equipment (DTE) and data circuit-terminating equipment (DCE) for terminals operating in the packet mode and connected to public data networks by dedicated circuit".

[17] ITU-T Recommendation X.121: "International Numbering Plan for Public Data Networks".

[18] UMTS TS 33.102: "3G Security; Security Architecture".

3 Definitions and abbreviations

3.1 Definitions

For the purpose of this Technical Specification, the following 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: A T-PDU plus a GTP header. A G-PDU is sent in a path.

GTP-Flow: A GTP flow is defined by the unidirectional virtual aggregation of G-PDUs and/or signalling messages related to one or more GTP tunnels. A GTP flow is identified by a Flow Label included in the GTP header. The meaning of the Flow Label is transparent for the transmitter side, only the receiver may evaluate the Flow Label.

GTP tunnel: A GTP tunnel is defined by two associated PDP Contexts in different GSN nodes and is identified with a Tunnel ID. A GTP tunnel is necessary to forward packets between an external packet data network and a MS user.

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

MM Context ID: IMSI or equivalent for use in conjunction with Anonymous Access (please refer to section GTP Header).

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: The UDP/IP path ~~and TCP/IP path are examples of paths that may be~~is used to multiplex GTP tunnels.

Path Protocol: The Path Protocol is the protocol~~(s)~~ used as a bearer of GTP between GSNs.

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

PDP Context: The 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 if the path media supports it. Separate paths with different priorities may be defined between a GSN pair. However, the possible use of QoS in the GGSN is outside the scope of the GTP specification.

Signalling message: GTP signalling messages are exchanged between GSN pairs in a path. The signalling messages are used to transfer GSN capability information between GSN pairs and to create, update and delete GTP tunnels.

~~**TCP/IP path:** A TCP/IP path is a reliable connection-oriented path defined by two end-points and an end-point is defined by an IP address and a TCP port number. TCP/IP paths should be used when the T-PDUs are based on connection-oriented protocols, such as the X.25 packet layer protocol.~~

T-PDU: An original packet, for example an IP datagram, from a 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): 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.

UDP/IP path: A UDP/IP path is a connection-less path defined by two end-points and an end-point is defined by an IP address and a UDP port number. A UDP/IP path carries G-PDUs between GSN nodes related to one or more GTP tunnels. A UDP/IP path should be used when the T-PDUs are based on connection-less protocols, such as IP.

3.2   Abbreviations

Abbreviations used in this specification are listed in GSM 01.04.

For the purpose of this specification the following additional abbreviations apply:

BB	Backbone Bearer
DF	Don't Fragment
FFS	For Further Study
GTP	GPRS Tunneling Protocol
GTP-C	GTP Control
GTP-U	GTP User
IANA	Internet Assigned Number Authority
ICMP	Internet Control Message Protocol
IP	Internet Protocol
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
MTU	Maximum Transmission Unit
QoS	Quality of Service
RANAP	Radio Access Network Application Part
RNC	Radio Network Controller
~~TCP~~	~~Transmission Control Protocol~~
TEID	Tunnel Endpoint IDentifier
TFT	Traffic Flow Template
UDP	User Datagram Protocol
UTRAN	UMTS Terrestrial Radio Access Network
Gn interface	Interface between GPRS Support Nodes (GSNs) within a PLMN
Gp interface	Interface between GPRS Support Nodes (GSNs) in different PLMNs

*********************************** next change*********************************

9.2.1.1.1   GTP-U-CONTROL-RX-SETUP.request

This primitive is used to allocate packet reception resources according to a QoS profile specified via the 'QoS' parameter. These resources are to be associated to a tunnel endpoint identified via the TEID specified in the 'TEID' parameter. In case this TEID is already being used, this shall be interpreted as a resource modification request.

The 'IP address' parameter is used to identify the IP address of the remote GTP-U protocol entity where the GTP-U tunnel is terminated. This implicitly identifies the path being used. ~~The PATH may be TCP or UDP based depending on the QoS required (namely depending on whether reliable transmission is required or not).~~ The knowledge of the path being used is necessary in order to send ECHO messages used to detect path failure.

*********************************** next change*******************************

9.2.1.2.1 GTP-U-CONTROL-TX-SETUP.request

This primitive is used to allocate packet transmission resources according to a QoS profile specified via the 'QoS' parameter. These resources are to be associated to a tunnel endpoint identified via the TEID specified in the 'TEID' parameter. In case this TEID is already being used, this shall be interpreted as a resource modification request.

The 'IP address' parameter is used to identify the IP address of the remote GTP-U protocol entity where the GTP-U tunnel is terminated. This implicitly identifies the path being used. ~~The PATH may be TCP or UDP based depending on the QoS required (namely depending on whether reliable transmission is required or not).~~ The knowledge of the path being used is necessary in order to send ECHO messages to detect PATH failure.

*********************************** next change*******************************

~~10.2~~ ~~TCP/IP~~

~~TCP/IP is the recommended choice as a reliable connection-oriented path to tunnel connection-oriented T-PDUs. A Transmission Control Protocol (TCP) compliant with STD 0007 shall be used.~~

~~10.2.1~~ ~~TCP Header~~

~~The TCP Destination Port shall be the server port number 3386. This value shall be reserved for G-PDUs. Extra implementation specific destination ports are possible but all GSNs shall support the server port number 3386.~~

~~The TCP Source Port can be arbitrarily selected and is locally assigned at the sending GSN.~~

~~10.2.2~~ ~~IP Header~~

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

~~The IP Destination Address shall be an IP address of the destination GSN.~~

*********************************** next change*******************************

13.2 IP fragmentation

Here it is described how the fragmentation mechanism shall work together with GTP, when the GPRS backbone is based on IPv4.

However, fragmentation should be avoided if possible. Examples of fragmentation drawbacks are, e.g.:

- Fragmentation is inefficient, since the complete IP header is duplicated in each fragment.

- If one fragment is lost, the complete packet has to be discarded. The reason is that no selective retransmission of fragments is possible.

By using Path MTU discovery the application may find out the MTU, and thereby utilise more efficient segmentation mechanisms in other protocol layers than IP.

The maximum size of a T-PDU that may be transmitted without fragmentation by GGSN or the MS is defined in GSM 03.60. All backbone links should have MTU values that exceeds the sum of the maximum value plus the size of the tunnel headers (IP header, UDP or TCP header and GTP header) in order to avoid fragmentation in the backbone.

13.2.1   MO direction

SGSN: A packet from an MS shall be encapsulated at the SGSN with a GTP header, UDP or TCP header, and IP header. If the resulting IP packet is larger than the MTU of the first link towards the GGSN, fragmentation of the IP packet shall be performed by the SGSN. The SGSN should preferably fragment the IP packet if it is larger than the MTU of any link between SGSN and GGSN.

Backbone router: Any router in the backbone may fragment the GTP packet if needed, according to IPv4.

GGSN: The GGSN shall assemble any IP fragments received from SGSNs, according to IPv4. Note that if any fragment is lost, the whole packet shall be discarded.

13.2.2   MT direction

GGSN: A packet from an external host shall be encapsulated at the GGSN with a GTP header, UDP or TCP header, and IP header. If the resulting IP packet is larger than the MTU on the first link towards the SGSN, fragmentation of the IP packet shall be performed by the GGSN. The GGSN should preferably fragment the IP packet if it is larger than the MTU of any link between GGSN and SGSN.

Backbone router: Any router in the backbone may fragment the GTP packet if needed, according to IPv4.

SGSN: The SGSN shall assemble any IP fragments received from the GGSN, according to IPv4. Note that if any fragment is lost, the whole packet shall be discarded.

13.2.3   Tunnelling from old to new SGSN

Old SGSN: A user packet shall be encapsulated with a GTP header, UDP or TCP header, and IP header. If the resulting IP packet is larger than the MTU on the first link towards the new SGSN, fragmentation of the IP packet shall be performed by the old SGSN. The old SGSN should preferably fragment the IP packet if it is larger than the MTU of any link between old and new SGSN.

Backbone router: Any router in the backbone may fragment the GTP packet if needed, according to IPv4.

New SGSN: The new SGSN shall assemble any IP fragments received from the old SGSN, according to IPv4. Note that if any fragment is lost, the whole packet shall be discarded.

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 **081**	Current Version:	**3.3.0**

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

For submission to:	**CN#07**	for approval	**X**	strategic		*(for SMG*
list expected approval meeting # here ↑		for information		non-strategic	**X**	*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: (U)SIM [ ]   ME [ ]   UTRAN / Radio [ ]   Core Network **X**
(at least one should be marked with an X)

Source:	N2		**Date:**	2000-02-15

Subject:	Addition of PDP Context Identifier to PDP Context Information Element

Work item:	GTP enhancements

Category:

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

Reason for change:	During Inter-SGSN Routeing Area Update the PDP Context Identifier is required in the PDP Context Information Element in order that the new SGSN be able to match the PDP Context information sent from the old SGSN with the PDP Context information in the HLR Subscriber Data.

Clauses affected:	7.7.19 PDP Context

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:	Original CR was presented as N2-99G84 for release 97 and 98. Decision was to apply CR to R99 only. This cover page applies the technical changes contained in N2-99G84 to R99.

help.doc

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

7.7.19 PDP Context

The PDP Context information element contains the Session Management parameters, defined for an external packet data network address, that are necessary to transfer between SGSNs at the Inter SGSN Routeing Area Update procedure.

NSAPI is an integer value in the range [0; 15].

The NSAPI points out the affected PDP context.

The SAPI indicates the LLC SAPI which is associated with the NSAPI.

Transaction Identifier is the 4 bit Transaction Identifier used in the GSM 04.08 Session Management messages which control this PDP Context.

Reordering Required (Order) indicates whether the SGSN shall reorder T-PDUs before delivering the T-PDUs to the MS.

VPLMN Address Allowed (VAA) indicates whether the MS is allowed to use the APN in the domain of the HPLMN only, or additionally the APN in the domain of the VPLMN.

QoS Sub Length, QoS Req Length and QoS Neg Length represent respectively the lengths of the QoS Sub, QoS Req and QoS Neg fields, excluding the QoS Length octet.

Quality of Service Subscribed (QoS Sub), Quality of Service Requested (QoS Req) and Quality of Service Negotiated (QoS Neg) are encoded as described in section 'Quality of Service (QoS) Profile'.

The Sequence Number Down is the number of the next T-PDU that shall be sent from the new SGSN to the MS. The number is associated to the Sequence Number from the GTP Header of an encapsulated T-PDU.

The Sequence Number Up is the number that new SGSN shall use as the Sequence Number in the GTP Header for the next encapsulated T-PDU from the MS to the GGSN.

The Send N-PDU Number is used only when acknowledged peer-to-peer LLC operation is used for the PDP context. The Send N-PDU Number is the N-PDU number to be assigned by SNDCP to the next downlink N-PDU received from the GGSN. It shall be set to 255 if unacknowledged peer-to-peer LLC operation is used for the PDP context.

The Receive N-PDU Number is used only when acknowledged peer-to-peer LLC operation is used for the PDP context. The Receive N-PDU Number is the N-PDU number expected by SNDCP from the next uplink N-PDU to be received from the MS. It shall be set to 255 if unacknowledged peer-to-peer LLC operation is used for the PDP context.

The Uplink Tunnel Endpoint Identifier Signalling is the Tunnel Endpoint Identifier used between the old SGSN and the GGSN in uplink direction for signalling purpose. It shall be used by the new SGSN within the GTP header of the Update PDP Context Request message.

The PDP Context Identifier is used to identify a PDP context for the subscriber.

The PDP Type Organization and PDP Type Number are encoded as in the End User Address information element.

The PDP Address Length represents the length of the PDP Address field, excluding the PDP Address Length octet.

The PDP Address is an octet array with a format dependent on the PDP Type. The PDP Address is encoded as in the End User Address information element if the PDP Type is IPv4, IPv6 or X.25.

The GGSN Address Length represents the length of the GGSN Address field, excluding the GGSN Address Length octet.

The old SGSN includes the GGSN Address for signalling that it has received from GGSN at PDP context activation or update.

The APN is the APN in use in the old SGSN. I.e. the APN sent in the Create PDP Context request message.

The spare bits x indicate unused bits which shall be set to 0 by the sending side and which shall not be evaluated by the receiving side.

1	Type = 130 (Decimal)
2-3	Length

	Res-rved	AA	Res-rved	rder	NSAPI
4	Res-rved	AA	Res-rved	rder	NSAPI
5	X	X	X	X	SAPI

6	QoS Sub Length
7 - (q+6)	QoS Sub [3..15]
q+7	QoS Req Length
(q+8)-(2q+7)	QoS Req [3..15]
2q+8	QoS Neg. Length
(2q+9)-(3q+8)	QoS Neg [3..15]
(3q+9)-(3q+10)	Sequence Number Down (SND)
(3q+11)-(3q+12)	Sequence Number Up (SNU)
3q+13	Send N-PDU Number
3q+14	Receive N-PDU Number
(3q+15)-(3q+18)	Uplink Tunnel Endpoint Identifier Signalling
3q+19	PDP Context Identifier

	Spare 1 1 1 1	PDP Type Organization
3q+20~~19~~	Spare 1 1 1 1	PDP Type Organization

3q+21~~0~~	PDP Type Number
3q+22~~1~~	PDP Address Length
(3q+23~~2~~)-m	PDP Address [1..63]
m+1	GGSN Address for signalling Length
(m+2)-n	GGSN Address for signalling [4..16]
n+1	APN length
(n+2)-o	APN

	Spare (sent as 0 0 0 0)	Transaction Identifier
o+1	Spare (sent as 0 0 0 0)	Transaction Identifier

Figure 33: PDP Context information element