Source: TSG CN WG4

Title: Small Technical Enhancements and Improvements on GTP Enhacements

Agenda item: 8.8

Document for: APPROVAL

Spec	CR	Rev	Doc-2nd-Level	Phase	Subject	Cat	Ver_C
29.060	387		N4-030064	Rel-5	Correction on the handling of PCO	F	5.4.0
29.060	388		N4-030082	Rel-5	Removal of the N3-BUFFER-SIZE parameter	F	5.4.0
29.060	389		N4-030083	Rel-5	Correction of presence requirement for the PCO IE	F	5.4.0
29.060	395	3	N4-030323	Rel-5	TEID for GTP-C messages related to unknown PDP Contexts	F	5.4.0
29.060	399		N4-030159	Rel-5	Correction of GTP' references	F	5.4.0
29.060	402	2	N4-030320	Rel-5	IPv4 and IPv6 form of Charging Gateway Address	F	5.4.0

CR-Form-v7

CHANGE REQUEST

| ⌘ | **29.060** CR **387** | ⌘**rev** | **-** | ⌘ | Current version: | **5.4.0** | ⌘ |

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

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

Title: ⌘	Correction on the handling of PCO	
Source: ⌘	CN4	
Work item code: ⌘	TEI5	***Date:*** ⌘ 31/01/2003
Category: ⌘	**F**	***Release:*** ⌘ Rel5

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

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

Reason for change: ⌘	The use of the Protocol Configuration Options(PCO) information element was extended for future application in Rel 5. That is, the PCO can be transferred between UE and GGSN during the secondary PDP context activation in Rel5 and later. However change of the specification for this extension was incomplete.
Summary of change: ⌘	It was clarified that the content of the PCO in the Create PDP Context Request message is transparently copied from the Activate PDP Context Request message for the first PDP context and the Activate Secondary PDP Context Request message for the secondary PDP context, those were sent from UE.
Consequences if not approved: ⌘	The handling of the PCO in case of the secondary PDP context activation is ambiguous.

Clauses affected: ⌘	7.3.1

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

Other comments: ⌘	

How to create CRs using this form:

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3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

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

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

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

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

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

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

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

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

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

The Protocol Configuration Options (PCO) information element may be included in the request when the MS provides the GGSN with application specific parameters. The SGSN includes this IE in the Create PDP Context Request if the associated Activate PDP Context Request or ~~Active~~Activate Secondary PDP Context Request from the MS includes protocol configuration options. The SGSN shall copy the content of this IE transparently from the content of the PCO IE in the Activate PDP Context Request message or Activate~~Active~~ Secondary PDP Context Request.

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 shall not send a Create PDP Context Request for an already active context.

If a new Create PDP Context Request is incoming on TEID 0 for an already active PDP context, this Create PDP Context Request must be considered related to a new session. The existing PDP context shall be torn down locally, and the associated PDP contexts deleted locally, before the new session is created. If a new Create PDP Context Request is incoming on a TEID which is different from 0 and this TEID is already allocated to one or more activated PDP contexts, and the NSAPI IE value in this message matches the NSAPI value of an active PDP context, the GGSN shall send back a Create PDP Context Response with a rejection cause code. It is implementation dependent deciding whether to teardown or keep the existing PDP context.

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

The SGSN shall determine Charging Characteristics from the Subscribed Charging Characteristics and/or PDP Context Charging Characteristics depending on the presence of the information in the Packet Domain Subscription Data as defined in 3GPP TS 23.060 [4]. The requirements for the presence of the Charging Characteristics IE are defined in 3G TS 23.060 [4]. The contents of the Charging Characteristics IE are defined in 3G TS 32.215 [18].

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

The SGSN may include the Routeing Area Identity (RAI) of the SGSN where the MS is registered. The MCC and MNC components shall be populated with the MCC and MNC, respectively, of the SGSN where the MS is registered. The LAC and RAC components shall be populated by the SGSN with the value of 'FFFE' and 'FF', respectively.

The optional Private Extension contains vendor or operator specific information.

Table 5: Information Elements in a Create PDP Context Request

Information element	Presence requirement	Reference
IMSI	Conditional	7.7.2
Routeing Area Identity (RAI)	Optional	7.7.3
Recovery	Optional	7.7.11
Selection mode	Conditional	7.7.12
Tunnel Endpoint Identifier Data I	Mandatory	7.7.13
Tunnel Endpoint Identifier Control Plane	Conditional	7.7.14
NSAPI	Mandatory	7.7.17
Linked NSAPI	Conditional	7.7.17
Charging Characteristics	Conditional	7.7.23
Trace Reference	Optional	7.7.24
Trace Type	Optional	7.7.25
End User Address	Conditional	7.7.27
Access Point Name	Conditional	7.7.30
Protocol Configuration Options	Conditional	7.7.31
SGSN Address for signalling	Mandatory	GSN Address 7.7.32
SGSN Address for user traffic	Mandatory	GSN Address 7.7.32
MSISDN	Conditional	7.7.33
Quality of Service Profile	Mandatory	7.7.34
TFT	Conditional	7.7.36
Trigger Id	Optional	7.7.41
OMC Identity	Optional	7.7.42
Private Extension	Optional	7.7.46

<div style="text-align:right">*CR-Form-v7*</div>

CHANGE REQUEST

| ⌘ | **29.060** CR **388** | ⌘**rev** | **-** | ⌘ | Current version: | **5.4.0** | ⌘ |

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

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

Title: ⌘	Removal of the N3-BUFFER-SIZE parameter	
Source: ⌘	CN4	
Work item code:⌘	TEI5	***Date:*** ⌘ 30/01/2003
Category: ⌘	**F**	***Release:*** ⌘ Rel-5

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

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

Reason for change: ⌘	Buffer sizes are a pure implementation issue and should not be standardised. Furthermore, it doesn't make sense to use a common buffer for both GTP-C and GTP-U packets. Therefore Ericsson suggest that the N3-BUFFER-SIZE parameter is removed from 29.060, sub clause 14.2, as it is confusing and this parameter is never mentioned in the body of any spec (at least explicitly).
Summary of change:⌘	The text re. N3-BUFFER-SIZE has been removed all together from sub clause 14.2 in 29.060.
Consequences if not approved: ⌘	29.060 will contain superfluous and irrelevant information that may create confusion for implementers.

Clauses affected: ⌘	14.2

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

Other comments: ⌘	

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The counter N3-REQUESTS holds the maximum number of attempts made by GTP to send a request message. The recommended value is 5.

The N3-BUFFER-SIZE is the size of the receive buffer for G-PDUs and request messages. The recommended value is 8192.

CR-Form-v7

CHANGE REQUEST

| ⌘ | **29.060** CR **389** | ⌘ **rev** | **-** | ⌘ | Current version: | **5.4.0** | ⌘ |

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

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

Title: ⌘	Correction of presence requirement for the PCO IE	
Source: ⌘	CN4	
Work item code: ⌘	TEI5	***Date:*** ⌘ 30/01/2003
Category: ⌘	**F**	***Release:*** ⌘ Rel-5

Use <u>one</u> of the following categories:
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  R98 *(Release 1998)*
  R99 *(Release 1999)*
  Rel-4 *(Release 4)*
  Rel-5 *(Release 5)*
  Rel-6 *(Release 6)*

Reason for change: ⌘	When updating 29.060 to v.3.3.0, the CR#031 (N2-99K78) introduced the secondary PDP context and correctly changed the presence requirement for the PCO IE from 'Optional' to 'Conditional'. Prior to v 3.3.0, the PCO IE was optional, but as the secondary PDP context was introduced, a condition for the PCO IE was introduced (see 29.060 v3.3.0).
	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**.
	However, at the CN#12bis meeting the CR#309r1 (N4-020294) introduced the PCO IE in the secondary PDP context, consequently the presence requirement for the PCO IE should have been changed back to 'optional'. Unfortunately this change seems to have been forgotten (see 29.060 v5.1.0).
	Furthermore, as the receiving part, i.e. GGSN, cannot determine from checking other IEs in the message whether the PCO IE shall be present or not, it shall be 'optional'.
	The PCO IE is correctly classified as 'optional' in all other messages.
Summary of change: ⌘	The presence requirement for the PCO IE is changed from 'Conditional' to 'Optional'.
Consequences if not approved: ⌘	Unclear how the GGSN shall determine whether the PCO IE should have been present or not, e.g. the Create PDP Context Response might be rejected wrongly.

Clauses affected:	⌘	7.3.1				
		Y	**N**			
Other specs	⌘		**X**	Other core specifications	⌘	
affected:			**X**	Test specifications		
			X	O&M Specifications		
Other comments:	⌘					

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

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

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

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

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

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

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

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

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

The Protocol Configuration Options (PCO) information element may be included in the request when the MS provides the GGSN with application specific parameters. The SGSN includes this IE in the Create PDP Context Request if the associated Activate PDP Context Request from the MS includes protocol configuration options. The SGSN shall copy the content of this IE transparently from the content of the PCO IE in the Activate PDP Context Request message.

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 shall not send a Create PDP Context Request for an already active context.

 If a new Create PDP Context Request is incoming on TEID 0 for an already active PDP context, this Create PDP Context Request must be considered related to a new session. The existing PDP context shall be torn down locally, and the associated PDP contexts deleted locally, before the new session is created. If a new Create PDP Context Request is incoming on a TEID which is different from 0 and this TEID is already allocated to one or more activated PDP contexts, and the NSAPI IE value in this message matches the NSAPI value of an active PDP context, the GGSN shall send back a Create PDP Context Response with a rejection cause code. It is implementation dependent deciding whether to teardown or keep the existing PDP context.

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

The SGSN shall determine Charging Characteristics from the Subscribed Charging Characteristics and/or PDP Context Charging Characteristics depending on the presence of the information in the Packet Domain Subscription Data as defined in 3GPP TS 23.060 [4]. The requirements for the presence of the Charging Characteristics IE are defined in 3G TS 23.060 [4]. The contents of the Charging Characteristics IE are defined in 3G TS 32.215 [18].

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

The SGSN may include the Routeing Area Identity (RAI) of the SGSN where the MS is registered. The MCC and MNC components shall be populated with the MCC and MNC, respectively, of the SGSN where the MS is registered. The LAC and RAC components shall be populated by the SGSN with the value of 'FFFE' and 'FF', respectively.

The optional Private Extension contains vendor or operator specific information.

Table 5: Information Elements in a Create PDP Context Request

Information element	Presence requirement	Reference
IMSI	Conditional	7.7.2
Routeing Area Identity (RAI)	Optional	7.7.3
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Tunnel Endpoint Identifier Control Plane	Conditional	7.7.14
NSAPI	Mandatory	7.7.17
Linked NSAPI	Conditional	7.7.17
Charging Characteristics	Conditional	7.7.23
Trace Reference	Optional	7.7.24
Trace Type	Optional	7.7.25
End User Address	Conditional	7.7.27
Access Point Name	Conditional	7.7.30
Protocol Configuration Options	~~Conditional~~Optional	7.7.31
SGSN Address for signalling	Mandatory	GSN Address 7.7.32
SGSN Address for user traffic	Mandatory	GSN Address 7.7.32
MSISDN	Conditional	7.7.33
Quality of Service Profile	Mandatory	7.7.34
TFT	Conditional	7.7.36
Trigger Id	Optional	7.7.41
OMC Identity	Optional	7.7.42
Private Extension	Optional	7.7.46

****   END OF MODIFICATION   ****

CR-Form-v7

CHANGE REQUEST

⌘   **29.060** CR **395**   ⌘**rev** **3** ⌘   Current version: **5.4.0** ⌘

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

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

Title: ⌘	TEID for GTP-C messages related to unknown PDP Contexts	
Source: ⌘	CN4	
Work item code: ⌘	TEI5	***Date:*** ⌘ 27/01/2003

Category: ⌘ **F**	***Release:*** ⌘ Rel-5

Use <u>one</u> *of the following categories:*
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A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
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Rel-5   (Release 5)
Rel-6   (Release 6)

Reason for change: ⌘	When a GTP-C Request message is sent from a sending GSN to a receiving GSN and the receiving GSN does not recognise the Context that the Request message relates to, the receiving node is required to respond with cause value 'Non-existent' or 'Context not supported'. However, since the receiving GSN has no knowledge of the PDP Context that the request message relates to, it also will not be able to determine the correct TEID-CP to use for the response message. In the case of Delete PDP Context Response, this situation is described and dealt with in 29.060, sec 7.3.6 with the text that reads;- 'If a GSN receives a Delete PDP Context Request message for a non existing PDP context, it will send back to the source of the message a Delete PDP Context Response message with cause value "Non existent". The TEID value used in the response message shall be zero.' This behaviour seems appropriate to be used for other cases (such as Update PDP Context and Create (Subsequent) PDP Context. As such, this generic behaviour should be described in section 8.2 'Usage of the GTP-C header'. This is an essential correction.
Summary of change: ⌘	Insert description of how GTP-C response messages related to non-existent PDP contexts are handled in section 8.2. Remove description from 7.3.6. Add cause value 'Context not known' to some response messages.
Consequences if not approved: ⌘	No description of handling of GTP-C response messages for non-existent PDP Contexts – possible interworking problems

Clauses affected: ⌘	7.3.2, 7.3.6, 8.2

		Y	N		
Other specs affected:	⌘		X	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

How to create CRs using this form:

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

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

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".

- "Context not found"

- "No resources available".

- "All dynamic PDP addresses are occupied".

- "No memory is available".

- "Missing or unknown APN".

- "Unknown PDP address or PDP type".

- "User authentication failed".

- "System failure".

- "Semantic error in the TFT operation".

- "Syntactic error in the TFT operation".

- "Semantic errors in packet filter(s)".

- "Syntactic errors in packet filters(s)".

- "Mandatory IE incorrect".

- "Mandatory IE missing".

- "Optional IE incorrect".

- "Invalid message format".

- "PDP context without TFT already activated".

'No resources available' indicates e.g. that all dynamic PDP addresses are occupied or no memory is available. 'Missing or unknown APN' indicates e.g. when the GGSN does not support the Access Point Name. 'Unknown PDP address or PDP type' indicates e.g. when the GGSN does not support the PDP type or the PDP address.
'User authentication failed' indicates that the external packet network has rejected the service requested by the user.
'PDP context without TFT already activated' indicates that a PDP context has already been activated without a TFT for that MS. 'Context not found' indicates that a Create PDP Request for a subsequent PDP context has been received, but the primary PDP context associated with the request, which the SGSN believes to be active does not exist on the GGSN.

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, Charging Gateway Address, Tunnel Endpoint Identifier Control Plane and Private Extension, are mandatory if the Cause contains the value 'Request accepted'.

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

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

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

If the MS requests a dynamic PDP address with the PDP Type IPv4 or IPv6 and a dynamic PDP address is allowed, then the End User Address information element shall be included and the PDP Address field in the End User Address information element shall contain the dynamic PDP Address allocated by the GGSN.

If the MS requests a static PDP address with the PDP Type IPv4 or IPv6, or a PDP address is specified with PDP Type PPP, then the End User Address information element shall be included and the PDP Address field shall not be included.

The PDP address in End User Address IE and in the Protocol configuration options IE shall be the same, if both IEs are present in the create PDP context response.

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

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

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

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

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

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

The optional Private Extension contains vendor or operator specific information.

Table 6: Information Elements in a Create PDP Context Response

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

****** Next Changed Section ******

7.3.6 Delete PDP Context Response

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

A GSN shall ignore a Delete PDP Context Response for a non-existing PDP context.

If a GSN receives a Delete PDP Context Request message for a non existing PDP context, it shall~~will~~ send back to the source of the message a Delete PDP Context Response message with cause value "Non existent". The TEID value used in the response message shall be zero.

Possible Cause values are:

- 'Request Accepted'

- 'Mandatory IE incorrect'

- 'Mandatory IE missing'

- 'Optional IE Incorrect'

- 'Invalid message format'

- 'Non existent'

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

The optional Private Extension contains vendor or operator specific information.

Table 12: Information Elements in a Delete PDP Context Response

Information element	Presence requirement	Reference
Cause	Mandatory	7.7.1
Private Extension	Optional	7.7.44

****** Next Changed Section ******

8.2 Usage of the GTP-C Header

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

- If a GSN receives a GTP-C message requesting action relating~~ed~~ to a PDP context that the sending node believes is in existence, but that ~~does~~is not ~~exist on~~recognised by the~~at~~ receiving node, the receiving node~~it~~ shall send back to the source of the message, a response with the appropriate cause value (either 'Non-existent' or 'Context not found'). The ~~TEID~~Tunnel Endoint Identifier ~~value~~ used in the response message shall ~~be~~be set to all zeroes.

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

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

- N-PDU Number shall not be interpreted.

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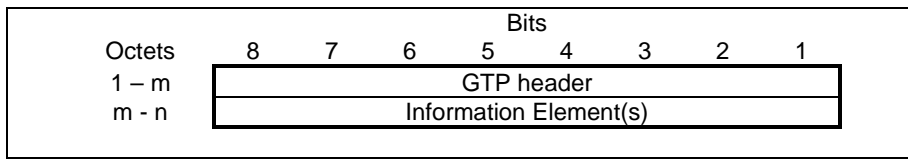
Octets	Bits							
	8	7	6	5	4	3	2	1
1 – m	GTP header							
m - n	Information Element(s)							

Figure 61: GTP Header followed by subsequent Information Elements

CR-Form-v7

CHANGE REQUEST

| ⌘ | **29.060** CR **399** | ⌘**rev** | **-** | ⌘ | Current version: | **5.4.0** | ⌘ |

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

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

Title: ⌘	Correction of GTP' references	
Source: ⌘	CN4	
Work item code:⌘	TEI5	***Date:*** ⌘ 31.01.2003

Category: ⌘ **F**	***Release:*** ⌘ Rel-5

Use one of the following categories:	*Use one of the following releases:*
F *(correction)*	*2 (GSM Phase 2)*
A *(corresponds to a correction in an earlier release)*	*R96 (Release 1996)*
B *(addition of feature),*	*R97 (Release 1997)*
C *(functional modification of feature)*	*R98 (Release 1998)*
D *(editorial modification)*	*R99 (Release 1999)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.	*Rel-4 (Release 4)*
	Rel-5 (Release 5)
	Rel-6 (Release 6)

Reason for change: ⌘	There are still some references to old GSM 12.15 when referencing to GTP' specification, which is currently 3GPP TS 32.215. **This is a correction agreed by consensus.**
Summary of change:⌘	GTP' references are corrected in clauses 6 and 7.1. Reference corrections also in clauses 7.5.1 and 7.5.3.
Consequences if not approved: ⌘	References to out of date specifications.

Clauses affected: ⌘	6, 7.1, 7.5.1, 7.5.3

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

Other comments: ⌘	

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3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

6   GTP Header

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

The GTP-C and the GTP-U use some of the fields in the GTP header differently. The detailed 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 clause 11.1.1, "Different GTP versions". The version number shall be set to '1'.

- Protocol Type (PT): This bit is used as a protocol discriminator between GTP (when PT is '1') and GTP' (when PT is '0'). GTP is described in this document and the GTP' protocol in ~~GSM 12.15~~3GPP TS 32.215 [18]. Note that the interpretation of the header fields may be different in GTP' than in GTP.

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

- Sequence number flag (S): This flag indicates the presence of a meaningful value of the Sequence Number field. When it is set to '0', the Sequence Number field either is not present or, if present, shall not be interpreted. When it is set to '1', the Sequence Number field is present, and shall be interpreted, as described below in this section.

- N-PDU Number flag (PN): This flag indicates the presence of a meaningful value of the N-PDU Number field. When it is set to '0', the N-PDU Number field either is not present, or, if present, shall not be interpreted. When it is set to '1', the N-PDU Number field is present, and shall be interpreted, as described below in this section.

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

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

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

Optional fields:

… Text removed for clarity.

7.1 Message Formats

GTP defines a set of messages between two associated GSNs or an SGSN and an RNC. The 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: Messages in GTP

Message Type value (Decimal)	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	x
2	Echo Response	7.2.2	X	X	x
3	Version Not Supported	7.2.3	X		x
4	Node Alive Request	~~GSM 12.15~~3GPP TS 32.215			X
5	Node Alive Response	~~GSM 12.15~~3GPP TS 32.215			X
6	Redirection Request	~~GSM 12.15~~3GPP TS 32.215			X
7	Redirection Response	~~GSM 12.15~~3GPP TS 32.215			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		
22-25	For future use. Shall not be sent. If received, shall be treated as an Unknown message.				
26	Error Indication	7.3.7		X	
27	PDU Notification Request	7.3.8	X		
28	PDU Notification Response	7.3.9	X		
29	PDU Notification Reject Request	7.3.10	X		
30	PDU Notification Reject Response	7.3.11	X		
31	Supported Extension Headers Notification	7.2.4	X	X	
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	Forward SRNS Context	7.5.13	X		
59	Forward Relocation Complete Acknowledge	7.5.11	X		
60	Forward SRNS Context Acknowledge	7.5.12	X		
61-69	For future use. Shall not be sent. If received, shall be treated as an Unknown message.				
70	RAN Information Relay	7.5.14.1	X		
71-239	For future use. Shall not be sent. If received, shall be treated as an Unknown message.				
240	Data Record Transfer Request	~~GSM~~			X

		~~12.15~~3GPP TS 32.215			
241	Data Record Transfer Response	~~GSM 12.15~~3GPP TS 32.215			**X**
242-254	For future use. Shall not be sent. If received, shall be treated as an Unknown message.				
255	G-PDU	9.3.1		**X**	

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****   END OF MODIFICATION   ****

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****   START OF NEXT MODIFICATION   ****

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7.5.1   Identification Request

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

For Intra Domain Connection of RAN Nodes to Multiple CN Nodes, where the old SGSN belongs to an SGSN pool, the new SGSN cannot in the general case determine the old SGSN. The new SGSN shall in this case send the Identification Request message to an SGSN based on the old RAI, as usual. If an SGSN within an SGSN pool receives an Identification Request message for an MS that has been attached to another SGSN of the same SGSN pool, the SGSN shall include the source IP address of the received Identification Request message in the optional parameter SGSN Address for Control Plane. The Identification Request message is then relayed to the old SGSN, keeping the other parts of the message unchanged. The SGSN within an SGSN pool can determine if the received Identification Request message was meant for itself or for another SGSN of the SGSN pool by looking at the Network Resource Identifier contained in the P-TMSI parameter. See 3GPP TS 23.003 [2] for details on the coding of the P-TMSI and see 3GPP TS 23.236 [1~~8~~9] for details on SGSN pool.

Note that an SGSN relaying the Identification Request message shall not supervise the Identification Response message.

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~~ 3GPP TS 23.060 [4] and 3GPP TS 24.008 [5]. If the MS has provided the P-TMSI Signature, the new SGSN shall include this parameter in the Identification Request message.

The optional Private Extension contains vendor or operator specific information.

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Table 24: Information Elements in an Identification Request

</div>

Information element	Presence requirement	Reference
Routeing Area Identity (RAI)	Mandatory	7.7.3
Packet TMSI	Mandatory	7.7.5
P-TMSI Signature	Conditional	7.7.9
SGSN Address for Control Plane	Optional	7.7.32
Private Extension	Optional	7.7.46

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****   END OF MODIFICATION   ****

</div>

****   START OF NEXT MODIFICATION   ****

7.5.3   SGSN Context Request

The new SGSN shall send an SGSN Context Request to the old SGSN to get the MM and PDP Contexts for the MS.

For Intra Domain Connection of RAN Nodes to Multiple CN Nodes, where the old SGSN belongs to an SGSN pool, the new SGSN cannot in the general case determine the old SGSN. The new SGSN shall in this case send the SGSN Context Request message to an SGSN based on the old RAI, as usual. If an SGSN within an SGSN pool receives an SGSN Context Request message for an MS that has been attached to another SGSN of the same SGSN pool, the SGSN shall relay the SGSN Context Request message unchanged to the old SGSN. The SGSN within an SGSN pool can determine if the received SGSN Context Request message was meant for itself or for another SGSN of the SGSN pool by looking at the Network Resource Identifier contained in the P-TMSI parameter, or alternatively in the TLLI parameter. See 3GPP TS 23.003 [2] for details on the coding of the P-TMSI and see 3GPP TS 23.236 [1~~8~~9] for details on SGSN pool.

Note that an SGSN relaying the SGSN Context Request message shall not supervise the SGSN Context Response message.

 The MS is identified in the old SGSN by its old RAI and old TLLI/old P-TMSI values. The TLLI/P-TMSI and RAI is a foreign TLLI/P-TMSI and an RAI in the old SGSN. Exactly one of the TLLI, P-TMSI or IMSI information fields shall be present.

The old SGSN responds with an SGSN Context Response.

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

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

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

The P-TMSI Signature is conditionally provided by the MS to the new SGSN for identification checking purposes as defined in ~~GSM~~ 3GPP TS 23.060 [4] and 3GPP TS 24.008 [5]. If the MS has provided the P-TMSI Signature, the new SGSN shall include this parameter in the SGSN Context Request message.

The optional Private Extension contains vendor or operator specific information.

Table 26: Information Elements in a SGSN Context Request

Information element	Presence requirement	Reference
IMSI	Conditional	7.7.2
Routeing Area Identity (RAI)	Mandatory	7.7.3
Temporary Logical Link Identifier (TLLI)	Conditional	7.7.4
Packet TMSI (P-TMSI)	Conditional	7.7.5
P-TMSI Signature	Conditional	7.7.9
MS Validated	Optional	7.7.10
Tunnel Endpoint Identifier Control Plane	Mandatory	7.7.14
SGSN Address for Control Plane	Mandatory	7.7.32
Private Extension	Optional	7.7.46

****   END OF MODIFICATION   ****

CR-Form-v7

CHANGE REQUEST

| ⌘ | **29.060** CR **402** | ⌘**rev** **2** ⌘ | Current version: | **5.4.0** ⌘ |

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

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

Title:	⌘	IPv4 and IPv6 form of Charging Gateway Address	
Source:	⌘	CN4	
Work item code:⌘	TEI5	*Date:* ⌘	14.02.2003
Category:	⌘ **F**	*Release:* ⌘	Rel-5

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

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

Reason for change:	⌘	Since in the mobile packet data networks contain in many cases GSN and CG nodes manufactured by different vendors and belonging to different product releases, part of the nodes can be equipped solely with IPv4 stacks while some others may have both IPv6 stack and IPv4 stack. A message sending node does not necessarily know beforehand with which kind of IPv4/IPv6 support all the other nodes' charging interfaces have. Therefore, the only safe way here is to not assume that all the other packet data nodes with a charging interface support exactly the same one IP version that the message sending node does. Example: A GGSN can inform SGSN by a Create PDP Context Response message the Charging Gateway Address, so that SGSN could later use it when it communicates via the Ga interface directly. If GGSN could only pass the IPv4 or the IPv6 address to the SGSN, there would be problem if the SGSN does not support in its own IP stack towards the CG the one IP adderss form got from the GGSN. The SGSNs can also change during the PDP Context, and the CG address information should have two forms when passed, to enable problem free co-existence of IPv6 and IPv4 stacks in the packet domain.
Summary of change:	⌘	By adding an optional information element to these messages, both IPv4 and IPv6 addresses can be supported simultaneously, which enables harmonious co-existence of IPv4 and IPv6 stacks in the packet data charging interfaces. It is notable that this amendment does not require any node to support a specific stack (like IPv6) but it just enables that those nodes who have such capability, are allowed to communicate in the way the network operator chooses .
Consequences if not approved:	⌘	If there are e.g. nodes that support only IPv4 in the charging interfaces, then problems can arise if such nodes receives only information about an IPv6 address of a node to communicate with. Also, without the possibility of

		advertising 2 address formats, it could be difficult to use IPv6 stacks in a (possibly multi-vendor) network if the existing network has IPv4-only nodes.

Clauses affected:	⌘	7.3.2, 7.3.4		

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

Other comments:	⌘		

How to create CRs using this form:

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

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

7.3.2   Create PDP Context Response

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

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

- "Request Accepted".

- "No resources available".

- "All dynamic PDP addresses are occupied".

- "No memory is available".

- "Missing or unknown APN".

- "Unknown PDP address or PDP type".

- "User authentication failed".

- "System failure".

- "Semantic error in the TFT operation".

- "Syntactic error in the TFT operation".

- "Semantic errors in packet filter(s)".

- "Syntactic errors in packet filters(s)".

- "Mandatory IE incorrect".

- "Mandatory IE missing".

- "Optional IE incorrect".

- "Invalid message format".

- "PDP context without TFT already activated"

'No resources available' indicates e.g. that all dynamic PDP addresses are occupied or no memory is available. 'Missing or unknown APN' indicates e.g. when the GGSN does not support the Access Point Name. 'Unknown PDP address or PDP type' indicates e.g. when the GGSN does not support the PDP type or the PDP address.
'User authentication failed' indicates that the external packet network has rejected the service requested by the user.
'PDP context without TFT already activated' indicates that a PDP context has already been activated without a TFT for that MS.

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, Charging Gateway Address, Tunnel Endpoint Identifier Control Plane and Private Extension, are mandatory if the Cause contains the value 'Request accepted'.

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

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

when it receives any message with its assigned Tunnel Endpoint Identifier Control Plane in the GTP header from the SGSN.

The GGSN shall include a GGSN Address for control plane and a GGSN address for user traffic, which may differ from that provided by the underlying network service (e.g. IP).

If the Create PDP Context Request received from the SGSN included IPv6 SGSN address, an IPv4/IPv6 capable GGSN shall include IPv6 addresses in the fields GGSN Address for Control Plane and GGSN Address for user traffic, and IPv4 addresses in the fields Alternative GGSN Address for Control Plane and Alternative GGSN Address for user traffic. If SGSN included only an IPv4 SGSN address in the request, IPv4/IPv6 capable GGSN shall include IPv4 addresses in the fields GGSN Address for Control Plane and GGSN Address for user traffic, and IPv6 addresses in the fields Alternative GGSN Address for Control Plane and Alternative GGSN Address for user traffic. The SGSN shall store these GGSN Addresses and use one set of them when sending control plane on this GTP tunnel or G-PDUs to the GGSN for the MS.

If the MS requests a dynamic PDP address with the PDP Type IPv4 or IPv6 and a dynamic PDP address is allowed, then the End User Address information element shall be included and the PDP Address field in the End User Address information element shall contain the dynamic PDP Address allocated by the GGSN.

If the MS requests a static PDP address with the PDP Type IPv4 or IPv6, or a PDP address is specified with PDP Type PPP, then the End User Address information element shall be included and the PDP Address field shall not be included.

The PDP address in End User Address IE and in the Protocol configuration options IE shall be the same, if both IEs are present in the create PDP context response.

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

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

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

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

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

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

The Alternative Charging Gateway Address IE has a similar purpose as the Charging Gateway Address but enables co-existence of IPv4 and IPv6 stacks in the Ga charging interfaces, without mandating any node to have a dual stack. The format of the optional Alternative Charging Gateway Address information element is the same as the format of the Charging Gateway Address.

When both these addresses are present, the Charging Gateway address IE shall contain the IPv4 address of the Charging Gateway Function and the Alternative Charging Gateway address IE shall contain the IPv6 address of the Charging Gateway Function.

NOTE: The Charging Gateway Address and Alternative Charging Gateway Address both refer to the same Charging Gateway Function.

The optional Private Extension contains vendor or operator specific information.

The Protocol Configuration Options (PCO) information element may be included in the response when the GGSN provides the MS with application specific parameters.

Table 6: Information Elements in a Create PDP Context Response

Information element	Presence requirement	Reference
Cause	Mandatory	7.7.1
Reordering required	Conditional	7.7.6
Recovery	Optional	7.7.11
Tunnel Endpoint Identifier Data I	Conditional	7.7.13
Tunnel Endpoint Identifier Control Plane	Conditional	7.7.14
Charging ID	Conditional	7.7.26
End User Address	Conditional	7.7.27
Protocol Configuration Options	Optional	7.7.31
GGSN Address for Control Plane	Conditional	GSN Address 7.7.32
GGSN Address for user traffic	Conditional	GSN Address 7.7.32
Alternative GGSN Address for Control Plane	Conditional	GSN Address 7.7.32
Alternative GGSN Address for user traffic	Conditional	GSN Address 7.7.32
Quality of Service Profile	Conditional	7.7.34
Charging Gateway Address	Optional	7.7.44
Alternative Charging Gateway Address	Optional	7.7.44
Private Extension	Optional	7.7.46

******* *Next Modification* *******

7.3.4   Update PDP Context Response

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

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

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

Possible Cause values are:

- 'Request Accepted'.

- 'Non-existent'.

- 'Service not supported'.

- 'System failure'.

- 'Semantic error in the TFT operation'.

- 'Syntactic error in the TFT operation'.

- 'Semantic errors in packet filter(s)'.

- 'Syntactic errors in packet filters(s)'.

- 'Mandatory IE incorrect'.

- 'Mandatory IE missing'.

- 'Optional IE incorrect'.

- 'Invalid message format'.

The Tunnel Endpoint Identifier Data field specifies an uplink Tunnel Endpoint Identifier for G-PDUs that is chosen by the GGSN. The SGSN shall include this Tunnel Endpoint Identifier in the GTP header of all subsequent uplink G-PDUs that are related to the requested PDP context. This information element shall be included if the Cause contains the value 'Request accepted'.

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

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

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

The GGSN shall include a GGSN address for user traffic, which may differ from that provided by the underlying network service (e.g. IP). IPv4/IPv6 capable GGSN shall include both its IP version addresses. If the Update PDP Context Request received from the SGSN included IPv6 SGSN addresses, an IPv4/IPv6 capable GGSN shall include an IPv6 address in the field GGSN Address for User Traffic and a corresponding IPv4 address in the field Alternative GGSN Address for User Traffic. If SGSN included only an IPv4 SGSN address in the request, IPv4/IPv6 capable GGSN shall include IPv4 address for user traffic in the field GGSN Address for User Traffic and IPv6 address in the field Alternative GGSN Address for User Traffic. The SGSN shall store the GGSN Addresses and use one of them when sending 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 also include a GGSN address for control plane, which shall not differ from that provided at PDP context setup time and shall remain unchanged for the lifetime of the PDP context. If the Update PDP Context Request received from the SGSN included IPv6 SGSN addresses, an IPv4/IPv6 capable GGSN shall include an IPv6 address in the field GGSN Address for Control Plane and a corresponding IPv4 address in the field Alternative GGSN Address for Control Plane. If SGSN included only an IPv4 SGSN address in the request, IPv4/IPv6 capable GGSN shall include IPv4 address for Control plane in the field GGSN Address for Control Plane and IPv6 address for Control plane in the field Alternative GGSN Address for Control Plane.

The GGSN Address for control plane and the GGSN Address for user traffic shall be included if the Cause contains the value 'Request accepted'. The Alternative GGSN Addresses shall be included if the GGSN supports IPv6 below GTP and the Cause contains the value 'Request accepted'.

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

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

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

The Alternative Charging Gateway Address IE has a similar purpose as the Charging Gateway Address but enables co-existence of IPv4 and IPv6 stacks in the Ga charging interfaces, without mandating any node to have a dual stack. The format of the optional Alternative Charging Gateway Address information element is the same as the format of the Charging Gateway Address.

When both these addresses are present, the Charging Gateway address IE shall contain the IPv4 address of the Charging Gateway Function and the Alternative Charging Gateway address IE shall contain the IPv6 address of the Charging Gateway Function.

NOTE: The Charging Gateway Address and Alternative Charging Gateway Address both refer to the same Charging Gateway Function.

The optional Private Extension contains vendor or operator specific information.

The GGSN includes the Protocol Configuration Options (PCO) information element in the response if the GGSN wishes to provide the MS with application specific parameters.

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

Information element	Presence requirement	Reference
Cause	Mandatory	7.7.1
Recovery	Optional	7.7.11
Tunnel Endpoint Identifier Data I	Conditional	7.7.13
Tunnel Endpoint Identifier Control Plane	Conditional	7.7.14
Charging ID	Conditional	7.7.26
Protocol Configuration Options	Optional	7.7.31
GGSN Address for Control Plane	Conditional	GSN Address 7.7.32
GGSN Address for User Traffic	Conditional	GSN Address 7.7.32
Alternative GGSN Address for Control Plane	Conditional	GSN Address 7.7.32
Alternative GGSN Address for User Traffic	Conditional	GSN Address 7.7.32
Quality of Service Profile	Conditional	7.7.34
Charging Gateway Address	Optional	7.7.44
Alternative Charging Gateway Address	Optional	7.7.44
Private Extension	Optional	7.7.46

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 if the associated Update PDP Context Request was sent only to re-negotiate the QoS of a PDP context. Furthermore if the associated Update PDP Context Request included an 'End User Address' information element the GGSN shall delete the PDP context using the Delete PDP Context procedure and may notify the Operation and Maintenance network element.

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. When the optional IMSI IE value differs from the IMSI IE value associated to the PDP context, the SGSN shall respond using the cause value 'Non-existent'.

The SGSN includes the Protocol Configuration Options (PCO) information element in the response if the MS wishes to provide the GGSN with application specific parameters. The SGSN includes this IE in the Update PDP Context Response message if the associated Modify PDP Context Accept message from the MS includes protocol configuration options. The SGSN shall copy the content of this IE transparently from the content of the PCO IE in the Modify PDP Context Accept message.

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

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

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

Information element	Presence requirement	Reference
Cause	Mandatory	7.7.1
Recovery	Optional	7.7.11
Protocol Configuration Options	Optional	7.7.31
Quality of Service Profile	Conditional	7.7.34
Private Extension	Optional	7.7.46