3GPP TSG CN
Nice, France, 13 -15 December 1999

***Document* NP-99486**
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	032	Current Version:	3.2.0

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

For submission to:	CN#06	for approval	X	strategic	X	*(for SMG use only)*
list expected approval meeting # here ↑		for information		non-strategic		

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: Nokia **Date:** 2.12.1999

Subject: Improving charging efficiency

Work item:

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

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

Reason for change:

Normally, the SGSN and the GGSN collect charging information on MSs which they are serving. The SGSN collects charging information for each attached MS and for each active PDP context. The GGSN collects charging information for each active PDP context.

Alternative charging mechanisms, such as prepaid or flat rate billing, do not require generating charging information (CDRs) in the SGSN and in the GGSN. Sending CDRs for such MSs and/or PDP contexts to Charging Gateway Functionality increases load in the communication channel.

This CR introduces a method of decreasing the load in the communication channel. CDRs may not be sent for MSs and/or PDP contexts which are not liable for charging. If the feature is not supported in the SGSN and in the GGSN, the SGSN and the GGSN will send CDRs normally. It is operator-specific whether charging information is collected for those MSs and/or PDP contexts which are not liable for charging. For roaming subscribers, CDRs should be generated.

At attach or at inter-SGSN routing area update, the packet domain subscription data is transferred to the SGSN. The packet domain subscription data includes the subscribed charging characteristics. When creating a PDP context or when updating the PDP context, the SGSN copies the charging characteristics of the PDP context from the subscribed charging characteristics. At inter-SGSN routing area update, the subscribed charging characteristics are transferred from the old SGSN to the new SGSN in the MM context.

Clauses affected:

Other specs affected:

Other 3G core specifications	X	→ List of CRs:	23.060, 29.002
Other GSM core specifications		→ List of CRs:	
MS test specifications		→ List of CRs:	
BSS test specifications		→ List of CRs:	

O&M specifications → List of CRs:

Other comments:


help.doc

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

7.5.1 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 Flow Label Data I field specifies a downlink flow label for G-PDUs which is chosen by the SGSN. The GGSN shall include this flow label in the GTP header of all subsequent downlink G-PDUs which are related to the requested PDP context.

The Flow Label Signalling field specifies a downlink flow label for signalling messages which is chosen by the SGSN. The GGSN shall include this flow label in the GTP header of all subsequent downlink signalling messages which are related to the requested PDP context.

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.

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

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

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

The SGSN shall copy Charging Characteristics from the Subscribed Charging Characteristics in the Packet Domain Subscription Data.

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
Quality of Service Profile	Mandatory	7.9.6
Recovery	Optional	7.9.14
Selection mode	Mandatory	7.9.15
Flow Label Data I	Mandatory	7.9.16
Flow Label Signalling	Mandatory	7.9.17
MSISDN	Mandatory	
End User Address	Mandatory	7.9.20
Access Point Name	Mandatory	7.9.23
Protocol Configuration Options	Optional	7.9.24
SGSN Address for signalling	Mandatory	GSN Address 7.9.25
SGSN Address for user traffic	Mandatory	GSN Address 7.9.25
Charging Characteristics	Optional	7.9.XX
Private Extension	Optional	7.9.27

< next modified section>

7.5.3 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 Flow Label Data I field specifies a downlink flow label for G-PDUs which is chosen by the SGSN. The GGSN shall include this flow label in the GTP header of all subsequent downlink G-PDUs which are related to the requested PDP context.

The Flow Label Signalling field specifies a downlink flow label for signalling messages which is chosen by the SGSN. The GGSN shall include this flow label 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 SGSN shall copy Charging Characteristics from the Subscribed Charging Characteristics in the Packet Domain Subscription Data.

The optional Private Extension contains vendor or operator specific information.

Table 6: Information elements in an Update PDP Context Request

Information element	Presence requirement	Reference
Quality of Service Profile	Mandatory	7.9.6
Recovery	Optional	7.9.14
Flow Label Data I	Mandatory	7.9.16
Flow Label Signalling	Mandatory	7.9.17
SGSN Address for signalling	Mandatory	GSN Address 7.9.25
SGSN Address for user traffic	Mandatory	GSN Address 7.9.25
Charging Characteristics	Optional	7.9.XX
Private Extension	Optional	7.9.27

< next modified section>

7.9.XX Charging Characteristics

The Charging Characteristics information element indicates which kind of charging a PDP context is liable for. The N flag indicates normal charging, the P flag indicates prepaid charging, the F flag indicates flat rate charging and the H flag indicates charging by hot billing. One or more of the flags shall be set according to the subscribed charging characteristics received from HLR as part of the packet domain subscription data.

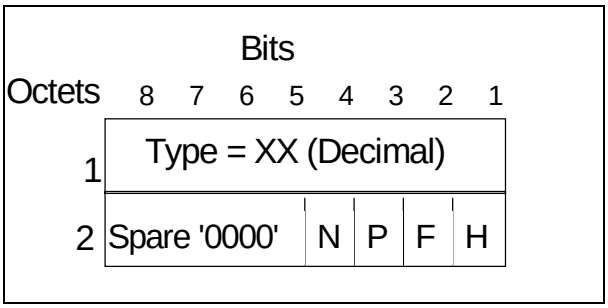

Figure XX: Charging Characteristics information element