Source: **TSG SA WG2**
Title: **CRs on 23.060 (PS domain Stage 2)**
Agenda Item: **7.2.3**

The following Change Requests (CRs) have been approved by TSG SA WG2 and are requested to be approved by TSG SA plenary #25.
Note: the source of all these CRs is now S2, even if the name of the originating company(ies) is still reflected on the cover page of all the attached CRs.

S2 doc #	Title	Spec	CR #	cat	Version in	Rel	WI	S2 meeting	Clauses affected
S2-042764	Correction for DTM	23.060	507	F	5.8.0	5	TEI	S2 #41	3.2
S2-042765	Correction for DTM	23.060	508	A	6.5.0	6	TEI	S2 #41	3.2
S2-042904	Correction to the Network-Requested PDP Context Activation Procedure	23.060	504r2	F	6.5.0	6	TEI	S2 #41	9.2.2.2.2
S2-042807	Correction to the term of PDP Configuration Options	23.060	506r1	D	6.5.0	6	TEI	S2 #41	9.2.2.1, 9.2.2.1.1, 9.2.3.3
S2-042578	Introduction of Network Sharing	23.060	510r1	B	6.5.0	6	NTShar	S2 #41	2, 5

3GPP TSG-SA WG2 Meeting #41
Montreal, Canada, 16-20 August 2004

Tdoc S2-042904
Revised S2-042806, S2-042652

CR-Form-v7.1

CHANGE REQUEST

23.060	CR	504	rev	2	Current version:	6.5.0

*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 to the Network-Requested PDP Context Activation Procedure
Source:	SA2(Huawei, China Mobile)
Work item code:	TEI
Date:	19/08/2004
Category:	F
Release:	Rel-6

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:

Ph2	*(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)*
Rel-7	*(Release 7)*

Reason for change:	In the Unsuccessful Network-Requested PDP Context Activation Procedure, it is unclear that the MNRG flag is set for all PDP addresses for the MS.
Summary of change:	Clarify that the MNRG flag is set for all PDP addresses for the MS in the Unsuccessful Network-Requested PDP Context Activation Procedure.
Consequences if not approved:	It will make confusion in implementation. The usage of MNRG flag is not consistent in the GGSN.

Clauses affected:	9.2.2.2.2

	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.

<< Begin of change >>

9.2.2.2.2 Unsuccessful Network-Requested PDP Context Activation Procedure

If the PDP context requested by the GGSN cannot be established, the SGSN sends a PDU Notification Response (Cause) or a PDU Notification Reject Request (IMSI, PDP Type, PDP Address, Cause) message to the GGSN depending on if the context activation fails before or after the SGSN has sent a Request PDP Context Activation message to the MS. Cause indicates the reason why the PDP context could not be established:

- "IMSI Not Known". The SGSN has no MM context for that IMSI (Cause in PDU Notification Response).
- "MS GPRS Detached". The MM state of the MS is IDLE (Cause in PDU Notification Response).
- "MS Not GPRS Responding". The MS is GPRS-attached to the SGSN but the MS does not respond. This may be due to the lack of a response to a GPRS Paging Request, due to an Abnormal RLC condition, or due to no Activate PDP Context Request message received within a certain time after the Request PDP Context Activation message was delivered to the MS (Cause in PDU Notification Reject Request).
- "MS Refuses". The MS refuses explicitly the network-requested PDP context (Cause in PDU Notification Reject Request).

When receiving the PDU Notification Response or the PDU Notification Reject Request message, the GGSN may reject or discard the PDP PDU depending on the PDP type.

After an unsuccessful Network-Requested PDP Context Activation procedure the network may perform some actions to prevent unnecessary enquires to the HLR. The actions taken depend on the cause of the delivery failure.

- If the MS is not reachable or if the MS refuses the PDP PDU (Cause value "MS Not GPRS Responding" or "MS Refuses"), the SGSN shall not change the setting of MNRG for this MS. The GGSN may refuse any PDP PDU for that PDP address during a certain period. The GGSN may store the SGSN address during a certain period and send subsequent PDU Notification Request messages to that SGSN.
- If the MS is GPRS-detached or if the IMSI is not known in the SGSN (Cause value "MS GPRS Detached" or "IMSI Not Known"), the SGSN, the GGSN, and the HLR may perform the Protection and Mobile User Activity procedures.

The Protection procedure is illustrated in Figure 68.

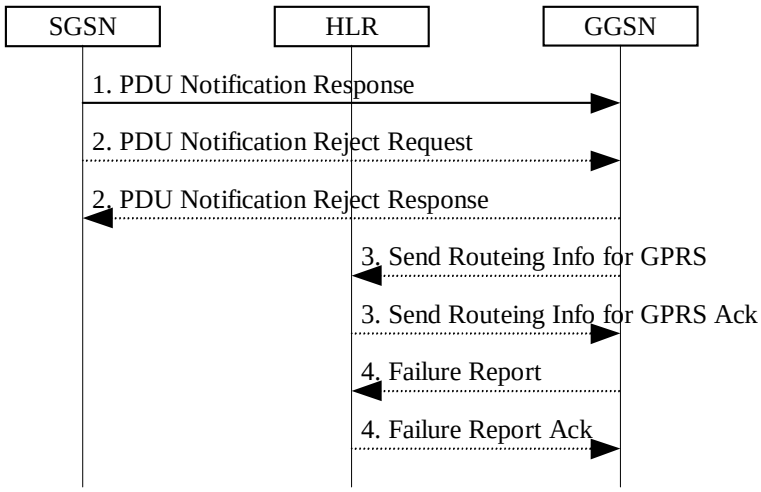

Figure 68: Protection Procedure

1) If the MM context of the mobile is IDLE or if the SGSN has no information about that user, the SGSN returns a PDU Notification Response (Cause) message to the GGSN with Cause equal to "MS GPRS Detached" or "IMSI Not Known". Otherwise, the Cause shall be "Activation Proceeds". If the Cause is "MS GPRS Detached" or "IMSI Not Known" and if the SGSN has an MM context for that user, the SGSN sets MNRG to indicate the need to report to the HLR when the next contact with that MS is performed.

2) If the MS does not respond or refuses the activation request, the SGSN sends a PDU Notification Reject Request (IMSI, PDP Type, PDP Address, Cause) message to the GGSN with Cause equal to "MS Not GPRS Responding" or "MS Refuses". The GGSN returns a PDU Notification Reject Response message to the SGSN.

3) If Cause equals "IMSI Not Known", the GGSN may send Send Routeing Information for GPRS (IMSI) message to the HLR. The HLR returns Send Routeing Information for GPRS Ack (IMSI, SGSN Address, Cause) message to the GGSN indicating the address of the SGSN that currently serves the MS. If SGSN Address is different from the one previously stored by the GGSN, then steps 3, 4, and 5 in Figure 67 are followed.

4) If SGSN Address is the same as the one previously stored in the GGSN, or if the Cause value returned in step 1 equals "MS GPRS Detached", then the GGSN sets MNRG for ~~that~~ all PDP address(es) for that MS and sends a Failure Report (IMSI, GGSN Number, GGSN Address) message to the HLR to request MNRG to be set in the HLR. The HLR sets (if not already set) MNRG for the IMSI and adds GGSN Number and GGSN Address to the list of GGSNs to report to when activity from that IMSI is detected. GGSN Number is either the number of the GGSN, or, if a protocol-converting GSN is used as an intermediate node, the number of the protocol-converting GSN. GGSN Address is an optional parameter that shall be included if a protocol-converting GSN is used.

The Mobile User Activity procedure is illustrated in Figure 69.

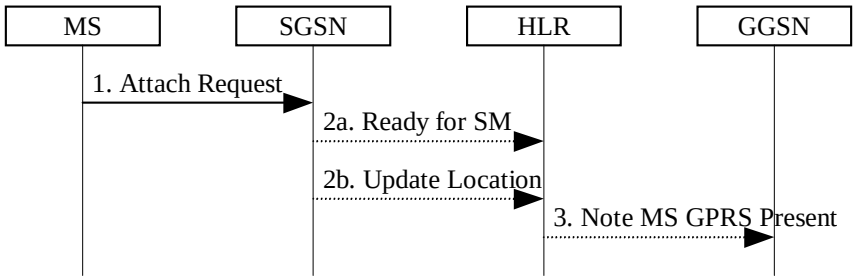

Figure 69: Mobile User Activity Procedure

1) The SGSN receives an indication that an MS is reachable, e.g., an Attach Request message from the MS.

2a) If the SGSN contains an MM context of the MS and MNRG for that MS is set, the SGSN shall send a Ready for SM (IMSI, MS Reachable) message to the HLR and clears MNRG for that MS.

2b) If the SGSN does not keep the MM context of the MS, the SGSN shall send an Update Location message (see subclause "GPRS Attach Function") to the HLR.

3) When the HLR receives the Ready for SM message or the Update Location message for an MS that has MNRG set, it clears MNRG for that MS and sends a Note MS GPRS Present (IMSI, SGSN Address) message to all the GGSNs in the list of the subscriber. (The Ready for SM message also triggers the SMS alert procedure as described in subclause "Unsuccessful Mobile-terminated SMS Transfer".) SGSN Address field is the address of the SGSN that currently serves the MS. Upon reception of Note MS Present each GGSN shall clear MNRG.

<< End of change >>

3GPP TSG-SA WG2 Meeting #41
Montreal, Canada, 16-20 August 2004

Tdoc ⌘S2-042807
Revised S2-042654

CR-Form-v7.1

CHANGE REQUEST

⌘ **23.060** **CR** **506** ⌘ **rev** **1** ⌘ Current version: **6.5.0** ⌘

*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 to the term of PDP Configuration Options
Source:	⌘	SA2 (Huawei, China Mobile)
Work item code:	⌘	TEI
Date:	⌘	16/08/2004
Category:	⌘	**D**
Release:	⌘	Rel-6

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:

Ph2	*(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)*
Rel-7	*(Release 7)*

Reason for change:	⌘	In the TS 23.060, the term of ìPDP Configuration Optionsî is used in several procedures, i.e., the PDP Context Activation Procedure, the Secondary PDP Context Activation Procedure and the MS-Initiated PDP Context Modification Procedure. However, in the stage 3 specification TS 24.008, it is the ìProtocol Configuration Optionsî instead of ìPDP Configuration Optionsî present in the Activate PDP Context Request message and Modify PDP context request message. Also, according to the explanation of PDP Configuration Options, it is used to transfer optional PDP parameters and/or requests to the GGSN/UE, which is similar to the definition of ìProtocol Configuration Optionsî. Therefore, the term of ìPDP Configuration Optionsî should be ìProtocol Configuration Optionsî.
Summary of change:	⌘	Change the ìPDP Configuration Optionsî to the ìProtocol Configuration Optionsî in TS 23.060.
Consequences if not approved:	⌘	It will cause confusion to readers and make inconsistence between TS 23.060 and TS 24.008.

Clauses affected:	⌘	9.2.2.1, 9.2.2.1.1, 9.2.3.3

		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.

< Modification 1 >

9.2.2.1 PDP Context Activation Procedure

The PDP Context Activation procedure is illustrated in Figure 63 and Figure 64.

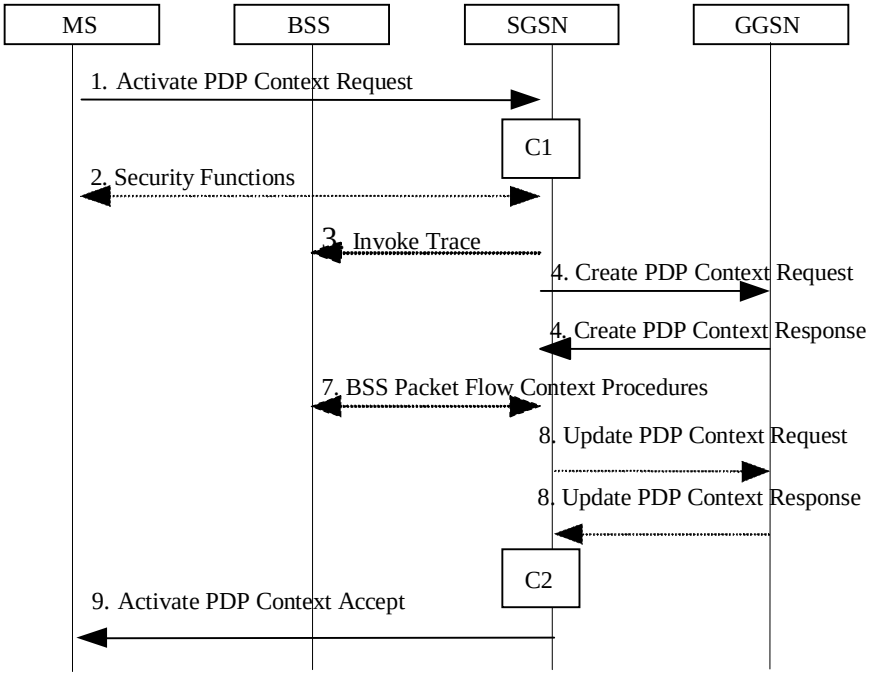

Figure 63: PDP Context Activation Procedure for A/Gb mode

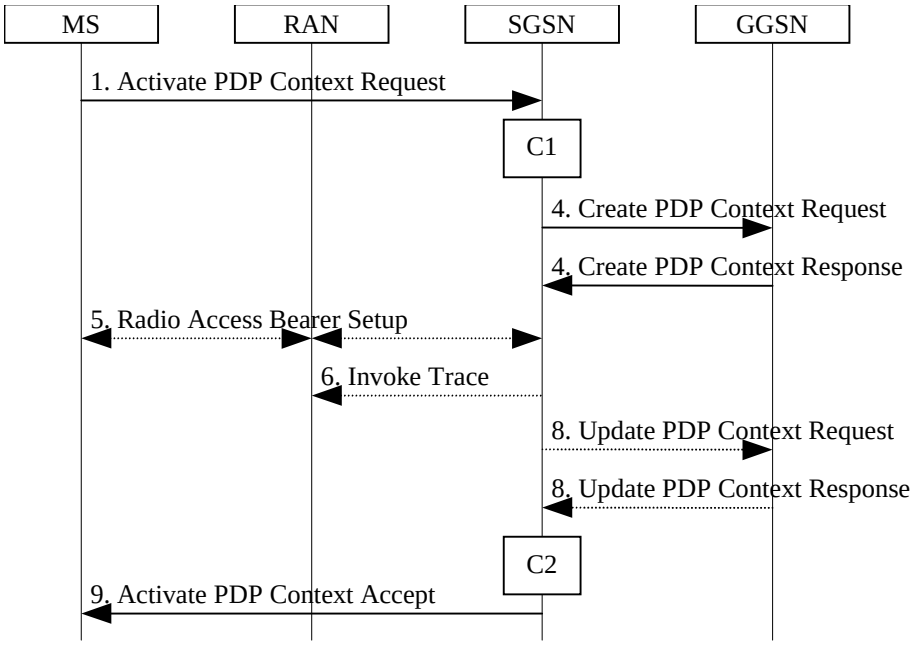

Figure 64: PDP Context Activation Procedure for Iu mode

1) The MS sends an Activate PDP Context Request (NSAPI, TI, PDP Type, PDP Address, Access Point Name, QoS Requested, ~~PDP~~Protocol Configuration Options) message to the SGSN. The MS shall use PDP Address to indicate whether it requires the use of a static PDP address or whether it requires the use of a dynamic PDP address. The MS shall leave PDP Address empty to request a dynamic PDP address. The MS may use Access

Point Name to select a reference point to a certain packet data network and/or to select a service. Access Point Name is a logical name referring to the packet data network and/or to a service that the subscriber wishes to connect to. QoS Requested indicates the desired QoS profile. ~~PDP~~Protocol Configuration Options may be used to transfer optional PDP parameters and/or request to the GGSN (see GSM 29.060 [26] and 24.229 [75]). ~~PDP~~Protocol Configuration Options is sent transparently through the SGSN.

If the SGSN has stored a value for the Maximum APN restriction and the value indicates the most restrictive type, then the SGSN shall reject any Activate PDP Context requests to a different APN, using the PDP Context Activation Reject message including an appropriate error cause.

2) In A/Gb mode, security functions may be executed. These procedures are defined in clause "Security Function".

3) In A/Gb mode and if BSS trace is activated, the SGSN shall send an Invoke Trace (Trace Reference, Trace Type, Trigger Id, OMC Identity) message to the BSS. Trace Reference, and Trace Type are copied from the trace information received from the HLR or OMC.

4) The SGSN validates the Activate PDP Context Request using PDP Type (optional), PDP Address (optional), and Access Point Name (optional) provided by the MS and the PDP context subscription records. The validation criteria, the APN selection criteria, and the mapping from APN to a GGSN are described in annex A.

If no GGSN address can be derived or if the SGSN has determined that the Activate PDP Context Request is not valid according to the rules described in annex A, the SGSN rejects the PDP context activation request.

If a GGSN address can be derived, the SGSN creates a TEID for the requested PDP context. If the MS requests a dynamic address, the SGSN lets a GGSN allocate the dynamic address. The SGSN may restrict the requested QoS attributes given its capabilities and the current load, and it shall restrict the requested QoS attributes according to the subscribed QoS profile.

The SGSN sends a Create PDP Context Request (PDP Type, PDP Address, Access Point Name, QoS Negotiated, TEID, NSAPI, MSISDN, Selection Mode, Charging Characteristics, Trace Reference, Trace Type, Trigger Id, OMC Identity, ~~PDP~~Protocol Configuration Options, serving network identity, Maximum APN Restriction IMEISV, CGI/SAI, RAT type, S-CDR CAMEL information) message to the affected GGSN. The SGSN shall send the serving network identity to the GGSN. Access Point Name shall be the APN Network Identifier of the APN selected according to the procedure described in Annex A. PDP Address shall be empty if a dynamic address is requested. The GGSN may use Access Point Name to find a packet data network and optionally to activate a service for this APN. Selection Mode indicates whether a subscribed APN was selected, or whether a non-subscribed APN sent by an MS or a non-subscribed APN chosen by the SGSN was selected. Selection Mode is set according to Annex A. The GGSN may use Selection Mode when deciding whether to accept or reject the PDP context activation. For example, if an APN requires subscription, the GGSN is configured to accept only the PDP context activation that requests a subscribed APN as indicated by the SGSN with Selection Mode. Charging Characteristics indicates which kind of charging the PDP context is liable for. The charging characteristics on the GPRS subscription and individually subscribed APNs as well as the way the SGSN handles Charging Characteristics and chooses to send them or not to the GGSN is defined in 3GPP TS 32.215 [70]. The SGSN shall include Trace Reference, Trace Type, Trigger Id, and OMC Identity if GGSN trace is activated. The SGSN shall copy Trace Reference, Trace Type, and OMC Identity from the trace information received from the HLR or OMC. The Maximum APN Restriction denotes the most stringent restriction as required by any already active PDP contexts. If there are no already active PDP contexts, this value is set to the least restrictive type (see subcluase 15.4). If the GGSN receives the Maximum APN Restriction, then the GGSN shall check if the Maximum APN Restiction value does not conflict with the APN Restriction value associated with this PDP context request. If there is no conflict the request shall be allowed, otherwise the request shall be rejected with the SGSN sending a PDP Context Activation Reject Message to the MS including an appropriate error cause.

The GGSN creates a new entry in its PDP context table and generates a Charging Id. The new entry allows the GGSN to route PDP PDUs between the SGSN and the packet data network, and to start charging. The way the GGSN handles Charging Characteristics that it may have received from the SGSN is defined in 3GPP TS 32.215 [70]. The GGSN may restrict QoS Negotiated given its capabilities and the current load. The GGSN then returns a Create PDP Context Response (TEID, PDP Address, ~~PDP~~Protocol Configuration Options, QoS Negotiated, Charging Id, Prohibit Payload Compression, APN Restriction, Cause) message to the SGSN. The Prohibit Payload Compression indicates that the SGSN should negotiate no data compression for this PDP context. PDP Address is included if the GGSN allocated a PDP address. If the GGSN has been configured by the operator to use External PDN Address Allocation for the requested APN, PDP Address shall be set to 0.0.0.0, indicating that the PDP address shall be negotiated by the MS with the external PDN after completion of the

PDP Context Activation procedure. The GGSN shall relay, modify and monitor these negotiations as long as the PDP context is in ACTIVE state, and use the GGSN-Initiated PDP Context Modification procedure to transfer the currently used PDP address to the SGSN and the MS. ~~PDP~~Protocol Configuration Options contain optional PDP parameters that the GGSN may transfer to the MS. These optional PDP parameters may be requested by the MS in the Activate PDP Context Request message, or may be sent unsolicited by the GGSN. ~~PDP~~Protocol Configuration Options is sent transparently through the SGSN. The Create PDP Context messages are sent over the backbone network.

If QoS Negotiated received from the SGSN is incompatible with the PDP context being activated, the GGSN rejects the Create PDP Context Request message. The GGSN operator configures the compatible QoS profiles.

If an APN Restriction is received from the GGSN for this PDP Context, then the SGSN shall store this value for the PDP Context and the SGSN shall check this received value with the stored value for the Maximum APN Restriction to ensure there are no conflicts between values. If the consquence of this check results in the PDP context being rejected, the SGSN shall initiate a PDP Context Deactivation and return an appropriate error cause. If the PDP Context is accepted, it shall determine a (new) value for the Maximum APN Restriction. If there is no previously stored value for Maximum APN Restriction, then the Maximum APN Restriction shall be set to the value of the received APN Restriction.

5) In Iu mode, RAB setup is done by the RAB Assignment procedure, see subclause "RAB Assignment Procedure".

6) In Iu mode and if BSS trace is activated, the SGSN shall send an Invoke Trace (Trace Reference, Trace Type, Trigger Id, OMC Identity) message to the RAN. Trace Reference, and Trace Type are copied from the trace information received from the HLR or OMC.

7) In A/Gb mode, BSS packet flow context procedures may be executed. These procedures are defined in clause "BSS Context".

8) In case the QoS attributes have been downgraded in step 7 for A/Gb mode or in step 5 for Iu mode, the SGSN may inform the GGSN about the downgraded QoS attributes by sending an Update PDP Context Request to the affected GGSN. The GGSN confirms the new QoS attributes by sending an Update PDP Context Response to the SGSN.

9) The SGSN inserts the NSAPI along with the GGSN address in its PDP context. If the MS has requested a dynamic address, the PDP address received from the GGSN is inserted in the PDP context. The SGSN selects Radio Priority and Packet Flow Id based on QoS Negotiated, and returns an Activate PDP Context Accept (PDP Type, PDP Address, TI, QoS Negotiated, Radio Priority, Packet Flow Id, ~~PDP~~Protocol Configuration Options) message to the MS. If the MS indicated in the MS Network Capability it does not support BSS packet flow procedures or if the BSS does not support BSS packet flow procedures, then the SGSN shall not include the Packet Flow Id. In A/Gb mode, the QoS Negotiated shall take into account the Aggregate BSS QoS Profile, if any, returned from the BSS. ~~PDP~~Protocol Configuration Options may be used to transfer optional PDP parameters to the UE (see GSM 29.060 [26] and 24.229 [75]). ~~PDP~~Protocol Configuration Options is sent transparently through the SGSN.The SGSN is now able to route PDP PDUs between the GGSN and the MS, and to start charging.

For each PDP Address a different quality of service (QoS) profile may be requested. For example, some PDP addresses may be associated with E-mail that can tolerate lengthy response times. Other applications cannot tolerate delay and demand a very high level of throughput, interactive applications being one example. These different requirements are reflected in the QoS profile. The QoS profile is defined in clause "Quality of Service Profile". If a QoS requirement is beyond the capabilities of a PLMN, the PLMN negotiates the QoS profile as close as possible to the requested QoS profile. The MS either accepts the negotiated QoS profile, or deactivates the PDP context.

After an SGSN has successfully updated the GGSN, the PDP contexts associated with an MS is distributed as shown in clause "Information Storage".

If the PDP Context Activation Procedure fails or if the SGSN returns an Activate PDP Context Reject (Cause, ~~PDP~~Protocol Configuration Options) message, the MS may attempt another activation to the same APN up to a maximum number of attempts.

The CAMEL procedure calls shall be performed, see referenced procedures in 3GPP TS 23.078:

C1) CAMEL_GPRS_PDP_Context_Establishment.

In Figure 63 and Figure 64, procedures return as result "Continue".

C2) CAMEL_GPRS_PDP_Context_Establishment_Acknowledgement.

In Figure 63 and Figure 64, procedures return as result "Continue".

9.2.2.1.1 Secondary PDP Context Activation Procedure

The Secondary PDP Context Activation procedure may be used to activate a PDP context while reusing the PDP address and other PDP context information from an already active PDP context, but with a different QoS profile. Procedures for APN selection and PDP address negotiation are not executed. A unique TI and a unique NSAPI shall identify each PDP context sharing the same 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. The TFT contains attributes that specify an IP header filter that is used to direct data packets received from the interconnected packet data network to the newly activated PDP context.

The Secondary PDP Context Activation procedure may only be initiated after a PDP context is already activated for the same PDP address and APN. The procedure is illustrated in Figure 65 and Figure 66.

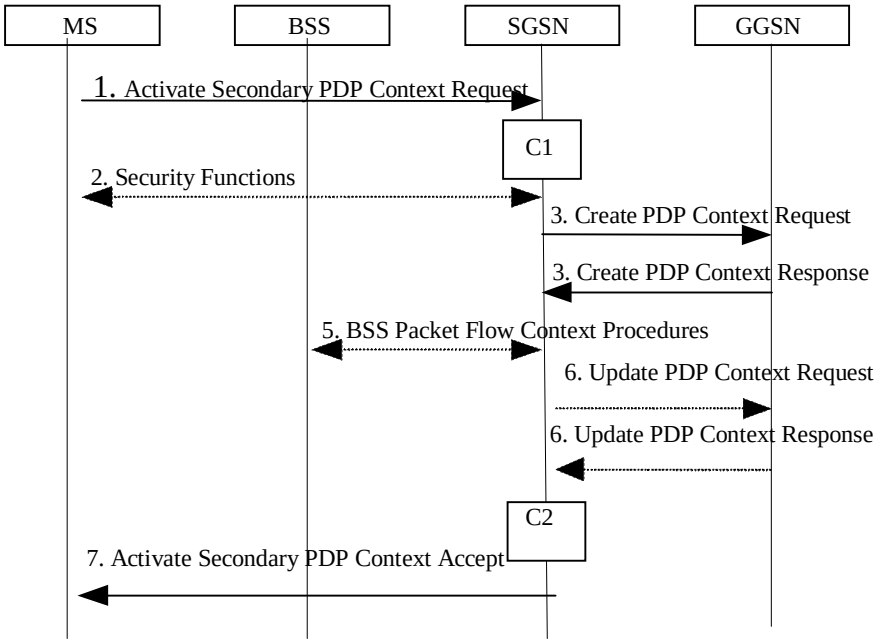

Figure 65: Secondary PDP Context Activation Procedure for A/Gb mode

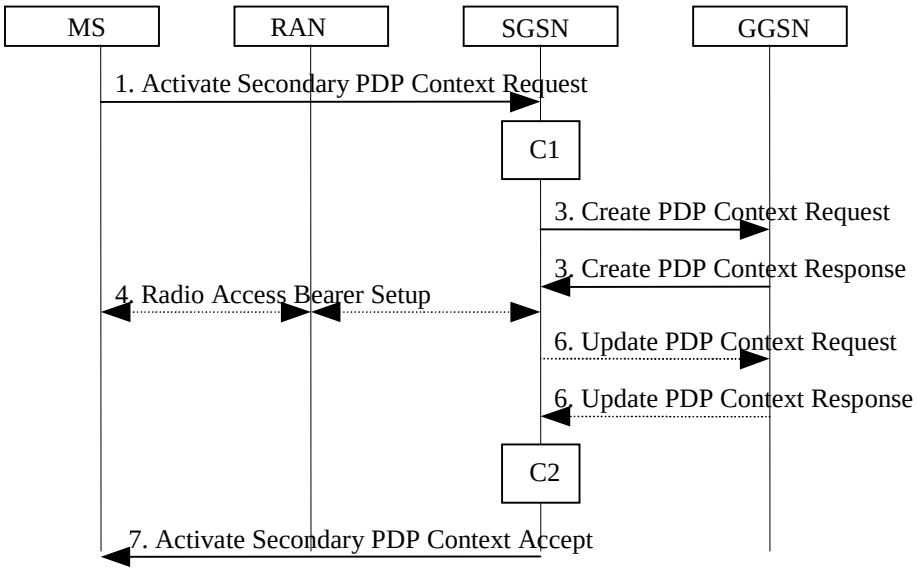

Figure 66: Secondary PDP Context Activation Procedure for Iu mode

1) The MS sends an Activate Secondary PDP Context Request (Linked TI, NSAPI, TI, QoS Requested, TFT, ~~PDP~~Protocol Configuration Options) message to the SGSN. Linked TI indicates the TI value assigned to any one of the already activated PDP contexts for this PDP address and APN. QoS Requested indicates the desired QoS profile. TFT is sent transparently through the SGSN to the GGSN to enable packet classification for downlink data transfer. TI and NSAPI contain values not used by any other activated PDP context. ~~PDP~~Protocol Configuration Options may be used to transfer optional PDP parameters and/or requests to the GGSN (see GSM 29.060 [26] and 24.229 [75]). ~~PDP~~Protocol Configuration Options is sent transparently through the SGSN.

2) In A/Gb mode, security functions may be executed. These procedures are defined in clause "Security Function".

3) The SGSN validates the Activate Secondary PDP Context Request using the TI indicated by Linked TI. The same GGSN address is used by the SGSN as for the already-activated PDP context(s) for that TI and PDP address.

   The SGSN may restrict the requested QoS attributes given its capabilities and the current load, and it shall restrict the requested QoS attributes according to the subscribed QoS profile, which represents the maximum QoS per PDP context to the associated APN. The GGSN may restrict and negotiate the requested QoS as specified in clause "PDP Context Activation Procedure". The SGSN sends a Create PDP Context Request (QoS Negotiated, TEID, NSAPI, Primary NSAPI, TFT, ~~PDP~~Protocol Configuration Options, serving network identity, IMEISV, CGI/SAI, RAT type, S-CDR CAMEL information) message to the affected GGSN. The SGSN shall send the serving network identity to the GGSN. Primary NSAPI indicates the NSAPI value assigned to any one of the already activated PDP contexts for this PDP address and APN. TFT is included only if received in the Activate Secondary PDP Context Request message. ~~PDP~~Protocol Configuration Options is sent transparently through the SGSN if received in the Activate secondary PDP Context Request message.

   The GGSN uses the same packet data network as used by the already-activated PDP context(s) for that PDP address, generates a new entry in its PDP context table, and stores the TFT. The new entry allows the GGSN to route PDP PDUs via different GTP tunnels between the SGSN and the packet data network. The GGSN returns a Create PDP Context Response (TEID, QoS Negotiated, Cause, ~~PDP~~Protocol Configuration Options, Prohibit Payload Compression, APN Restriction) message to the SGSN. ~~PDP~~Protocol Configuration Options may be used to transfer optional PDP parameters to the UE (see GSM 29.060 [26] and 24.229 [75]). The Prohibit Payload Compression indicates that the SGSN should negotiate no data compression for this PDP context. If an APN Restriction is received from the GGSN for this PDP Context, then the SGSN shall store this value for the PDP Context.

4) In Iu mode, RAB setup is done by the RAB Assignment procedure.

5) In A/Gb mode, BSS packet flow context procedures may be executed. These procedures are defined in clause "BSS Context".

6) In case the QoS attributes have been downgraded in step 5 for A/Gb mode or in step 4 for Iu mode, the SGSN may inform the GGSN about the downgraded QoS attributes by sending an Update PDP Context Request to the affected GGSN. The GGSN confirms the new QoS attributes by sending an Update PDP Context Response to the SGSN.

7) The SGSN selects Radio Priority and Packet Flow Id based on QoS Negotiated, and returns an Activate Secondary PDP Context Accept (TI, QoS Negotiated, Radio Priority, Packet Flow Id, ~~PDP~~Protocol Configuration Options) message to the MS. If the MS indicated in the MS Network Capability it does not support BSS packet flow procedures or if the BSS does not support BSS packet flow procedures, then the SGSN shall not include the Packet Flow Id. In A/Gb mode, the QoS Negotiated shall take into account the Aggregate BSS QoS Profile, if any, returned from the BSS. ~~PDP~~Protocol Configuration Options is sent transparently through the SGSN if received in the Create PDP Context Response message. The SGSN is now able to route PDP PDUs between the GGSN and the MS via different GTP tunnels and possibly different LLC links.

For each additionally activated PDP context a QoS profile and TFT may be requested.

If the secondary PDP context activation procedure fails or if the SGSN returns an Activate Secondary PDP Context Reject (Cause, ~~PDP~~Protocol Configuration Options) message, the MS may attempt another activation with a different TFT, depending on the cause.

The CAMEL procedure calls shall be performed, see referenced procedures in 3GPP TS 23.078:

C1) CAMEL_GPRS_PDP_Context_Establishment.

In Figure 65 and in Figure 66, procedures return as result "Continue".

C2) CAMEL_GPRS_PDP_Context_Establishment_Acknowledgement.

In Figure 65 and in Figure 66, procedures return as result "Continue".

< Modification 2 >

9.2.3.3 MS-Initiated PDP Context Modification Procedure

The MS-Initiated PDP Context Modification procedure is illustrated in Figures 72a and 72b.

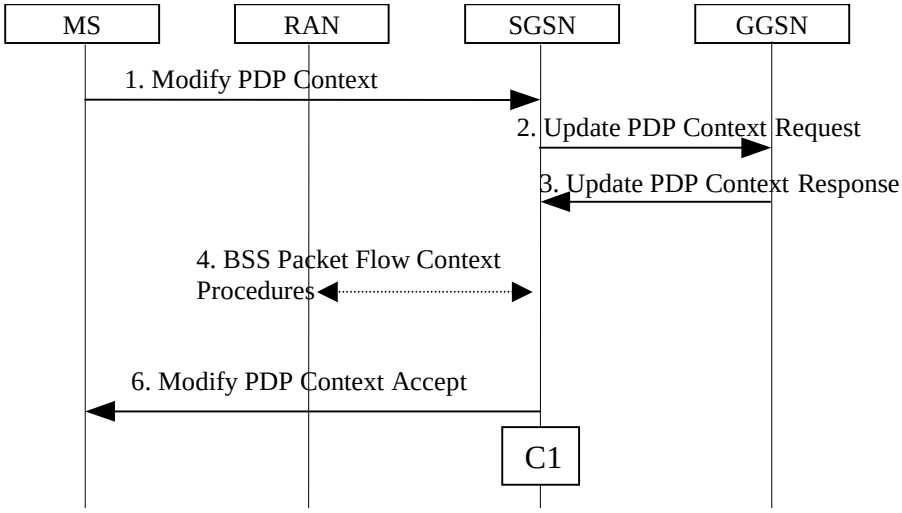

Figure 72a: MS-Initiated PDP Context Modification Procedure, A/Gb mode

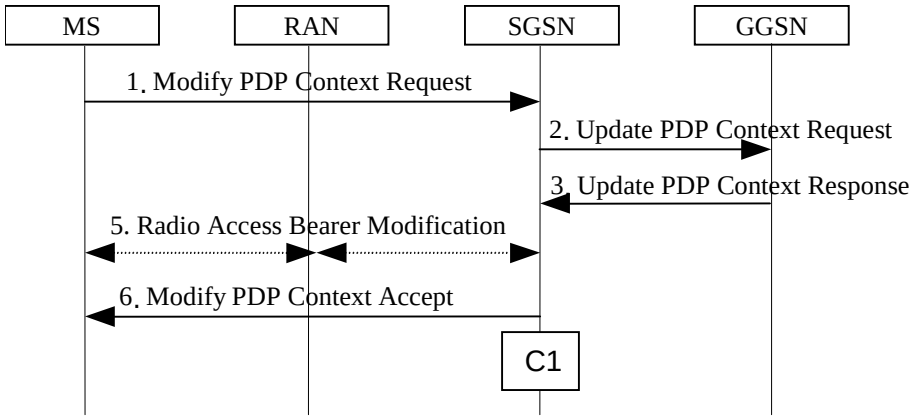

Figure 72b: MS-Initiated PDP Context Modification Procedure, Iu mode

1) The MS sends a Modify PDP Context Request (TI, QoS Requested, TFT, ~~PDP~~Protocol Configuration Options) message to the SGSN. Either QoS Requested or TFT or both may be included. QoS Requested indicates the desired QoS profile, while TFT indicates the TFT that is to be added or modified or deleted from the PDP context. ~~PDP~~Protocol Configuration Options may be used to transfer optional PDP parameters and/or requests to the GGSN.

2) The SGSN may restrict the desired QoS profile given its capabilities, the current load, and the subscribed QoS profile. The SGSN sends an Update PDP Context Request (TEID, NSAPI, QoS Negotiated, TFT, ~~PDP~~Protocol Configuration Options, serving network identity, CGI/SAI) message to the GGSN. The SGSN shall send the serving network identity to the GGSN. If QoS Negotiated and/or TFT received from the SGSN is incompatible with the PDP context being modified (e.g., TFT contains inconsistent packet filters), the GGSN rejects the Update PDP Context Request. The GGSN operator configures the compatible QoS profile. ~~PDP~~Protocol Configuration Options is sent transparently through the SGSN if received in Modify PDP Context Request message.

3) The GGSN may further restrict QoS Negotiated given its capabilities, operator policies and the current load. The GGSN stores QoS Negotiated, stores, modifies, or deletes TFT of that PDP context as indicated in TFT, and returns an Update PDP Context Response (TEID, QoS Negotiated, ~~PDP~~Protocol Configuration Options, Prohibit Payload Compression, APN Restriction) message. ~~PDP~~Protocol Configuration Options may be used to transfer optional PDP parameters to the UE. The Prohibit Payload Compression indicates that the SGSN should negotiate no data compression for this PDP context.

4) In A/Gb mode, BSS packet flow context procedures may be executed. These procedures are defined in clause "BSS Context".

5) In Iu mode, radio access bearer modification may be performed by the RAB Assignment procedure. In case the radio access bearer does not exist the RAB setup is done by the RAB Assignement procedure.

6) The SGSN selects Radio Priority and Packet Flow Id based on QoS Negotiated, and returns a Modify PDP Context Accept (TI, QoS Negotiated, Radio Priority, Packet Flow Id, ~~PDP~~Protocol Configuration Options) message to the MS. If the MS indicated in the MS Network Capability it does not support BSS packet flow procedures or if the BSS does not support BSS packet flow procedures, then the SGSN shall not include the Packet Flow Id. In A/Gb mode, the QoS Negotiated shall take into account the Aggregate BSS QoS Profile, if any, returned from the BSS. ~~PDP~~Protocol Configuration Options is sent transparently through the SGSN if received in Modify PDP Context Response message.

NOTE1: If the SGSN does not accept QoS Requested, then steps 2 and 3 of this procedure are skipped, and the existing QoS Negotiated is returned to the MS in step 4.

NOTE2: In this release of the standards no procedure is defined that uses the Protocol Configuration Options in the PDP context modification procedure.

If an APN Restriction is received from the GGSN for this PDP Context, then the SGSN shall store this value for the PDP Context, replacing any previously stored value for this PDP context. The SGSN shall determine a (new) value for the Maximum APN Restriction using any stored APN Restriction and the received APN Restriction.

The CAMEL procedure calls shall be performed, see referenced procedure in 3GPP TS 23.078:

C1) CAMEL_GPRS_Change_Of_QoS.

The procedure returns as result "Continue".

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Montreal, Canada 16th ñ 20th August 2004

Tdoc S2-042764

CR-Form-v7

CHANGE REQUEST

⌘ **23.060** **CR** **507** ⌘ **rev** ⌘ Current version: **5.8.0** ⌘

*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 for DTM
Source:	⌘	SA2 (Siemens)
Work item code:	⌘	TEI
Date:	⌘	02/09/2004
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:	⌘	The TS describes Dual Transfer Mode specific functionality only by using the abbreviation DTM. The section abbreviations defines DTM as Discontinuous Transfer Mode, which may be understood as another radio feature (DRX).
Summary of change:	⌘	Correction in abbreviations section.
Consequences if not approved:	⌘	Wrong dependencies for DTM specific functions and erroneous DTM behaviour.

Clauses affected:	⌘	3.2

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

Other comments:	⌘	The abbreviation has a wrong definition starting with R99. A corrections from R5 onwards is probably sufficient.

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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.

3.2 Abbreviations

Applicable abbreviations can be found in GSM 01.04 [1] and 3GPP 21.905 [9]. For the purposes of the present document the following abbreviations apply:

AAL5	ATM Adaptation Layer type 5
APN	Access Point Name
ATM	Asynchronous Transfer Mode
AUTN	Authentication Token
BG	Border Gateway
BSSAP+	Base Station System Application Part +
BSSGP	Base Station System GPRS Protocol
BVCI	BSSGP Virtual Connection Identifier
CCU	Channel Codec Unit
CDR	Call Detail Record
CGF	Charging Gateway Functionality
CGI	Cell Global Identification
CK	Cipher Key
CMM	Circuit Mobility Management
CS	Circuit Switched
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name System
DTM	Dual~~iscontinuous~~ Transfer Mode
EGPRS	Enhanced GPRSESP Encapsulating Security Payload
GEA	GPRS Encryption Algorithm
GERAN	GSM EDGE Radio Access Network
GGSN	Gateway GPRS Support Node
GMM/SM	GPRS Mobility Management and Session Management
GPRS-SSF	GPRS Service Switching Function
GPRS-CSI	GPRS CAMEL Subscription Information
GRA	GERAN Registration Area
GSM-SCF	GSM Service Control Function
GSIM	GSM Service Identity Module
GSN	GPRS Support Node
GTP	GPRS Tunnelling Protocol
GTP-C	GTP Control Plane
GTP-U	GTP User Plane
ICMP	Internet Control Message Protocol
IETF	Internet Engineering Task Force
IK	Integrity Key
IP	Internet Protocol
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
IPX	Internet Packet eXchange
ISP	Internet Service Provider
KSI	Key Set Identifier
L2TP	Layer-2 Tunnelling Protocol
LL-PDU	LLC PDU
LLC	Logical Link Control
MAC	Medium Access Control
MIP	Mobile IP
MNRF	Mobile station Not Reachable Flag
MNRG	Mobile station Not Reachable for GPRS flag
MNRR	Mobile station Not Reachable Reason
MTP2	Message Transfer Part layer 2
MTP3	Message Transfer Part layer 3
NACC	Network Assisted Cell Change
NGAF	Non-GPRS Alert Flag
N-PDU	Network Protocol Data Unit
NS	Network Service
NSAPI	Network layer Service Access Point Identifier

NSS	Network SubSystem
ODB	Operator Determined Barring
P-TMSI	Packet TMSI
PCU	Packet Control Unit
PDCH	Packet Data CHannel
PDCP	Packet Data Convergence Protocol
PDN	Packet Data Network
PDP	Packet Data Protocol, e.g. IP
PDU	Protocol Data Unit
PMM	Packet Mobility Management
PPF	Paging Proceed Flag
PPP	Point-to-Point Protocol
PTP	Point To Point
PVC	Permanent Virtual Circuit
RA	Routeing Area
RAB	Radio Access Bearer
RAC	Routeing Area Code
RAI	Routeing Area Identity
RANAP	Radio Access Network Application Protocol
RAU	Routeing Area Update
RLC	Radio Link Control
RNC	Radio Network Controller
RNS	Radio Network Subsystem
RNTI	Radio Network Temporary Identity
RRC	Radio Resource Control
SBSC	Serving Base Station Controller
SBSS	Serving BSS
SGSN	Serving GPRS Support Node
SM	Short Message
SM-SC	Short Message service Service Centre
SMS-GMSC	Short Message Service Gateway MSC
SMS-IWMSC	Short Message Service Interworking MSC
SN-PDU	SNDCP PDU
SNDC	SubNetwork Dependent Convergence
SNDCP	SubNetwork Dependent Convergence Protocol
SPI	Security Parameter Index
SRNC	Serving RNC
SRNS	Serving RNS
TCAP	Transaction Capabilities Application Part
TCP	Transmission Control Protocol
TFT	Traffic Flow Template
TEID	Tunnel Endpoint IDentifier
TLLI	Temporary Logical Link Identity
TOM	Tunnelling Of Messages
TOS	Type of Service
TRAU	Transcoder and Rate Adaptor Unit
UDP	User Datagram Protocol
UEA	UMTS Encryption Algorithm
UESBI-Iu	UE Specific Behaviour Information - Iu
UESBI-Uu	UE Specific Behaviour Information - Uu
UIA	UMTS Integrity Algorithm
URA	UTRAN Registration Area
USIM	User Service Identity Module
UTRAN	UMTS Terrestrial Radio Access Network

3GPP TSG-SA2 Meeting #41
Montreal, Canada 16th ñ 20th August 2004

Tdoc S2-042765

CR-Form-v7

CHANGE REQUEST

⌘ **23.060** **CR** **508** ⌘ **rev** ⌘ Current version: **6.5.0** ⌘

*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 for DTM
Source:	⌘	SA2 (Siemens)
Work item code:	⌘	TEI
Date:	⌘	02/09/2004
Category:	⌘	**A**
Release:	⌘	Rel-6

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:	⌘	The TS describes Dual Transfer Mode specific functionality only by using the abbreviation DTM. The section abbreviations defines DTM as Discontinuous Transfer Mode, which may be understood as another radio feature (DTX).
Summary of change:	⌘	Correction in abbreviations section.
Consequences if not approved:	⌘	Wrong dependencies for DTM specific functions and erroneous DTM behaviour.

Clauses affected:	⌘	3.2

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

Other comments: ⌘

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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.

3.2 Abbreviations

Applicable abbreviations can be found in GSM 01.04 [1] and 3GPP 21.905 [9]. For the purposes of the present document the following abbreviations apply:

AAL5	ATM Adaptation Layer type 5
ADD	Automatic Device Detection
APN	Access Point Name
ATM	Asynchronous Transfer Mode
AUTN	Authentication Token
BG	Border Gateway
BSSAP+	Base Station System Application Part +
BSSGP	Base Station System GPRS Protocol
BVCI	BSSGP Virtual Connection Identifier
CCU	Channel Codec Unit
CDR	Call Detail Record
CGF	Charging Gateway Functionality
CGI	Cell Global Identification
CK	Cipher Key
CMM	Circuit Mobility Management
CS	Circuit Switched
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name System
DTM	Dual~~iscontinuous~~ Transfer Mode
EGPRS	Enhanced GPRSESP Encapsulating Security Payload
GEA	GPRS Encryption Algorithm
GERAN	GSM EDGE Radio Access Network
GGSN	Gateway GPRS Support Node
GMM/SM	GPRS Mobility Management and Session Management
GPRS-SSF	GPRS Service Switching Function
GPRS-CSI	GPRS CAMEL Subscription Information
GRA	GERAN Registration Area
GSM-SCF	GSM Service Control Function
GSIM	GSM Service Identity Module
GSN	GPRS Support Node
GTP	GPRS Tunnelling Protocol
GTP-C	GTP Control Plane
GTP-U	GTP User Plane
ICMP	Internet Control Message Protocol
IETF	Internet Engineering Task Force
IK	Integrity Key
IP	Internet Protocol
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
IPX	Internet Packet eXchange
ISP	Internet Service Provider
KSI	Key Set Identifier
L2TP	Layer-2 Tunnelling Protocol
LL-PDU	LLC PDU
LLC	Logical Link Control
MAC	Medium Access Control
MIP	Mobile IP
MNRF	Mobile station Not Reachable Flag
MNRG	Mobile station Not Reachable for GPRS flag
MNRR	Mobile station Not Reachable Reason
MTP2	Message Transfer Part layer 2
MTP3	Message Transfer Part layer 3
NACC	Network Assisted Cell Change
NGAF	Non-GPRS Alert Flag
N-PDU	Network Protocol Data Unit
NS	Network Service

NSAPI	Network layer Service Access Point Identifier
NSS	Network SubSystem
ODB	Operator Determined Barring
P-TMSI	Packet TMSI
PCU	Packet Control Unit
PDCH	Packet Data CHannel
PDCP	Packet Data Convergence Protocol
PDN	Packet Data Network
PDP	Packet Data Protocol, e.g. IP
PDU	Protocol Data Unit
PMM	Packet Mobility Management
PPF	Paging Proceed Flag
PPP	Point-to-Point Protocol
PTP	Point To Point
PVC	Permanent Virtual Circuit
RA	Routeing Area
RAB	Radio Access Bearer
RAC	Routeing Area Code
RAI	Routeing Area Identity
RANAP	Radio Access Network Application Protocol
RAU	Routeing Area Update
RLC	Radio Link Control
RNC	Radio Network Controller
RNS	Radio Network Subsystem
RNTI	Radio Network Temporary Identity
RRC	Radio Resource Control
SBSC	Serving Base Station Controller
SBSS	Serving BSS
SGSN	Serving GPRS Support Node
SM	Short Message
SM-SC	Short Message service Service Centre
SMS-GMSC	Short Message Service Gateway MSC
SMS-IWMSC	Short Message Service Interworking MSC
SN-PDU	SNDCP PDU
SNDC	SubNetwork Dependent Convergence
SNDCP	SubNetwork Dependent Convergence Protocol
SPI	Security Parameter Index
SRNC	Serving RNC
SRNS	Serving RNS
TCAP	Transaction Capabilities Application Part
TCP	Transmission Control Protocol
TFT	Traffic Flow Template
TEID	Tunnel Endpoint IDentifier
TLLI	Temporary Logical Link Identity
TOM	Tunnelling Of Messages
TOS	Type of Service
TRAU	Transcoder and Rate Adaptor Unit
UDP	User Datagram Protocol
UEA	UMTS Encryption Algorithm
UESBI-Iu	UE Specific Behaviour Information - Iu
UESBI-Uu	UE Specific Behaviour Information - Uu
UIA	UMTS Integrity Algorithm
URA	UTRAN Registration Area
USIM	User Service Identity Module
UTRAN	UMTS Terrestrial Radio Access Network

3GPP TSG-SA2 Meeting #41
Montreal, Canada, August 16-20, 2004

Tdoc ⌘S2-042578

CR-Form-v7.1

CHANGE REQUEST

⌘ **23.060** **CR** **510** ⌘ **rev** **1** ⌘ Current version: **6.5.0** ⌘

*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:	⌘	Introduction of Network Sharing
Source:	⌘	SA2 (TeliaSonera)
Work item code:	⌘	NTShar
Date:	⌘	19/07/04
Category:	⌘	**B**
Release:	⌘	Rel-6

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:
Ph2 (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)
Rel-7 (Release 7)

Reason for change:	⌘	The support of network sharing introduces functionality in various network nodes. The functioality is defined in TS 23.251. TS 23.060 needs a reference to TS 23.251 to point this out.
Summary of change:	⌘	A reference to TS 23.251 is introduced in the list of references. Introductory text regarding network sharing functionality is introduced in Section 5 and an appropriate reference to TS 23.251 is introduced.
Consequences if not approved:	⌘	Unclear specification as regards network sharing functionality.

Clauses affected:	⌘	2, 5
Other specs affected:	⌘	Y N ☐ X Other core specifications ☐ X Test specifications ☐ X O&M Specifications
	⌘	
Other comments:	⌘	

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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.

**********FIRST CHANGE**********

2 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. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

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

[2] GSM 01.61: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); GPRS ciphering algorithm requirements".

[3] 3GPP TS 22.060: "General Packet Radio Service (GPRS); Service description; Stage 1".

[4] 3GPP TS 23.003: "Numbering, addressing and identification".

[5] 3GPP TS 23.007: "Restoration procedures".

[5b] 3GPP TS 23.016: "Subscriber data management; Stage 2".

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

[7] GSM 03.22: "Digital cellular telecommunications system (Phase 2+); Functions related to Mobile Station (MS) in idle mode and group receive mode".

[7b] 3GPP TS 23.122: "Non-Access Stratum functions related to Mobile Station (MS) in idle mode".

[8] 3GPP TS 23.040: "Technical realization of the Short Message Service (SMS)".

[8b] 3GPP TS 23.078: "Customised Applications for Mobile network Enhanced Logic (CAMEL) Phase 3 - Stage 2".

[9] 3GPP TS 21.905: "Vocabulary for 3GPP Specifications", (Release 4).

[10] Void.

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

[12] 3GPP TS 24.007: "Mobile radio interface signalling layer 3; General aspects".

[13] 3GPP TS 24.008: "Mobile Radio Interface Layer 3 specification; Core Network Protocols; Stage 3".

[13b] 3GPP TS 24.011: "Point to Point (PP) Short Message Service (SMS) support on mobile radio interface".

[14] GSM 04.60: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Mobile Station (MS) - Base Station System (BSS) interface; Radio Link Control/Medium Access Control (RLC/MAC) protocol".

[15] GSM 04.64: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Mobile Station ñ Serving GPRS Support Node (MS-SGSN) Logical Link Control (LLC) layer specification".

[16] GSM 04.65: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Mobile Station (MS) ñ Serving GPRS Support Node (SGSN); Subnetwork Dependent Convergence Protocol (SNDCP)".

[16b] GSM 05.08: "Digital cellular telecommunications system (Phase 2+); Radio subsystem link control".

[17] 3GPP TS 27.060: "Packet Domain; Mobile Station (MS) supporting Packet Switched services".

[18] GSM 08.08: "Digital cellular telecommunications system (Phase 2+); Mobile-services Switching Centre - Base Station System (MSC-BSS) interface; Layer 3 specification".

[19] GSM 08.14: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Base Station System (BSS) - Serving GPRS Support Node (SGSN) interface; Gb interface layer 1".

[20] GSM 08.16: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Base Station System (BSS) - Serving GPRS Support Node (SGSN) interface; Network Service".

[21] GSM 08.18: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Base Station System (BSS) - Serving GPRS Support Node (SGSN); BSS GPRS Protocol (BSSGP)".

[22] GSM 08.60: "Digital cellular telecommunications system (Phase 2+); In-band control of remote transcoders and rate adaptors for Enhanced Full Rate (EFR) and full rate traffic channels".

[23] 3GPP TS 29.002: "Mobile Application Part (MAP) specification".

[24] 3GPP TS 29.016: "General Packet Radio Service (GPRS); Serving GPRS Support Node (SGSN) - Visitors Location Register (VLR); Gs interface network service specification".

[25] 3GPP TS 29.018: "General Packet Radio Service (GPRS); Serving GPRS Support Node (SGSN) - Visitors Location Register (VLR); Gs interface layer 3 specification".

[26] 3GPP TS 29.060: "General Packet Radio Service (GPRS); GPRS Tunnelling Protocol (GTP) across the Gn and Gp Interface".

[27] 3GPP TS 29.061: "Interworking between the Public Land Mobile Network (PLMN) supporting Packet Based services and Packet Data Networks (PDN)".

[27b] 3GPP TS 29.078: "Customised Applications for Mobile network Enhanced Logic (CAMEL) Phase 3; CAMEL Application Part (CAP) Specification".

[28] GSM 11.11: "Digital cellular telecommunications system (Phase 2+); Specification of the Subscriber Identity Module - Mobile Equipment (SIM-ME) interface".

[29] ITU-T Recommendations I.130: "Method for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN".

[30] ITU-T Recommendation E.164: "The international public telecommunication numbering plan".

[31] ITU-T Recommendation Q.65: "The unified functional methodology for the characterization of services and network capabilities".

[32] ITU-T Recommendation V.42bis: "Data compression procedures for data circuit-terminating equipment (DCE) using error correction procedures".

[33] ITU-T Recommendation X.3: "Packet assembly/disassembly facility (PAD) in a public data network".

[34] 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".

[39] RFC 768 (1980): "User Datagram Protocol" (STD 6).

[40] RFC 791 (1981): "Internet Protocol" (STD 5).

[41] RFC 792 (1981): "Internet Control Message Protocol" (STD 5).

[42] RFC 793 (1981): "Transmission Control Protocol" (STD 7).

[43] RFC 1034 (1987): "Domain names ñ concepts and facilities" (STD 13).

[44] RFC 1661 (1994): "The Point-to-Point Protocol (PPP)" (STD 51).

[45] RFC 1542 (1993): "Clarifications and Extensions for the Bootstrap Protocol".

[46] RFC 2002 (1996): "IP Mobility Support".

[47] RFC 2131 (1997): "Dynamic Host Configuration Protocol".

[48] RFC 2460 (1998): "Internet Protocol, Version 6 (IPv6) Specification".

[49] TIA/EIA-136 (1999): "TDMA Cellular / PCS"; Arlington: Telecommunications Industry Association.

[50] 3GPP TS 25.301: "Radio Interface Protocol Architecture".

[51] 3GPP TS 25.303: "Interlayer procedures in Connected Mode".

[51b] 3GPP TS 25.304: "UE Procedures in Idle Mode and Procedures for Call Reselection in Connected Mode".

[52] 3GPP TS 25.331: "RRC Protocol Specification".

[53] 3GPP TS 25.401: "UTRAN Overall Description".

[54] 3GPP TS 23.121: "Architectural Requirements for Release 1999".

[55] 3GPP TS 25.322: "RLC protocol specification".

[56] 3GPP TS 25.412: "UTRAN Iu Interface Signalling Transport".

[56b] 3GPP TS 25.413: "UTRAN Iu Interface RANAP Signalling".

[57] 3GPP TS 25.323: "Packet Data Convergence Protocol (PDCP) specification".

[58] 3GPP TS 23.107: "Quality of Service (QoS) concept and architecture".

[59] ITU-T Recommendation I.361: "B-ISDN ATM layer specification".

[60] 3GPP TS 25.321: "Medium Access Control (MAC) protocol specification".

[61] 3GPP TS 33.102: "3G Security; Security architecture".

[62] 3GPP TS 22.002: "Circuit Bearer Services (BS) supported by a Public Land Mobile Network (PLMN)".

[63] 3GPP TS 25.411: "UTRAN Iu interface Layer 1".

[64] 3GPP TS 25.414: "UTRAN Iu interface data transport & transport signalling".

[65] 3GPP TS 23.271: "Functional stage 2 description of LCS".

[66] 3GPP TS 23.015: "Technical realization of Operator Determined Barring (ODB)".

[67] ITU-T Recommendation I.363.5: "B-ISDN ATM Adaptation Layer (AAL) specification: Type 5 AAL".

[68] RFC 2373 (1998): "IP Version 6 Addressing Architecture".

[69] RFC 2462 (1998): "IPv6 Stateless Address Autoconfiguration".

[70] 3GPP TS 32.215: "3G Telecom Management; Charging management; Charging data description for the Packet Switched (PS) domain".

[71] RFC 2461 (1998): "Neighbor Discovery for IP Version 6 (IPv6)".

[72] 3GPP TS 29.202: "Signalling System No. 7 (SS7) signalling transport in core network; Stage 3".

[73] 3GPP TS 23.236: "Intra Domain Connection of RAN Nodes to Multiple CN Nodes".

[74] 3GPP TS 43.051: "Radio Access Network; Overall description ñ Stage 2".

[75] 3GPP TS 24.229: IP Multimedia Call Control Protocol based on SIP and SDP.

[76] 3GPP TS 23.195: "Provision of UE Specific Behaviour Information to Network Entities".

[77] 3GPP TS 44.060: General Packet Radio Service (GPRS); Mobile Station (MS) - Base Station System (BSS) interface; Radio Link Control/Medium Access Control (RLC/MAC) protocol".

[78] 3GPP TS 48.018: "General Packet Radio Service (GPRS); Base Station System (BSS) - Serving GPRS Support Node (SGSN); BSS GPRS Protocol (BSSGP)".

[X] 3GPP TS23.251: " Network Sharing; Architecture and Functional Description".

3 Definitions, abbreviations and symbols

************************************SECOND CHANGE************************************

5.7 Functionality Needed for Mobile IP Using IPv4

To support the optional Mobile IP services, see 3GPP TS 23.121 [54], efficiently by GPRS, Foreign Agent (FA) functionality needs to be provided in the GGSN. The interface between the GGSN and FA, including the mapping between the care of IP address and the GTP tunnel in the PLMN is not standardized as the GGSN and FA are considered to be one integrated node.

Mobile IP services need a Home Agent (HA). The HA is a router that tunnels datagrams to an FA. The FA de-tunnels the datagrams and sends them towards the MS that is in a PLMN. The HA maintains current location information for each of the departed users. The location of the HA is outside the scope of the 3GPP specifications.

The FA and HA functionality is specified in RFC 2002 [46].

5.8 Functionality for Intra Domain Connection of RAN Nodes to Multiple CN Nodes

The Intra Domain Connection of RAN Nodes to Multiple CN Nodes overcomes the strict hierarchy that restricts the connection of a RAN node to just one CN node, and hence also to one SGSN. This implies that a RAN node must be able to determine which of the SGSNs, covering the area where an MS is located, should receive the signalling and user traffic sent from an MS. To avoid unnecessary signalling in the core network, an MS that has attached to one SGSN, should generally continue to be served by this SGSN as long as the MS is in the radio coverage of the pool area, to which the SGSN is associated. The concept of pool area is a RAN based definition that comprises one or more RA(s) that, from a RAN perspective, are served by a certain group of CN nodes. This does not exclude that one or more of the SGSNs in this group serve RAs outside the pool area. This group of SGSNs is also referred to as an SGSN pool.

To enable the RAN node to determine which SGSN to select when forwarding messages from an MS, Intra Domain Connection of RAN Nodes to Multiple CN Nodes defines a routing mechanism (and other related functionality). Another routing mechanism (and other related functionality) is defined for the SGSNs that support the Intra Domain Connection of RAN Nodes to Multiple CN Nodes. The routing mechanism is required to find the correct old SGSN (from the multiple SGSNs that are associated with a pool area). When an MS roams out of the pool area and into the area of one or more SGSNs that do not know about the internal structure of the pool area where the MS roamed from, the new SGSN will send the Identification Request message or the SGSN Context Request message to an SGSN that is believed to be the old SGSN. This SGSN, which is associated with the same pool area as the actual old SGSN, resolves the ambiguity of multiple SGSNs in the pool area and determines the correct old SGSN from the P-TMSI (or the TLLI). The received message is then relayed to the correct old SGSN (unless it is itself the correct old SGSN). The routing mechanism in both the SGSNs and the RAN nodes utilises the fact that every SGSN that serves a pool area must have its own unique value range of the P-TMSI parameter within the pool area.

The requirements on, and the detailed functionality needed to support, the Intra Domain Connection of RAN Nodes to Multiple CN Nodes are defined in 3GPP TS 23.236 [73].

5.9 Functionality for network sharing

Network sharing allows multiple network operators to share a radio access network. In a shared network, an MS that supports network sharing selects one of the operators and indicates it to the network. This allows the network to provide services from the selected operator. For an MS that does not support network sharing, the network may select the network operator that provides the services.

The functionality needed to support network sharing is defined in 3GPP TS 23.251 [X].

6 Mobility Management Functionality

6.1 Definition of Mobility Management States

The Mobility Management (MM) activities related to a subscriber are characterised by one of three different MM states. In A/Gb mode, the MM states for a GPRS subscriber are IDLE, STANDBY, and READY. In Iu mode, the MM states for a GPRS subscriber are PMM-DETACHED, PMM-IDLE, and PMM-CONNECTED. Each state describes a certain level of functionality and information allocated. The information sets held at the MS and the SGSN are denoted MM context.

The MM state relates only to GPRS MM activities of a subscriber. The MM state is independent of the number and state of PDP contexts for that subscriber.