3GPP TSG-SA Meeting #26 **TSGS#26(04)0751**
13th – 16th December 2004. Athens, Greece.

Source: **TSG SA WG2**
Title: **CRs on 23.060 (GPRS Stage 2)**
Agenda item: **7.2.3**
Document for: **APPROVAL**

The following CRs have been agreed by TSG SA WG2 and are requested to be approved by TSG SA plenary #26.

Note: *the source of all these CRs is now SA2, even if the name of the originating company(ies) is still reflected on the cover page of all the attached CRs.*

Tdoc	Title	Spec	CR	Rev	Cat	C_Ver	Rel	WI
S2-043123	Transfer of selected core network operator identity between SGSN and MSC/VLR	23.060	513	1	F	6.6.0	Rel-6	NTSHAR
S2-043732	Handling of preserved Real Time PDP context	23.060	516	2	F	6.6.0	Rel-6	TEI6
S2-043897	Management Based Activation Impacts	23.060	518	3	F	6.6.0	Rel-6	OEM-TRACE

3GPP TSG-SA2 Meeting #42
Sophia Antipolis, France, October 11-15, 2004

Tdoc ⌘S2-043123

CR-Form-v7.1

CHANGE REQUEST

⌘ **23.060** **CR** **513** ⌘ **rev** **1** ⌘ Current version: **6.6.0** ⌘

*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 ☒

Title:	⌘	Transfer of selected core network operator identity between SGSN and MSC/VLR
Source:	⌘	TeliaSonera
Work item code:	⌘	NTShar
Date:	⌘	4/10/2004
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:	⌘	The Gs interface may be used to achieve PS and CS domain registration coordination in networks that support network sharing. The transfer of selected core network operator identity between a SGSN and an MSC/VLR for combined procedures (GPRS attach and RA update) needs to be described in TS23.060.
Summary of change:	⌘	Text describing at which points in the signalling transfer for combined attach procedures, routeing area updates the selected core network operator identity is to be transferred between the SGSN and the MSC/VLR are added. Text indicating at which point in the signallings the selected core network information becomes available to the SGSN is also added.
Consequences if not approved:	⌘	CS and PS domain coordination using the Gs interface can not be achieved in shared networks.

Clauses affected:	⌘	6.3, 6.5.2, 6.5.3, 6.9.2.1, 6.13.1.2, 6.13.2.2			
Other specs affected:	⌘	**Y** / **N**	Other core specifications	⌘	29.018
		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.

********** END OF CHANGE

6.3 Interactions Between SGSN and MSC/VLR

The interactions described in this clause shall be supported if the optional Gs interface is installed. All functionality of this clause and sub-clauses applies for A/Gb mode and Iu mode unless stated differently.

An association is created between SGSN and MSC/VLR to provide for interactions between SGSN and MSC/VLR. The association is created when the VLR stores the SGSN number and the SGSN stores the VLR number. The association is used for co-ordinating MSs that are both GPRS-attached and IMSI-attached.

The association supports the following actions:

- IMSI attach and detach via SGSN. This makes combined GPRS / IMSI attach and combined GPRS / IMSI detach possible, thus saving radio resources.
- Co-ordination of LA update and RA update, including periodic updates, thus saving radio resources. A combined RA / LA update is sent from the MS to the SGSN. The SGSN forwards the LA update to the VLR.
- Paging for a CS connection via the SGSN.
- Alert procedures for non-PS services.
- Identification procedure.
- MM Information procedure.
- CS and PS registration coordination in networks that support network sharing as defined in TS 23.251[83] so that a UE is registered with the same core network operator in the CS and PS domain.

********** END OF CHANGE

********** BEGINNING OF CHANGE

6.5.2 Iu mode GPRS Attach Procedure

A GPRS-attached MS makes an IMSI attach via the SGSN with the combined RA / LA update procedure if the network operates in mode I. If the network operates in mode II, or if the MS is not GPRS-attached, the MS makes a normal IMSI attach. An IMSI-attached MS engaged in a CS connection shall use the (non-combined) GPRS Attach procedure when it performs a GPRS attach.

After having executed the GPRS attach, the MS is in the PMM-CONNECTED state and MM contexts are established in the MS and the SGSN. The MS may then activate PDP contexts as described in clause "Activation Procedures".

An IMSI-attached MS that cannot operate in CS/PS mode of operation shall follow the normal IMSI detach procedure before it makes a GPRS attach. A GPRS-attached MS that cannot operate in CS/PS mode of operation shall perform a GPRS detach before it makes an IMSI attach.

In networks that support network sharing as defined in TS 23.251 [83], the SGSN may be informed by the RNS about the identity of the selected core network operator when receiving the Attach Request message. If available, this information is stored in the SGSN MM context.

********** END OF CHANGE

********** BEGINNING OF CHANGE

6.5.3 Combined GPRS / IMSI Attach procedure

The Combined GPRS / IMSI Attach procedure is illustrated in Figure 22.

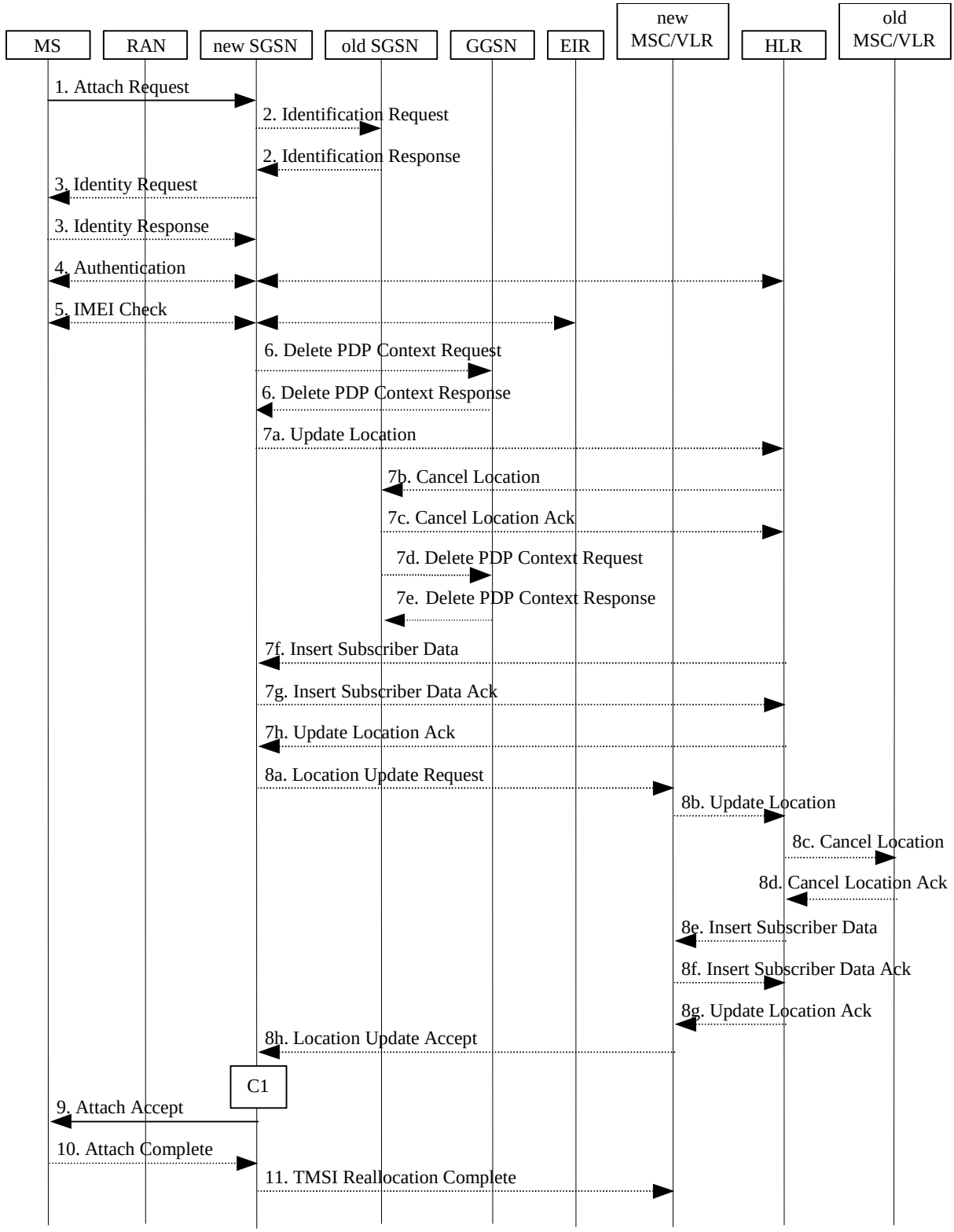


Figure 22: Combined GPRS / IMSI Attach Procedure

1) In A/Gb mode, the MS initiates the attach procedure by the transmission of an Attach Request (IMSI or P-TMSI and old RAI, Classmark, CKSN, Attach Type, DRX Parameters, old P-TMSI Signature) message to the SGSN. IMSI shall be included if the MS does not have a valid P-TMSI available. If the MS has a valid P-TMSI, then P-TMSI and the old RAI associated with P-TMSI shall be included. Classmark contains the MS's GPRS multislot capabilities and supported GPRS ciphering algorithms in addition to the existing classmark parameters defined in GSM 04.08. Attach Type indicates which type of attach is to be performed, i.e. GPRS attach only, GPRS Attach while already IMSI attached, or combined GPRS / IMSI attach. DRX Parameters indicates whether the MS uses discontinuous reception or not. If the MS uses discontinuous reception, then DRX Parameters also indicate when the MS is in a non-sleep mode able to receive paging requests and channel assignments. If the MS uses P-TMSI for identifying itself and if it has also stored its old P-TMSI Signature, then the MS shall include the old P-TMSI Signature in the Attach Request message.

   For Iu mode, the MS initiates the attach procedure by the transmission of an Attach Request (IMSI or P-TMSI and old RAI, Core Network Classmark, KSI, Attach Type, old P-TMSI Signature, Follow On Request, DRX Parameters) message to the SGSN. IMSI shall be included if the MS does not have a valid P-TMSI available. If the MS uses P-TMSI for identifying itself and if it has also stored its old P-TMSI Signature, then the MS shall include the old P-TMSI Signature in the Attach Request message. If the MS has a valid P-TMSI, then P-TMSI and the old RAI associated with P-TMSI shall be included. KSI shall be included if the MS has valid security parameters. Core Network Classmark is described in clause "MS Network Capability". The MS shall set "Follow On Request" if there is pending uplink traffic (signalling or user data). The SGSN may use, as an implementation option, the follow on request indication to release or keep the Iu connection after the completion of the GPRS Attach procedure. Attach Type indicates which type of attach is to be performed, i.e. GPRS attach only, GPRS Attach while already IMSI attached, or combined GPRS / IMSI attach. DRX Parameters indicates whether or not the MS uses discontinuous reception and the DRX cycle length.

2) If the MS identifies itself with P-TMSI and the SGSN has changed since detach, the new SGSN sends an Identification Request (P-TMSI, old RAI, old P-TMSI Signature) to the old SGSN to request the IMSI. If the new SGSN provides functionality for Intra Domain Connection of RAN Nodes to Multiple CN Nodes, the new SGSN may derive the old SGSN from the old RAI and the old P-TMSI and send the Identification Request message to this old SGSN. Otherwise, the new SGSN derives the old SGSN from the old RAI. In any case the new SGSN will derive an SGSN that it believes is the old SGSN. This derived SGSN is itself the old SGSN, or it is associated with the same pool area as the actual old SGSN and it will determine the correct old SGSN from the P-TMSI and relay the message to that actual old SGSN. The old SGSN responds with Identification Response (IMSI, Authentication Triplets or Authentication Quintets). If the MS is not known in the old SGSN, the old SGSN responds with an appropriate error cause. The old SGSN also validates the old P-TMSI Signature and responds with an appropriate error cause if it does not match the value stored in the old SGSN.

3) If the MS is unknown in both the old and new SGSN, the SGSN sends an Identity Request (Identity Type = IMSI) to the MS. The MS responds with Identity Response (IMSI).

4) The authentication functions are defined in the clause "Security Function". If no MM context for the MS exists anywhere in the network, then authentication is mandatory. Ciphering procedures are described in clause "Security Function". If P-TMSI allocation is going to be done and the network supports ciphering, the network shall set the ciphering mode.

5) The equipment checking functions are defined in the clause "Identity Check Procedures". Equipment checking is optional.

6) If there are active PDP contexts in the new SGSN for this particular MS (i.e. the MS re-attaches to the same SGSN without having properly detached before), the new SGSN deletes these PDP contexts by sending Delete PDP Context Request (TEID) messages to the GGSNs involved. The GGSNs acknowledge with Delete PDP Context Response (TEID) messages.

7) If the SGSN number has changed since the GPRS detach, or if it is the very first attach, or if the Automatic Device Detection (ADD) function is supported and the IMEISV has changed (see [82] for ADD functional requirement), then the SGSN informs the HLR:

   a) The SGSN sends an Update Location (SGSN Number, SGSN Address, IMSI, IMEISV) to the HLR. IMEISV is sent if the ADD function is supported.

   b) The HLR sends Cancel Location (IMSI, Cancellation Type) to the old SGSN with Cancellation Type set to Update Procedure.

c) The old SGSN acknowledges with Cancel Location Ack (IMSI). If there are any ongoing procedures for that MS, the old SGSN shall wait until these procedures are finished before removing the MM and PDP contexts.

d) If there are active PDP contexts in the old SGSN for this particular MS, the old SGSN deletes these PDP contexts by sending Delete PDP Context Request (TEID) messages to the GGSNs involved.

e) The GGSNs acknowledge with Delete PDP Context Response (TEID) messages.

f) The HLR sends Insert Subscriber Data (IMSI, GPRS Subscription Data) to the new SGSN.

g) The new SGSN validates the MS's presence in the (new) RA. If due to regional subscription restrictions or access restrictions (see TS 23.221 [80] and TS 23.008 [79]) the MS is not allowed to attach in the RA, the SGSN rejects the Attach Request with an appropriate cause, and may return an Insert Subscriber Data Ack (IMSI, SGSN Area Restricted) message to the HLR. If subscription checking fails for other reasons, the SGSN rejects the Attach Request with an appropriate cause and returns an Insert Subscriber Data Ack (IMSI, Cause) message to the HLR. If all checks are successful then the SGSN constructs an MM context for the MS and returns an Insert Subscriber Data Ack (IMSI) message to the HLR.

h) The HLR acknowledges the Update Location message by sending an Update Location Ack to the SGSN after the cancelling of old MM context and insertion of new MM context are finished. If the Update Location is rejected by the HLR, the SGSN rejects the Attach Request from the MS with an appropriate cause.

8) If Attach Type in step 1 indicated GPRS Attach while already IMSI attached, or combined GPRS / IMSI attached, then the VLR shall be updated if the Gs interface is installed. When the SGSN does not provide functionality for the Intra Domain Connection of RAN Nodes to Multiple CN Nodes, the VLR number is derived from the RAI. When the SGSN provides functionality for Intra Domain Connection of RAN Nodes to Multiple CN Nodes, the SGSN uses the RAI and a hash value from the IMSI to determine the VLR number. The SGSN starts the location update procedure towards the new MSC/VLR upon receipt of the first Insert Subscriber Data message from the HLR in step 6d). This operation marks the MS as GPRS-attached in the VLR.

   a) The SGSN sends a Location Update Request (new LAI, IMSI, SGSN Number, Location Update Type) message to the VLR. Location Update Type shall indicate IMSI attach if Attach Type indicated combined GPRS / IMSI attach. Otherwise, Location Update Type shall indicate normal location update. The VLR creates an association with the SGSN by storing SGSN Number. In networks that support network sharing, the Location Update Request includes the identity of the selected core network operator if the SGSN has received this information from the RAN, as described in TS 23.251 [83].

   b) If the LA update is inter-MSC, the new VLR sends Update Location (IMSI, new VLR) to the HLR.

   c) If the LA update is inter-MSC, the HLR sends a Cancel Location (IMSI) to the old VLR.

   d) The old VLR acknowledges with Cancel Location Ack (IMSI).

   e) If the LA update is inter-MSC, the HLR sends Insert Subscriber Data (IMSI, subscriber data) to the new VLR.

   f) The VLR acknowledges with Insert Subscriber Data Ack (IMSI).

   g) After finishing the inter-MSC location update procedures, the HLR responds with Update Location Ack (IMSI) to the new VLR.

   h) The VLR responds with Location Update Accept (VLR TMSI) to the SGSN.

9) The SGSN selects Radio Priority SMS, and sends an Attach Accept (P-TMSI, VLR TMSI, P-TMSI Signature, Radio Priority SMS) message to the MS. P-TMSI is included if the SGSN allocates a new P-TMSI.

10) If P-TMSI or VLR TMSI was changed, the MS acknowledges the received TMSI(s) by returning an Attach Complete message to the SGSN.

11) If VLR TMSI was changed, the SGSN confirms the VLR TMSI re-allocation by sending a TMSI Reallocation Complete message to the VLR.

If the Attach Request cannot be accepted, the SGSN returns an Attach Reject (IMSI, Cause) message to the MS.

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

C1) CAMEL_GPRS_Attach and CAMEL_PS_Notification.

They are called in the following order:

- The procedure CAMEL_GPRS_Attach is called. In Figure 22, the procedure returns as result "Continue".
- Then the procedure CAMEL_PS_Notification is called. The procedure returns as result "Continue".

6.6 Detach Function

The GPRS Detach procedure allows:

- an MS to inform the network that it does not want to access the SGSN-based services any longer; and
- the network to inform an MS that it does not have access to the SGSN-based services any more.

The Detach function allows an MS to inform the network that it wants to make a GPRS and/or IMSI detach, and it allows the network to inform an MS that it has been GPRS-detached or IMSI-detached by the network.

********** END OF CHANGE

********** BEGINNING OF CHANGE

6.9.2 Location Management Procedures (Iu-mode)

In the context of this specification, the terms RNS or RNC refer also to a GERAN BSS or BSC (respectively) when serving an MS in Iu mode.

Refer to 3GPP TS 25.301 for further information on the location management procedures for the UTRAN.

The PLMN shall provide information for the MS to be able to:

- detect when it has entered a new cell or a new RA; and
- determine when to perform periodic RA updates.

In this specification, only the Location Management procedures related to the CN are described. These procedures are:

- a routeing area update procedure; and
- Serving RNC relocation procedure.

An MS detects entering a new cell by comparing the cell's identity with the cell identity stored in the MS. By comparing the RAI stored in the MS's MM context with the RAI received from the network, the MS detects that an RA update shall be performed. In RRC-CONNECTED mode (PMM-CONNECTED state or CS MM CONNECTED state), the MS is informed of RAI and Cell Identity by the serving RNC via an "MM information" message at the RRC layer. In RRC-IDLE state, the MS is informed of RAI and Cell Identity by the broadcast system information at the RRC layer.

If the MS enters a new PLMN, the MS shall perform a routeing area update, unless it is not allowed to do so for the reasons specified in TS 24.008 [13] and TS 23.122 [7b].

In network mode of operation II, whenever an MS determines that it shall perform both an LA update and an RA update, the MS shall start the LA update first. The MS should start the RA update procedure before the LA update is completed.

6.9.2.1 Routeing Area Update Procedure

A routeing area update takes place when an attached MS detects that it has entered a new RA or when the periodic RA update timer has expired or when RRC connection is released with cause "Directed Signalling connection re-establishment" or when the MS has to indicate new access capabilities to the network.

The SGSN detects that it is an intra-SGSN routeing area update by noticing that it also handles the old RA. In this case, the SGSN has the necessary information about the MS and there is no need to inform the GGSNs or the HLR about the new MS location. A periodic RA update is always an intra-SGSN routeing area update. If the network operates in mode I, an MS that is in CS/PS mode of operation shall perform the Combined RA / LA Update procedures except this CS/PS mode MS is engaged in a CS connection, then it shall perform (non combined) RA Update procedures.

In Iu mode, an RA update is either an intra-SGSN or inter-SGSN RA update, either combined RA / LA update or only RA update, either initiated by an MS in PMM-CONNECTED or in PMM-IDLE state. The SRNC may provide a PMM-CONNECTED state MS with MM information like RAI by dedicated signalling. Typically, the SRNC should not provide a RAI to an MS in PMM-CONNECTED state. An exception is after an SRNS relocation, in which case the new SRNC shall indicate the RAI to the MS.

All the RA update cases are contained in the procedure illustrated in Figure 36.

NOTE 1: The network may receive an RA update from a UE in PMM-CONNECTED state over a new Iu signalling connection. This could happen when the UE enters PMM-IDLE state on receipt of RRC Connection Release with cause "Directed Signalling connection re-establishment" and initiates an RA or Combined RA update procedure (see clause 6.1.2.4.1).

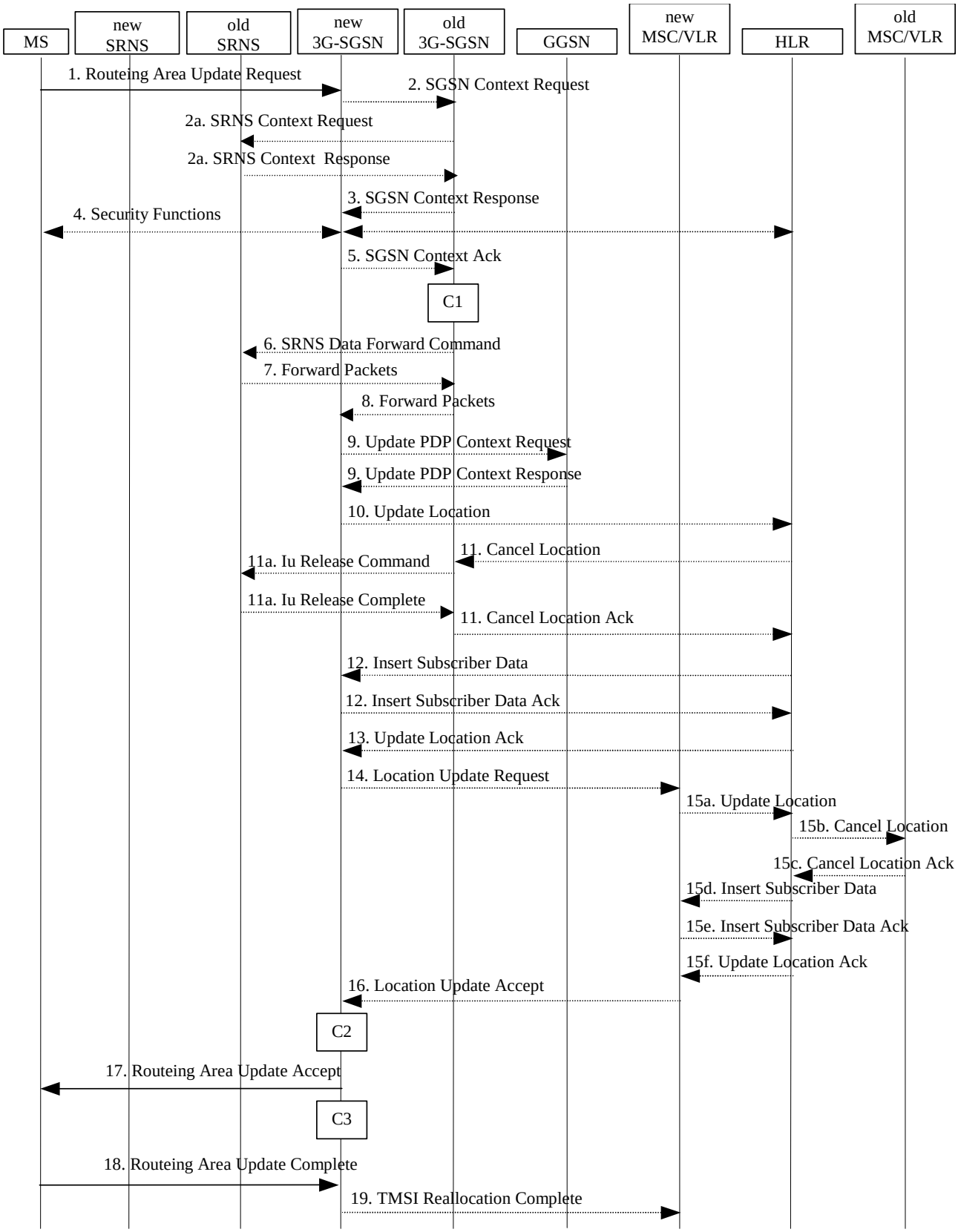


Figure 36: Iu mode RA Update Procedure

1) The RRC connection is established, if not already done. The MS sends a Routeing Area Update Request message (P-TMSI, old RAI, old P-TMSI Signature, Update Type, follow on request, Classmark, DRX Parameters, MS Network Capability) to the new SGSN. The MS shall set a follow-on request if there is pending uplink traffic (signalling or user data). The SGSN may use, as an implementation option, the follow-on request indication to release or keep the Iu connection after the completion of the RA update procedure. Update Type shall indicate:

   - RA Update if the RA Update is triggered by a change of RA;
   - Periodic RA Update if the RA update is triggered by the expiry of the Periodic RA Update timer;
   - Combined RA / LA Update if the MS is also IMSI-attached and the LA update shall be performed in network operation mode I (see clause "Interactions Between SGSN and MSC/VLR"); or
   - Combined RA / LA Update with IMSI attach requested if the MS wants to perform an IMSI attach in network operation mode I.

   The SRNC shall add the Routeing Area Identity including the RAC and LAC of the area where the MS is located before forwarding the message to the 3G-SGSN. This RA identity corresponds to the RAI in the MM system information sent by the SRNC to the MS. Classmark is described in clause "MS Network Capability". DRX Parameters indicates whether or not the MS uses discontinuous reception and the DRX cycle length.

NOTE 2: Sending the Routeing Area Update Request message to the SGSN triggers the establishment of a signalling connection between RAN and SGSN for the concerned MS.

2) If the RA update is an Inter-SGSN Routeing area update and if the MS was in PMM-IDLE state, the new SGSN sends an SGSN Context Request message (old P-TMSI, old RAI, old P-TMSI Signature) to the old SGSN to get the MM and PDP contexts for the MS. If the new SGSN provides functionality for Intra Domain Connection of RAN Nodes to Multiple CN Nodes, the new SGSN may derive the old SGSN from the old RAI and the old P-TMSI and send the SGSN Context Request message to this old SGSN. Otherwise, the new SGSN derives the old SGSN from the old RAI. In any case the new SGSN will derive an SGSN that it believes is the old SGSN. This derived SGSN is itself the old SGSN, or it is associated with the same pool area as the actual old SGSN and it will determine the correct old SGSN from the P-TMSI and relay the message to that actual old SGSN. The old SGSN validates the old P-TMSI Signature and responds with an appropriate error cause if it does not match the value stored in the old SGSN. This should initiate the security functions in the new SGSN. If the security functions authenticate the MS correctly, the new SGSN shall send an SGSN Context Request (IMSI, old RAI, MS Validated) message to the old SGSN. MS Validated indicates that the new SGSN has authenticated the MS. If the old P-TMSI Signature was valid or if the new SGSN indicates that it has authenticated the MS, the old SGSN starts a timer.. If the MS is not known in the old SGSN, the old SGSN responds with an appropriate error cause.

2a) If the MS is PMM-CONNECTED state in the old 3G-SGSN or, in case of an intra-SGSN RA update, if the MS is in the PMM-CONNECTED state and the RAU was received over another Iu connection than the established one, the old SGSN sends an SRNS Context Request (IMSI) message to the old SRNS to retrieve the sequence numbers for the PDP context for inclusion in the SGSN Context Response message. Upon reception of this message, the SRNS buffers and stops sending downlink PDUs to the MS and returns an SRNS Context Response (IMSI, GTP-SNDs, GTP-SNUs, PDCP-SNUs) message. The SRNS shall include for each PDP context the next in-sequence GTP sequence number to be sent to the MS and the GTP sequence number of the next uplink PDU to be tunnelled to the GGSN. For each active PDP context which uses lossless PDCP, the SRNS also includes the uplink PDCP sequence number (PDCP-SNU). PDCP-SNU shall be the next in-sequence PDCP sequence number expected from the MS (per each active radio bearer). No conversion of PDCP sequence numbers to SNDCP sequence numbers shall be done in the 3G-SGSN.

3) The old 3G-SGSN responds with an SGSN Context Response (MM Context, PDP Contexts) message. For each PDP context the old 3G-SGSN shall include the GTP sequence number for the next uplink GTP PDU to be tunnelled to the GGSN and the next downlink GTP sequence number for the next PDU to be sent to the MS. Each PDP Context also includes the PDCP sequence numbers if PDCP sequence numbers are received from the old SRNS. The new 3G-SGSN shall ignore the MS Network Capability contained in MM Context of SGSN Context Response only when it has previously received an MS Network Capability in the Routeing Area Request. The GTP sequence numbers received from the old 3G-SGSN are only relevant if delivery order is required for the PDP context (QoS profile).

4) Security functions may be executed. These procedures are defined in clause "Security Function". If the SGSN Context Response message did not include IMEISV and ADD is supported, the SGSN retrieves the IMEISV from the MS. If the security functions do not authenticate the MS correctly, the routeing area update shall be rejected, and the new SGSN shall send a reject indication to the old SGSN. The old SGSN shall continue as if the SGSN Context Request was never received.

5) If the RA update is an Inter-SGSN Routeing area update, the new SGSN sends an SGSN Context Acknowledge message to the old SGSN. The old SGSN marks in its context that the MSC/VLR association and the information in the GGSNs and the HLR are invalid. This triggers the MSC/VLR, the GGSNs, and the HLR to be updated if the MS initiates a routeing area update procedure back to the old SGSN before completing the ongoing routeing area update procedure.

6) If the MS is in PMM-CONNECTED state in the old 3G-SGSN or, in case of an intra-SGSN RA update, if the MS is PMM connected and the RAU was received over another Iu connection than the established one, the old 3G-SGSN sends an SRNS Data Forward Command (RAB ID, Transport Layer Address, Iu Transport Association) message to the SRNS. Upon receipt of the SRNS Data Forward Command message from the 3G-SGSN, the SRNS shall start the data-forwarding timer.

7) For each indicated RAB the SRNS starts duplicating and tunnelling the buffered GTP PDUs to the old 3G-SGSN. For each radio bearer which uses lossless PDCP the SRNS shall start tunnelling the partly transmitted and the transmitted but not acknowledged PDCP-PDUs together with their related PDCP sequence numbers and start duplicating and tunnelling the buffered GTP PDUs to the old 3G-SGSN. Upon receipt of the SRNS Data Forward Command message from the 3G-SGSN, the SRNS shall start the data-forwarding timer.

8) If the RA update is an Inter-SGSN RA Update, the old 3G-SGSN tunnels the GTP PDUs to the new 3G-SGSN. No conversion of PDCP sequence numbers to SNDCP sequence numbers shall be done in the 3G-SGSN.

9) If the RA update is an Inter-SGSN RA Update and if the MS was not in PMM-CONNECTED state in the new 3G-SGSN, the new SGSN sends Update PDP Context Request (new SGSN Address, QoS Negotiated, Tunnel Endpoint Identifier, serving network identity, CGI/SAI, RAT type) to the GGSNs concerned. The SGSN shall send the serving network identity to the GGSN. The GGSNs update their PDP context fields and return an Update PDP Context Response (Tunnel Endpoint Identifier, Prohibit Payload Compression, APN Restriction). The Prohibit Payload Compression indicates that the SGSN should negotiate no data compression for this PDP context. Note: If the RA update is an Inter-SGSN routeing area update initiated by an MS in PMM-CONNECTED state in the new 3G-SGSN, the Update PDP Context Request message is sent as described in subclause "Serving RNS Relocation Procedures".

10) If the RA update is an Inter-SGSN RA Update, the new SGSN informs the HLR of the change of SGSN by sending Update Location (SGSN Number, SGSN Address, IMSI, IMEISV) to the HLR. IMEISV is sent if the ADD function is supported.

11) If the RA update is an Inter-SGSN RA Update, the HLR sends Cancel Location (IMSI, Cancellation Type) to the old SGSN with Cancellation Type set to Update Procedure. If the timer described in step 2 is not running, the old SGSN removes the MM context. Otherwise, the contexts are removed only when the timer expires. It also ensures that the MM context is kept in the old SGSN in case the MS initiates another inter SGSN routeing area update before completing the ongoing routeing area update to the new SGSN. The old SGSN acknowledges with Cancel Location Ack (IMSI).

11a) On receipt of Cancel Location, if the MS is PMM-CONNECTED in the old 3G-SGSN, the old 3G-SGSN sends an Iu Release Command message to the old SRNC. When the data-forwarding timer has expired, the SRNS responds with an Iu Release Complete message.

12) If the RA update is an inter-SGSN RA Update, the HLR sends Insert Subscriber Data (IMSI, subscription data) to the new SGSN. The new SGSN validates the MS's presence in the (new) RA. If due to regional subscription restrictions or access restrictions the MS is not allowed to be attached in the RA, the SGSN rejects the Routeing Area Update Request with an appropriate cause, and may return an Insert Subscriber Data Ack (IMSI, SGSN Area Restricted) message to the HLR. If all checks are successful, the SGSN constructs an MM context for the MS and returns an Insert Subscriber Data Ack (IMSI) message to the HLR.

13) If the RA update is an Inter-SGSN RA Update, the HLR acknowledges the Update Location by sending Update Location Ack (IMSI) to the new SGSN.

14) If Update Type indicates combined RA / LA update with IMSI attach requested, or if the LA changed with the routeing area update, the association has to be established, and the new SGSN sends a Location Update Request

(new LAI, IMSI, SGSN Number, Location Update Type) to the VLR. Location Update Type shall indicate IMSI attach if Update Type in step 1 indicated combined RA / LA update with ISI attach requested. Otherwise, Location Update Type shall indicate normal location update. When the SGSN does not provide functionality for the Intra Domain Connection of RAN Nodes to Multiple CN Nodes, the VLR number is derived from the RAI. When the SGSN provides functionality for Intra Domain Connection of RAN Nodes to Multiple CN Nodes, the SGSN uses the RAI and a hash value from the IMSI to determine the VLR number. The SGSN starts the location update procedure towards the new MSC/VLR upon receipt of the first Insert Subscriber Data message from the HLR in step 8). The VLR creates or updates the association with the SGSN by storing SGSN Number. In networks that support network sharing, the Location Update Request includes the identity of the selected core network operator if the SGSN has received this information from the RNS, as described in TS 23.251 [83].

15) If the subscriber data in the VLR is marked as not confirmed by the HLR, the new VLR informs the HLR. The HLR cancels the old VLR and inserts subscriber data in the new VLR:

   a) The new VLR sends an Update Location (new VLR) to the HLR.

   b) The HLR cancels the data in the old VLR by sending Cancel Location (IMSI) to the old VLR.

   c) The old VLR acknowledges with Cancel Location Ack (IMSI).

   d) The HLR sends Insert Subscriber Data (IMSI, subscriber data) to the new VLR.

   e) The new VLR acknowledges with Insert Subscriber Data Ack (IMSI).

   f) The HLR responds with Update Location Ack (IMSI) to the new VLR.

16) The new VLR allocates a new TMSI and responds with Location Update Accept (VLR TMSI) to the SGSN. VLR TMSI is optional if the VLR has not changed.

17) The new SGSN validates the MS's presence in the new RA. If due to roaming restrictions or access restrictions the MS is not allowed to be attached in the RA, or if subscription checking fails, the SGSN rejects the routeing area update with an appropriate cause. If all checks are successful, the new SGSN establishes MM context for the MS. The new SGSN responds to the MS with Routeing Area Update Accept (P-TMSI, VLR TMSI, P-TMSI Signature).

18) The MS confirms the reallocation of the TMSIs by returning a Routeing Area Update Complete message to the SGSN.

19) The new SGSN sends a TMSI Reallocation Complete message to the new VLR if the MS confirms the VLR TMSI.

NOTE 3: Steps 15, 16, and 19 are performed only if step 14 is performed.

NOTE: The new SGSN may initiate RAB establishment after execution of the security functions (step 4), or wait until completion of the RA update procedure. For the MS, RAB establishment may occur anytime after the RA update request is sent (step 1).

In the case of a rejected routeing area update operation, due to regional subscription, roaming restrictions, or access restrictions (see TS 23.221 [80] and TS 23.008 [79]) the new SGSN shall not construct an MM context. A reject shall be returned to the MS with an appropriate cause. The MS shall not re-attempt a routeing area update to that RA.

If the new SGSN is unable to update the PDP context in one or more GGSNs, the new SGSN shall deactivate the corresponding PDP contexts as described in subclause "SGSN-initiated PDP Context Deactivation Procedure". This shall not cause the SGSN to reject the routeing area update.

The PDP Contexts shall be sent from old to new SGSN in a prioritized order, i.e. the most important PDP Context first in the SGSN Context Response message. (The prioritization method is implementation dependent, but should be based on the current activity.)

The new SGSN shall determine the Maximum APN restriction based on the received APN Restriction of each PDP context from the GGSN and then store the new Maximum APN restriction value.

If the new SGSN is unable to support the same number of active PDP contexts as received from old SGSN, the new SGSN should use the prioritisation sent by old SGSN as input when deciding which PDP contexts to maintain active and which ones to delete. In any case, the new SGSN shall first update all contexts in one or more GGSNs and then

deactivate the context(s) that it cannot maintain as described in subclause "SGSN-initiated PDP Context Deactivation Procedure". This shall not cause the SGSN to reject the routeing area update.

NOTE: In case MS was in PMM-CONNECTED state the PDP Contexts are sent already in the Forward Relocation Request message as described in subclause “Serving RNS relocation procedures”.

If the routeing area update procedure fails a maximum allowable number of times, or if the SGSN returns a Routeing Area Update Reject (Cause) message, the MS shall enter PMM-DETACHED state.

If the Location Update Accept message indicates a reject, this should be indicated to the MS, and the MS shall not access non-PS services until a successful location update is performed.

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

C1) CAMEL_GPRS_PDP_Context_Disconnection, CAMEL_GPRS_Detach and CAMEL_PS_Notification.

They are called in the following order:

- The CAMEL_GPRS_PDP_Context_Disconnection procedure is called several times: once per PDP context. The procedure returns as result "Continue".

- Then the CAMEL_GPRS_Detach procedure is called once. The procedure returns as result "Continue".

- Then the CAMEL_PS_Notification procedure is called once. The procedure returns as result "Continue".

C2) CAMEL_GPRS_Routeing_Area_Update_Session and CAMEL_PS_Notification.

They are called in the following order:

- The CAMEL_GPRS_Routeing_Area_Update_Session procedure is called. The procedure returns as result "Continue".

- Then the CAMEL_PS_Notification procedure is called. The procedure returns as result "Continue".

C3) CAMEL_GPRS_Routeing_Area_Update_Context.

This procedure is called several times: once per PDP context. It returns as result "Continue".

********** END OF CHANGE

********** BEGINNING OF CHANGE

6.13.1.2 A/Gb mode to Iu mode Intra-SGSN Change

The intersystem change from A/Gb mode to Iu mode takes place when a GPRS-attached MS changes from A/Gb mode to GERAN or UTRAN Iu mode. Depending on the GPRS mobility management state before the intersystem change and whether the RA is changed or not, one of the following procedures is initiated by the MS:

- When an MS in STANDBY state changes to Iu mode inside the current RA, the MS shall follow the selective RA update procedures, see clause "Selective RA Update".

- When an MS in STANDBY state changes to Iu mode and the RA changes, the MS shall initiate the Iu mode RA update procedure, see clause "Routeing Area Update Procedure".

- When an MS in READY state changes to Iu mode independent of whether the RA has changed or not, the MS shall initiate the Iu mode RA update procedure and afterwards initiate the RABs by the Service Request procedure, see clause "MS Initiated Service Request Procedure". The RA update procedure is either combined RA / LA update or only RA update.

If the network operates in mode I, an MS that is both PS-attached and CS-attached shall perform the Combined RA / LA Update procedure. This concerns only idle mode (see 3GPP TS 23.122), as no combined RA / LA updates are performed during a CS connection. In the context of this specification, the terms RNS or RNC refer also to a GERAN BSS or BSC (respectively) when serving an MS in Iu mode.

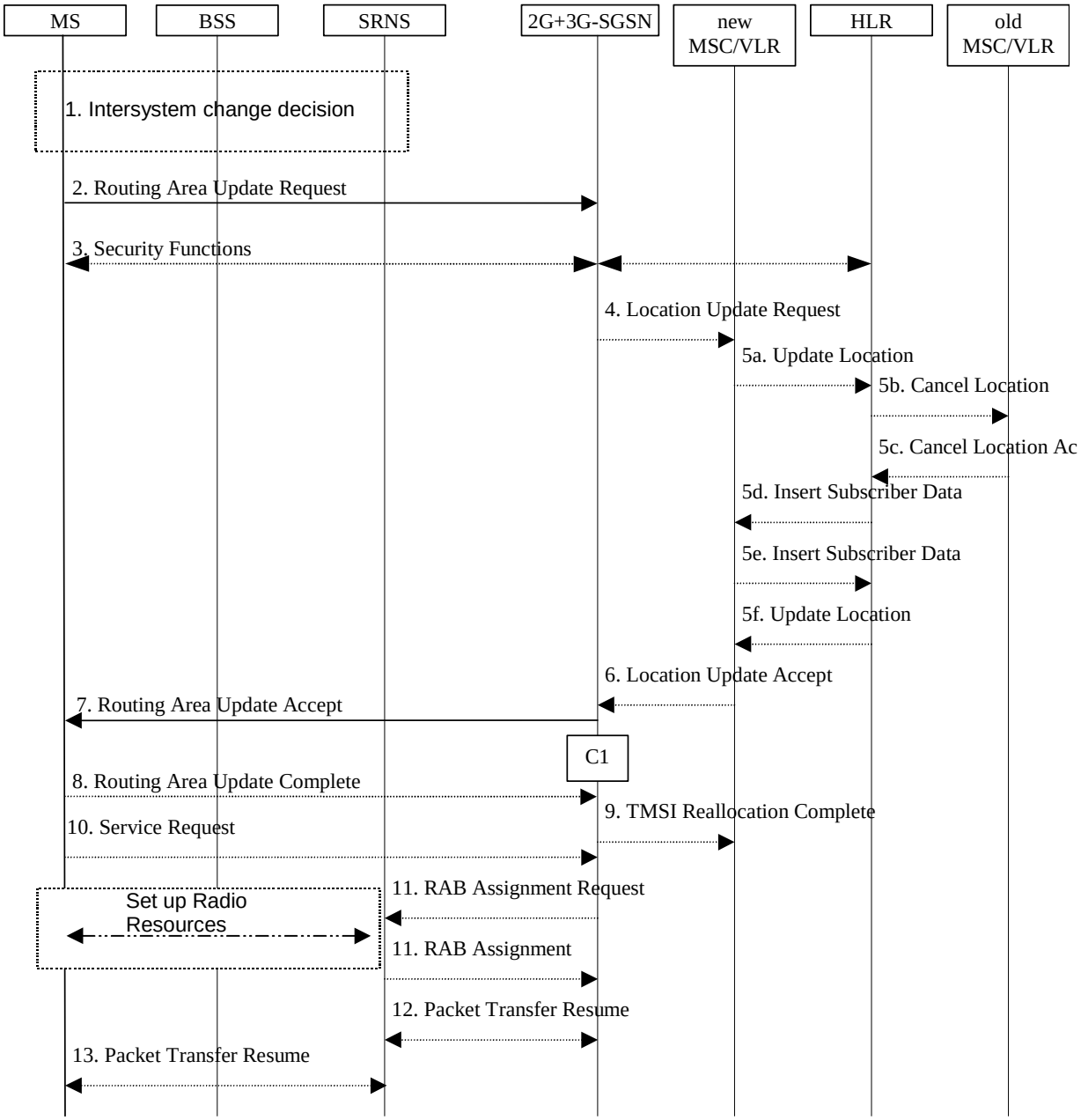


Figure 53: A/Gb mode to Iu mode Intra SGSN Change

1) The MS or the RAN decides to perform an intersystem change which makes the MS switch to a new cell where Iu mode has to be used, and stops transmission to the network.

2) The MS initiates an RRC connection establishment and sends a Routeing Area Update Request (P-TMSI, Old RA, Old P-TMSI Signature, Update Type, CM) message to the combined 2G+3G-SGSN. Update Type shall indicate RA update or combined RA / LA update or, if the MS wants to perform an IMSI attach, combined RA / LA update with IMSI attach requested and also if the MS has a follow on request, i.e. if there is pending uplink traffic (signalling or data). The SGSN may use, as an implementation option, the follow-on request indication to release or keep the Iu connection after the completion of the RA update procedure. The SRNS shall add an identifier of the area where the message was received before passing the message to the 2G+3G-SGSN. The 2G+3G-SGSN stops transmission of N-PDUs to the MS.

3) Security functions may be executed.

4) If the association has to be established i.e. if Update Type indicates combined RA / LA update with IMSI attach requested, or if the LA changed with the routeing area update, the 2G+3G-SGSN sends a Location Update Request (new LAI, IMSI, SGSN Number, Location Update Type) to the VLR. Location Update Type shall indicate IMSI attach if Update Type in step 1 indicated combined RA / LA update with IMSI attach requested. Otherwise, Location Update Type shall indicate normal location update. When the SGSN does not provide functionality for the Intra Domain Connection of RAN Nodes to Multiple CN Nodes, the VLR number is derived from the RAI. When the SGSN provides functionality for Intra Domain Connection of RAN Nodes to Multiple CN Nodes, the SGSN uses the RAI and a hash value from the IMSI to determine the VLR number. The VLR creates or updates the association with the 2G+3G-SGSN by storing SGSN Number. In networks that support network sharing, the Location Update Request includes the identity of the selected core network operator if the SGSN has received this information from the RNS, as described in TS 23.251 [83].

5) If the subscriber data in the VLR is marked as not confirmed by the HLR, the new VLR informs the HLR. The HLR cancels the data in the old VLR and inserts subscriber data in the new VLR:

   a) The new VLR sends an Update Location (new VLR) to the HLR.

   b) The HLR cancels the data in the old VLR by sending Cancel Location (IMSI) to the old VLR.

   c) The old VLR acknowledges with Cancel Location Ack (IMSI).

   d) The HLR sends Insert Subscriber Data (IMSI, subscriber data) to the new VLR.

   e) The new VLR acknowledges with Insert Subscriber Data Ack (IMSI).

   f) The HLR responds with Update Location Ack (IMSI) to the new VLR.

6) The new VLR allocates a new VLR TMSI and responds with Location Update Accept (VLR TMSI) to the 2G+3G-SGSN. VLR TMSI is optional if the VLR has not changed.

7) The 2G+3G-SGSN validates the MS's presence in the new RA. If due to roaming restrictions or access restrictions the MS is not allowed to be attached in the RA, or if subscription checking fails, the 2G+3G-SGSN rejects the routeing area update with an appropriate cause. If all checks are successful, the 2G+3G-SGSN updates MM and PDP contexts for the MS. A new P-TMSI may be allocated. A Routeing Area Update Accept (P-TMSI, P-TMSI Signature) message is returned to the MS. The 2G+3G-SGSN derives for this intersystem change the corresponding PDCP sequence numbers from the N-PDU sequence numbers stored in the SGSN PDP contexts by adding eight most significant bits "1". These PDCP sequence numbers are stored in the SGSN PDP contexts.

8) The MS acknowledges the new P-TMSI by returning a Routeing Area Update Complete message to the SGSN.

9) The 2G+3G-SGSN sends a TMSI Reallocation Complete message to the VLR if the MS confirms the VLR TMSI.

10) If the MS has pending uplink data or signalling, it shall send a Service Request (P-TMSI, RAI, CKSN, Service Type) message to the SGSN. Service Type specifies the requested service. Service Type shall indicate one of the following: Data or Signalling.

11) The 2G+3G-SGSN requests the SRNS to establish a radio access bearer by sending a RAB Assignment Request (RAB ID(s), QoS Profile(s), GTP-SNDs, GTP-SNUs, PDCP-SNUs) message to the SRNS. The PDCP sequence numbers are derived from the N-PDU sequence numbers and stored in the PDP contexts in step 7). The SRNS sends a Radio Bearer Setup Request (PDCP-SNUs) message to the MS. The MS responds with a Radio Bearer Setup Complete (PDCP-SNDs) message. The SRNS responds with a RAB Assignment Response message.

NOTE: The NSAPI value is carried in the RAB ID IE.

12) Traffic flow is resumed between the 2G+3G-SGSN and the SRNS. N-PDUs that were already sent to the MS in acknowledged mode SNDCP and that are not yet acknowledged by the MS are tunnelled by the 2G+3G-SGSN to the SRNS together with their related N-PDU number (SNDCP sequence number). No PDCP sequence numbers shall be indicated for these N-PDUs. The SRNS shall discard all N-PDUs with N-PDU sequence numbers older than the eight least significant bits of PDCP-SND received from the MS. Other N-PDUs shall be transmitted to the MS. The MS shall discard all N-PDUs with sequence numbers older than the eight least significant bits of the PDCP-SNU received from the SRNS. All other N-PDUs shall be transmitted to the SRNS. The SRNS negotiates with the MS for each radio bearer the use of lossless PDCP or not regardless whether the old 2G-SGSN used acknowledged or unacknowledged SNDCP for the related NSAPI or not.

13) The traffic flow is resumed between the SRNS and the MS.

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

C1) CAMEL_GPRS_Routeing_Area_Update_Session, CAMEL_PS_Notification and CAMEL_GPRS_Routeing_Area_Update_Context.

- The procedure CAMEL_GPRS_Routeing_Area_Update_Session is called once relative to the session. In Figure 53, the procedure returns as result "Continue".
- Then the procedures CAMEL_PS_Notification is called once relative to the session. The procedure returns as result "Continue".
- Then the procedure CAMEL_GPRS_Routeing_Area_Update_Context is called once per PDP context. In Figure 53, the procedure returns as result "Continue".

6.13.1.3 Selective RA Update

The MS shall use the following procedures when in STANDBY or PMM-IDLE state.

Note that upon expiry of the periodic RA update timer, the MS shall carry out the periodic routeing area update procedure.

6.13.1.3.1 Uplink Signalling or Data Transmission

In STANDBY or PMM-IDLE state the MS shall not perform an RA update procedure until uplink data or signalling information is to be sent from the MS.

If the MS is in the same mode (A/Gb mode or Iu mode) as when it last sent data or signalling, the procedures defined for that mode shall be followed. This shall be the sending of an LLC PDU in A/Gb mode, or for example sending of a Service Request message in Iu mode.

If the MS is in a different mode (A/Gb mode or Iu mode) as when it last sent data or signalling, the RA update procedure shall be performed before the sending of data or signalling. The RA update procedure needs not be performed if the signalling message is a power-off detach.

********** END OF CHANGE

********** BEGINNING OF CHANGE

6.13.2.2 A/Gb mode to Iu mode Inter-SGSN Change

The inter-system change from A/Gb mode to Iu mode takes place when a GPRS-attached MS changes from A/Gb mode to UTRAN or GERAN Iu mode and the new RAN node serving the MS is served by a different SGSN. In this case the RA changes. Therefore, the MS shall initiate a Iu mode RA update procedure by establishing an RRC connection and initiating the RA update procedure. The RA update procedure is either combined RA / LA update or only RA update, these RA update cases are illustrated in Figure 55. In the context of this specification, the terms RNS or RNC refer also to a GERAN BSS or BSC (respectively) when serving an MS in Iu mode.

If the network operates in mode I, then an MS, that is both PS-attached and CS-attached, shall perform the Combined RA / LA Update procedures. This concerns only idle mode (see 3GPP TS 23.122), as no combined RA / LA updates are performed during a CS connection.

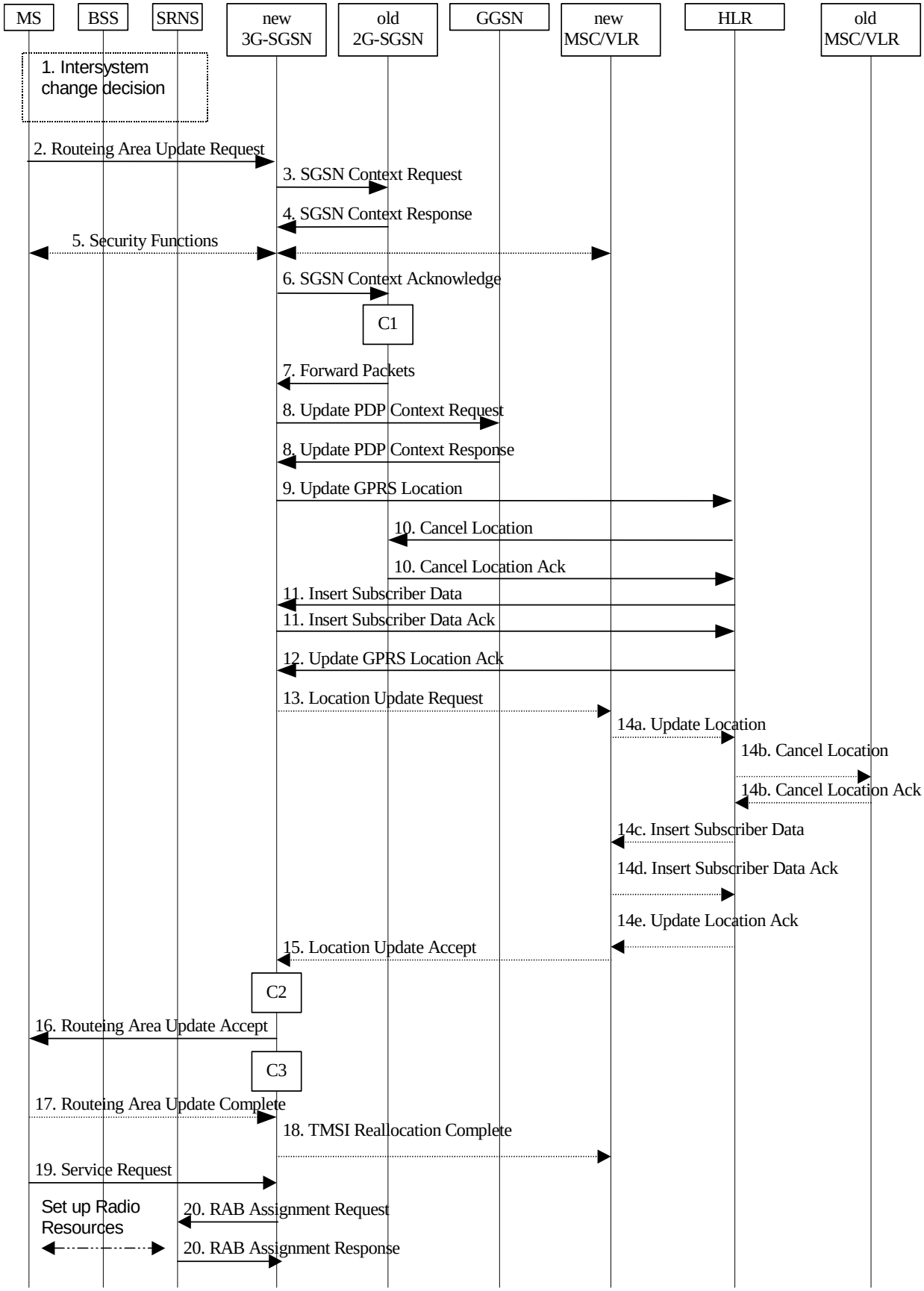


Figure 55: A/Gb mode to Iu mode Inter SGSN Change

1) The MS or RAN decides to perform an inter-system change, which makes the MS switch to a new cell where Iu mode has to be used, and stops transmission to the network.

2) The MS sends a Routeing Area Update Request (P-TMSI, old RAI, old P-TMSI Signature, Update Type, CM, MS Network Capability) message to the new 3G-SGSN. Update Type shall indicate RA update or combined RA / LA update, or, if the MS wants to perform an IMSI attach, combined RA / LA update with IMSI attach requested, and also if the MS has a follow-on request, i.e. if there is pending uplink traffic (signalling or data). The SGSN may use, as an implementation option, the follow-on request indication to release or keep the Iu connection after the completion of the RA update procedure. The SRNC shall add the Routeing Area Identity including the RAC and LAC of the area where the MS is located before forwarding the message to the 3G-SGSN. This RA identity corresponds to the RAI in the MM system information sent by the SRNC to the MS.

3) The new 3G-SGSN uses the old RAI received from the MS to derive the old 2G-SGSN address, and sends an SGSN Context Request (old RAI, old P-TMSI, New SGSN Address) message to the old 2G-SGSN to get the MM and PDP contexts for the MS. If the new SGSN provides functionality for Intra Domain Connection of RAN Nodes to Multiple CN Nodes, the new SGSN may derive the old SGSN from the old RAI and the old P-TMSI and send the SGSN Context Request message to this old SGSN. Otherwise, the new SGSN derives the old SGSN from the old RAI. In any case the new SGSN will derive an SGSN that it believes is the old SGSN. This derived SGSN is itself the old SGSN, or it is associated with the same pool area as the actual old SGSN and it will determine the correct old SGSN from the P-TMSI and relay the message to that actual old SGSN. The old 2G-SGSN validates the old P-TMSI Signature and responds with an appropriate error cause if it does not match the value stored in the old 2G-SGSN. If the received old P-TMSI Signature does not match the stored value, the old 2G-SGSN should initiate the security functions in the new 3G-SGSN. If the security functions authenticate the MS correctly, the new 3G-SGSN shall send an SGSN Context Request (old RAI, IMSI, MS Validated, New SGSN Address) message to the old 2G-SGSN. MS Validated indicates that the new 3G-SGSN has authenticated the MS. If the old P-TMSI Signature was valid or if the new 3G-SGSN indicates that it has authenticated the MS correctly, the old 2G-SGSN starts a timer and stops the transmission of N-PDUs to the MS.

4) The old 2G-SGSN responds with an SGSN Context Response (MM Context, PDP Contexts) message. Each PDP Context includes the GTP sequence number for the next downlink N-PDU to be sent to the MS and the GTP sequence number for the next uplink N-PDU to be tunnelled to the GGSN. Each PDP Context also includes the SNDCP Send N-PDU Number for the next downlink N-PDU to be sent in acknowledged mode SNDCP to the MS and the SNDCP Receive N-PDU Number for the next uplink N-PDU to be received in acknowledged mode SNDCP from the MS. The new 3G-SGSN derives the corresponding PDCP sequence numbers from these N-PDU sequence numbers by adding eight most significant bits "1". These PDCP sequence numbers are stored in the 3G-SGSN PDP contexts. The new 3G-SGSN shall ignore the MS Network Capability contained in MM Context of SGSN Context Response only when it has previously received an MS Network Capability in the Routeing Area Request.

5) Security functions may be executed. If the SGSN Context Response message did not include IMEISV and the ADD function is supported by the new 3G-SGSN, then the IMEISV shall be retrieved from the MS.

6) The new 3G-SGSN sends an SGSN Context Acknowledge message to the old 2G-SGSN. This informs the old 2G-SGSN that the new 3G-SGSN is ready to receive data packets belonging to the activated PDP contexts. The old SGSN marks in its context that the MSC/VLR association and the information in the GGSNs and the HLR are invalid. This triggers the MSC/VLR, the GGSNs, and the HLR to be updated if the MS initiates a routeing area update procedure back to the old SGSN before completing the ongoing routeing area update procedure.

7) The old 2G-SGSN duplicates the buffered N-PDUs and starts tunnelling them to the new 3G-SGSN. Additional N-PDUs received from the GGSN before the timer described in step 3 expires are also duplicated and tunnelled to the new 3G-SGSN. N-PDUs that were already sent to the MS in acknowledged mode SNDCP and that are not yet acknowledged by the MS are tunnelled together with their related SNDCP N-PDU sequence number. No PDCP sequence numbers shall be indicated for these N-PDUs. No N-PDUs shall be forwarded to the new 3G-SGSN after expiry of the timer described in step 3.

8) The new 3G-SGSN sends an Update PDP Context Request (new SGSN Address, TEID, QoS Negotiated, serving network identity, CGI/SAI, RAT type) message to each GGSN concerned. The SGSN shall send the serving network identity to the GGSN. Each GGSN updates its PDP context fields and returns an Update PDP Context Response (TEID, Prohibit Payload Compression, APN Restriction) message. The Prohibit Payload Compression indicates that the SGSN should negotiate no data compression for this PDP context.

9) The new 3G-SGSN informs the HLR of the change of SGSN by sending an Update GPRS Location (SGSN Number, SGSN Addr ess, IMSI, IMEISV) message to the HLR. IMEISV is sent if the ADD function is supported.

10) The HLR sends a Cancel Location (IMSI, Cancellation Type) message to the old 2G-SGSN. The old 2G-SGSN removes the MM and PDP contexts if the timer described in step 3 is not running. If the timer is running, the MM and PDP contexts are removed when the timer expires. The old 2G-SGSN acknowledges with a Cancel Location Ack (IMSI) message.

11) The HLR sends an Insert Subscriber Data (IMSI, GPRS Subscription Data) message to the new 3G-SGSN. The 3G-SGSN constructs an MM context for the MS and returns an Insert Subscriber Data Ack (IMSI) message to the HLR.

12) The HLR acknowledges the Update GPRS Location by returning an Update GPRS Location Ack (IMSI) message to the new 3G-SGSN.

13) If the association has to be established, if Update Type indicates combined RA / LA update with IMSI attach requested, or if the LA changed with the routeing area update, the new SGSN sends a Location Update Request (new LAI, IMSI, SGSN Number, Location Update Type) to the VLR. Location Update Type shall indicate IMSI attach if Update Type in step 1 indicated combined RA / LA update with IMSI attach requested. Otherwise, Location Update Type shall indicate normal location update. When the SGSN does not provide functionality for the Intra Domain Connection of RAN Nodes to Multiple CN Nodes, the VLR number is derived from the RAI. When the SGSN provides functionality for Intra Domain Connection of RAN Nodes to Multiple CN Nodes, the SGSN uses the RAI and a hash value from the IMSI to determine the VLR number. The 3G-SGSN starts the location update procedure towards the new MSC/VLR upon receipt of the first Insert Subscriber Data message from the HLR in step 12). The VLR creates or updates the association with the 3G-SGSN by storing SGSN Number. In networks that support network sharing, the Location Update Request includes the identity of the selected core network operator if the new 3G-SGSN has received this information from the RNS, as described in TS 23.251 [83].

14) If the subscriber data in the VLR is marked as not confirmed by the HLR, the new VLR informs the HLR. The HLR cancels the old VLR and inserts subscriber data in the new VLR:

   a) The new VLR sends an Update Location (new VLR) to the HLR.

   b) The HLR cancels the data in the old VLR by sending Cancel Location (IMSI) to the old VLR.

   c) The old VLR acknowledges with Cancel Location Ack (IMSI).

   d) The HLR sends Insert Subscriber Data (IMSI, subscriber data) to the new VLR.

   e) The new VLR acknowledges with Insert Subscriber Data Ack (IMSI).

   f) The HLR responds with Update Location Ack (IMSI) to the new VLR.

15) The new VLR allocates a new TMSI and responds with Location Update Accept (VLR TMSI) to the 3G-SGSN. VLR TMSI is optional if the VLR has not changed.

16) The new 3G-SGSN validate the MS's presence in the new RA. If due to roaming restrictions or access restrictions the MS is not allowed to be attached in the RA, or if subscription checking fails, the new 3G-SGSN rejects the routeing area update with an appropriate cause. If all checks are successful, the new 3G-SGSN constructs MM and PDP contexts for the MS. The new 3G-SGSN responds to the MS with a Routeing Area Update Accept (P-TMSI, P-TMSI signature) message.

17) The MS acknowledges the new P-TMSI by returning a Routeing Area Update Complete message to the SGSN.

18) The new 3G-SGSN sends TMSI Reallocation Complete message to the new VLR, if the MS confirms the VLR TMSI.

19) If the MS has uplink data or signalling pending it shall send a Service Request (P-TMSI, RAI, CKSN, Service Type) message to the SGSN. Service Type specifies the requested service. Service Type shall indicate one of the following: Data or Signalling.

20) If the MS has sent the Service Request, the new 3G-SGSN requests the SRNS to establish a radio access bearer by sending a RAB Assignment Request (RAB ID(s), QoS Profile(s), GTP-SNDs, GTP-SNUs, PDCP-SNUs) message to the SRNS. The PDCP sequence numbers are derived from the N-PDU sequence numbers in step 4) and stored in the SGSN PDP contexts. The SRNS sends a Radio Bearer Setup Request (PDCP-SNUs) message to the MS. The MS responds with a Radio Bearer Setup Complete (PDCP-SNDs) message. The MS deducts PDCP-SND from its Receive N-PDU Number by adding eight most significant bits "1". The SRNS responds

with a RAB Assignment Response message. The SRNS shall discard all N-PDUs tunnelled from the SGSN with N-PDU sequence numbers older than the eight least significant bits of the PDCP-SNDs received from the MS. Other N-PDUs shall be transmitted to the MS. The MS shall discard all N-PDUs with SNDCP sequence numbers older than the eight least significant bits of the PDCP-SNUs received from the SRNS. Other N-PDUs shall be transmitted to the SRNS. The SRNS negotiates with the MS for each radio bearer the use of lossless PDCP or not regardless whether the old 2G-SGSN used acknowledged or unacknowledged SNDCP for the related NSAPI or not.

NOTE: The NSAPI value is carried in the RAB ID IE.

NOTE: The new SGSN may initiate RAB establishment after execution of the security functions (step 5), or wait until completion of the RA update procedure. For the MS, RAB establishment may occur anytime after the RA update request is sent (step 2).

If the new SGSN is unable to update the PDP context in one or more GGSNs, the new SGSN shall deactivate the corresponding PDP contexts as described in subclause "SGSN-initiated PDP Context Deactivation Procedure". This shall not cause the SGSN to reject the routeing area update.

The PDP Contexts shall be sent from old to new SGSN in a prioritized order, i.e. the most important PDP Context first in the SGSN Context Response message. (The prioritization method is implementation dependent, but should be based on the current activity.)

The new SGSN shall determine the Maximum APN restriction based on the received APN Restriction of each PDP context from the GGSN and then store the new Maximum APN restriction value.

If the new SGSN is unable to support the same number of active PDP contexts as received from old SGSN, the new SGSN should use the prioritisation sent by old SGSN as input when deciding which PDP contexts to maintain active and which ones to delete. In any case, the new SGSN shall first update all contexts in one or more GGSNs and then deactivate the context(s) that it cannot maintain as described in subclause "SGSN-initiated PDP Context Deactivation Procedure". This shall not cause the SGSN to reject the routeing area update.

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

C1) CAMEL_GPRS_PDP_Context_Disconnection, CAMEL_GPRS_Detach and CAMEL_PS_Notification.

They are called in the following order:

- The CAMEL_GPRS_PDP_Context_Disconnection procedure is called several times: once per PDP context. The procedure returns as result "Continue".
- Then the CAMEL_GPRS_Detach procedure is called once. It returns as result "Continue".
- Then the CAMEL_PS_Notification procedure is called once. It returns as result "Continue".

C2) CAMEL_GPRS_Routeing_Area_Update_Session and CAMEL_PS_Notification.

They are called in the following order:

- The CAMEL_GPRS_Routeing_Area_Update_Session procedure is called. The procedure returns as result "Continue".
- Then the CAMEL_PS_Notification procedure is called. The procedure returns as result "Continue".

C3) CAMEL_GPRS_Routeing_Area_Update_Context

This procedure is called several times: once per PDP context. It returns as result "Continue".

6.14 Classmark Handling

To support efficient radio interface usage in GPRS, the MS classmark is handled differently for SGSN-based services than for MSC-based services. In particular, the classmark information is sent in MM and Iu mode RRC messages to the network and stored in the network as long as the MS is attached, avoiding redundant classmark retransmissions over the radio interface. This is sometimes called the "idle-mode classmark" principle.

********** END OF CHANGE

********** BEGINNING OF CHANGE

13.2 SGSN

SGSN maintains MM context and PDP context information for MSs in the STANDBY, READY, PMM-IDLE, and PMM-CONNECTED states. Table 6 shows the context fields for one MS.

During the Intersystem Change, when new Authentication and Key Agreement is not performed, the KSI in the new 3G-SGSN shall be assigned the value of the CKSN, which has been sent by the MS. Similarly, in the new 2G-SGSN, when AKA does not take place, the CKSN shall be assigned the value of the KSI, which has been sent by the MS.

Table 6: SGSN MM and PDP Contexts

Field	Description	A/Gb mode	Iu mode
IMSI	IMSI is the main reference key.	X	X
MM State	Mobility management state, IDLE, STANDBY, READY, PMM-DETACHED, PMM-IDLE, or PMM-CONNECTED.	X	X
P-TMSI	Packet Temporary Mobile Subscriber Identity.	X	X
P-TMSI Signature	A signature used for identification checking purposes.	X	X
IMEI	International Mobile Equipment Identity	X	X
SVN	Software Version Number (stored by SGSNs supporting the "Provision of UE Specific Behaviour Information to Network Entities" feature as defined in 3GPP TS 23.195 [76].)	3)	X
MSISDN	The basic MSISDN of the MS.	X	X
Routeing Area	Current routeing area.	X	X
Cell Identity	Current cell in READY state, last known cell in STANDBY or IDLE state.	X	
Cell Identity Age	Time elapsed since the last LLC PDU was received from the MS at the SGSN.	X	
Service Area Code	Last known SAC when initial UE message was received or Location Reporting procedure was executed.		X
Service Area Code Age	Time elapsed since the last SAC was received at the 3G-SGSN.		X
VLR Number	The VLR number of the MSC/VLR currently serving this MS.	X	X
New SGSN Address	The IP address of the new SGSN where buffered and not sent N-PDUs should be forwarded to.	X	X
Authentication Vectors	Authentication and ciphering parameters (authentication triplets or quintets)..	X	X
Kc	Currently used A/Gb mode ciphering key.	X	2)
CKSN	Ciphering key sequence number of Kc.	X	2)
Ciphering algorithm	Selected ciphering algorithm.	X	X
CK	Currently used Iu mode ciphering key.	1)	X
IK	Currently used Iu mode integrity key.	1)	X
KSI	Key Set Identifier.	1)	X
MS Radio Access Capability	MS radio access capabilities.	X	
MS Network Capability	MS network capabilities.	X	X
DRX Parameters	Discontinuous reception parameters.	X	X
MNRG	Indicates whether activity from the MS shall be reported to the HLR.	X	X
NGAF	Indicates whether activity from the MS shall be reported to the MSC/VLR.	X	X
PPF	Indicates whether paging for PS and CS services can be initiated.	X	X
Subscribed Charging Characteristics	The charging characteristics for the MS, e.g. normal, prepaid, flat-rate, and/or hot billing subscription.	X	X
Selected CN operator id	Selected core network operator idenity (to support network sharing as defined in TS 23.251 [83]).		4)
Trace Reference	Identifies a record or a collection of records for a particular trace.	X	X
Trace Type	Indicates the type of trace.	X	X
Trigger Id	Identifies the entity that initiated the trace.	X	X
OMC Identity	Identifies the OMC that shall receive the trace record(s).	X	X
SMS Parameters	SMS-related parameters, e.g. operator-determined barring.	X	X
Recovery	Indicates if HLR or VLR is performing database recovery.	X	X
Radio Priority SMS	The RLC/MAC radio priority level for uplink SMS transmission.	X	
GPRS-CSI	Optional GPRS CAMEL subscription information, see 3GPP TS 23.016	X	X
MG-CSI	Optional Mobility Management for GPRS CAMEL subscription information, see 3GPP TS 23.016.	X	X
ODB for PS parameters	Indicates that the status of the operator determined barring for packet oriented services.	X	X
Each MM context contains zero or more of the following PDP contexts:			
PDP Context Identifier	Index of the PDP context.	X	X
PDP State	Packet data protocol state, INACTIVE or ACTIVE.	X	X
PDP Type	PDP type, e.g. PPP or IP.	X	X
PDP Address	PDP address, e.g. an IP address.	X	X
APN Subscribed	The APN received from the HLR.	X	X
APN in Use	The APN currently used. This APN shall be composed of the APN Network Identifier and the APN Operator Identifier.	X	X
NSAPI	Network layer Service Access Point Identifier.	X	X
TI	Transaction Identifier.	X	X

Field	Description	A/Gb mode	Iu mode
TEID for Gn/Gp	Tunnel Endpoint Identifier for the Gn and Gp interfaces.	X	X
TEID for Iu	Tunnel Endpoint Identifier for the Iu interface.		X
GGSN Address in Use	The IP address of the GGSN currently used.	X	X
VPLMN Address Allowed	Specifies whether the MS is allowed to use the APN in the domain of the HPLMN only, or additionally the APN in the domain of the VPLMN.	X	X
QoS Profile Subscribed	The quality of service profile subscribed.	X	X
QoS Profile Requested	The quality of service profile requested.	X	X
QoS Profile Negotiated	The quality of service profile negotiated.	X	X
Radio Priority	The RLC/MAC radio priority level for uplink user data transmission.	X	
Packet Flow Id	Packet flow identifier.	X	
Aggregate BSS QoS Profile Negotiated	The aggregate BSS quality of service profile negotiated for the packet flow that this PDP context belongs to.	X	
Send N-PDU Number	SNDCP sequence number of the next downlink N-PDU to be sent to the MS.	X	
Receive N-PDU Number	SNDCP sequence number of the next uplink N-PDU expected from the MS.	X	
GTP-SND	GTP-U sequence number of the next downlink N-PDU to be sent to the MS.	X	X
GTP-SNU	GTP-U sequence number of the next uplink N-PDU to be sent to the GGSN.	X	X
PDCP-SND	Sequence number of the next downlink in-sequence PDCP-PDU to be sent to the MS.		X
PDCP-SNU	Sequence number of the next uplink in-sequence PDCP-PDU expected from the MS.		X
Charging Id	Charging identifier, identifies charging records generated by SGSN and GGSN.	X	X
PDP Context Charging Characteristics	The charging characteristics of this PDP context, e.g. normal, prepaid, flat-rate, and/or hot billing.	X	X
RNC Address in Use	The IP address of the RNC/BSC currently used.		X

The information marked with a "1)" in table 6 may be maintained if authentication is performed by the UMTS authentication procedure.

The information marked with a "2)" in table 6 may be maintained if authentication is performed by the GSM authentication procedure.

The information marked with a "3)" in table 6 is optional. It can be sent to a new SGSN at RA update.

The information marked with a "4)" in table 6 is used in networks that support network sharing as defined in TS 23.251 [83].

13.3 GGSN

GGSN maintains activated PDP contexts. Table 7 shows the PDP context fields for one PDP Address.

********** END OF CHANGE

3GPP TSG-SA WG2 Meeting #43 ***Tdoc ⌘S2-043732***
Seoul, Korea, 15-19 November 2004 **rev of S2-043561**

CR-Form-v7.1

CHANGE REQUEST

⌘ **23.060** **CR** **516** ⌘**rev** **2** ⌘ Current version: **6.6.0** ⌘

*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 [X] Radio Access Network [ ] Core Network [X]

Title:	⌘	Handling of preserved Real Time PDP context
Source:	⌘	Nokia
Work item code:	⌘	TEI6
Date:	⌘	18/11/2004
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: ⌘ Description of preservation procedures needs more clarification:

-for a preserved PDP context using streaming or conversational traffic class it is not clear which entity shall start PDP context modification after intersystem change from 3G ->2G.

- more changes are needed to clarify that for streaming or conversational traffic class RAN shall not request Iu (or RAB) release due to user inactivity.

-in 9.2.5 Preservation Procedures, the text could be understood so that PDP context is always preserved without modification. That is not true as for a PDP context using streaming or conversational traffic class, the the maximum bitrate is modified during preservation.

-subclause “9.2.5.1.2 Iu Release Procedure” is redundant text with 12.7.3 but not as complete.

Summary of change: ⌘ In 9.2.3.4

- the text “e.g. due to a break of the radio connection or due to user inactivity is removed.
- it is clarified that also after inter system change from 3G to 2G for each preserved PDP context using streaming or conversational traffic class the MS shall use the PDP Context Modification procedure to re-activate the PDP context or start PDP context Deactivation procedure.

In 9.2.5

		- text “without modification” is deleted and a reference to subclauses 9.2.3.4 and 9.2.3.5 is added to clarify that PDP context using streaming or conversational traffic class are modified during preservation. - The descriptions in 9.2.5.1.1 RAB Release Procedure and 9.2.5.2 Iu Release Procedure are replaced with a reference to 12.7.2a and 12.7.3. Description of RAB Release Procedure is moved to 12.7.2a. In 12.7.3 - relevant clarifications from deleted 9.2.5.2 are included to step 5)
Consequences if not approved:	⌘	Ambiguity in the description of preservation of PDP contexts using streaming or conversational traffic class may be interpreted differently that may cause situations where the re-establishment of RABs after preservation is not possible.

Clauses affected:	⌘	9.2; 9.2.3.4; 9.2.5 ;new 12.7.2a; 12.7.3			
Other specs affected:	⌘	**Y**	**N**		
			X	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘	RAN2 and 3 may need to check if their specifications would benefit similar clarifications.			

9.2 PDP Context Activation, Modification, Deactivation, and Preservation Functions

A GPRS-attached MS can initiate the activation, modification, and deactivation functions at any time for a PDP context in the MS, the SGSN, and the GGSN. A GGSN may request the activation of a PDP context to a GPRS-attached subscriber. A GGSN may initiate the deactivation of a PDP context.

NOTE: If the MS is in PMM-IDLE state, it needs to perform a service request procedure to enter the PMM-CONNECTED state before initiating these procedures.

Upon receiving an Activate PDP Context Request message or an Activate Secondary PDP Context Request message, the SGSN shall initiate procedures to set up PDP contexts. The first procedure includes subscription checking, APN selection, and host configuration, while the latter procedure excludes these functions and reuses PDP context parameters including the PDP address but except the QoS parameters. Once activated, all PDP contexts that share the same PDP address and APN shall be managed equally. At least one PDP context shall be activated for a PDP address before a Secondary PDP Context Activation procedure may be initiated. When the MS performs an RA update procedure to change from a release 99 to a release 97 or 98 system, only one active PDP context per PDP address and APN shall be preserved. This PDP context is selected taking the QoS profile and NSAPI value into account.

Upon receiving a Deactivate PDP Context Request message, the SGSN shall initiate procedures to deactivate the PDP context. When the last PDP context associated with a PDP address is deactivated, N-PDU transfer for this PDP address is disabled.

An MS does not have to receive the (De-) Activate PDP Context Accept message before issuing another (De-)Activate PDP Context Request. However, only one request can be outstanding for every TI.

By sending a RAB Release Request or Iu Release Request message to the SGSN, the RAN initiates the release of one or more RABs. The preservation function allows the active PDP contexts associated with the released RABs to be preserved ~~without modification~~ in the CN, and the RABs can then be re-established at a later stage.

**********NEXT CHANGE**********

9.2.3.4 RNC/BSS-Initiated PDP Context Modification Procedure

The RNC can request the release of the Iu connection (see clause "Iu Release Procedure") ~~e.g. due to a break of the radio connection or due to user inactivity~~. The BSS may terminate the downlink data transfer to a MS by the Suspend procedure (which is triggered by the MS) or by the Radio Status procedure with cause "Radio contact lost with MS" or "Radio link quality insufficient to continue communication" both defined in GSM 08.18 [21]. After Iu Release in Iu mode, or after termination of the downlink data transfer in A/Gb mode, the PDP contexts are modified as follows:

- In the SGSN, for a PDP context using background or interactive traffic class, the PDP context is preserved with no modifications.

- In the SGSN, for a PDP context using streaming or conversational traffic class, the PDP context is preserved, but the maximum bit rate is downgraded to 0 kbit/s (for both uplink and downlink). The SGSN sends an Update PDP Context Request (TEID, QoS Negotiated) message to the GGSN to set the maximum bit rate to 0 kbit/s in the GGSN. The value of 0 kbit/s for the maximum bit rate indicates to the GGSN to stop sending packets to the SGSN for this PDP context. For the Iu mode the value of 0 kbit/s for the maximum bit rate for both uplink and downlink indicates to the SGSN that a RAB shall not be re-established for this PDP Context in subsequent Service Request Procedure. For the A/Gb mode the value of 0 kbit/s for the maximum bit rate for both uplink and downlink indicates that the SGSN shall not send any downlink data for this PDP Context. In Iu and A/Gb mode CAMEL procedure calls shall be performed, see referenced procedure in 3G TS 23.078: CAMEL_GPRS_Change_Of_QoS. The procedure returns as result "Continue".

In Iu mode the following procedures shall be performed in the MS when radio coverage is lost:

- For a PDP context using background or interactive traffic class, the PDP context is preserved even if RRC re-establishment procedures have failed.

- For a PDP context using streaming or conversational traffic class, the PDP context is preserved, but the maximum bit rate is downgraded to 0 kbit/s (for both uplink and downlink) when the RRC re-establishment procedure has failed. After coverage is regained on the GERAN or the UTRAN and if the MS did not deactivate the PDP Context locally the MS should start MS-initiated PDP Context Modification procedure or the PDP Context Deactivation procedure. The MS shall use the PDP Context Modification procedure to re-activate the PDP context and re-establish the RAB .

In A/Gb mode the following procedures shall be performed in the MS when radio coverage is lost, when the radio link quality is insufficient or when the MS suspends GPRS:

- For a PDP context using background or interactive traffic class, the PDP context is preserved.

- For a PDP context using streaming or conversational traffic class, the PDP context is preserved, but the maximum bit rate is downgraded to 0 kbit/s (for both uplink and downlink). After coverage or radio link quality is regained on the GERAN or the UTRAN or when GPRS services shall resume and if the MS did not deactivate the PDP Context locally the MS should start MS initiated PDP Context Modification procedure or the PDP Context Deactivation procedure. The MS shall use the PDP Context Modification procedure to re-activate the PDP context.

9.2.3.5 RAB Release-Initiated Local PDP Context Modification Procedure

The RNC can request a RAB to be released through the RAB Release procedure without releasing the Iu connection.

After the RAB(s) release the SGSN shall modify the PDP context as follows:

- In the SGSN, for a PDP context using background or interactive traffic class, the PDP context is preserved with no modifications.

- In the SGSN, for a PDP context using streaming or conversational traffic class, the PDP context is preserved, but the maximum bit rate is downgraded to 0 kbit/s (for both uplink and downlink) when the associated RAB is released. The SGSN sends an Update PDP Context Request (TEID, QoS Negotiated) message to the GGSN to set the maximum bit rate to 0 kbit/s in the GGSN. The value of 0 kbit/s for the maximum bit rate indicates to the GGSN to stop sending packets to the SGSN on this PDP context. The value of 0 kbit/s for the maximum bit rate for both uplink and downlink indicates to the SGSN that a RAB shall not be re-established for this PDP Context in subsequent Service Request Procedure. CAMEL procedure calls shall be performed, see referenced procedure in 3G TS 23.078: CAMEL_GPRS_Change_Of_QoS. The procedure returns as result "Continue".

The following procedures shall be performed in the MS when the RRC layer indicate to higher layer that a RAB has been released and the RAB release was not initiated due to a PDP Context Deactivation Procedure:

- For a PDP context using background or interactive traffic class, the PDP context is be preserved with no modifications.

- For a PDP context using streaming or conversational traffic class, the PDP context is preserved, but the maximum bit rate is downgraded to 0 kbit/s (for both uplink and downlink) .

  At this point or at a later stage, the MS may start a PDP Context Deactivation procedure or PDP Context Modification procedure. The MS shall use the PDP context modification procedure to re-activate the PDP context and to re-establish the RAB.

**********NEXT CHANGE**********

9.2.5 Preservation Procedures

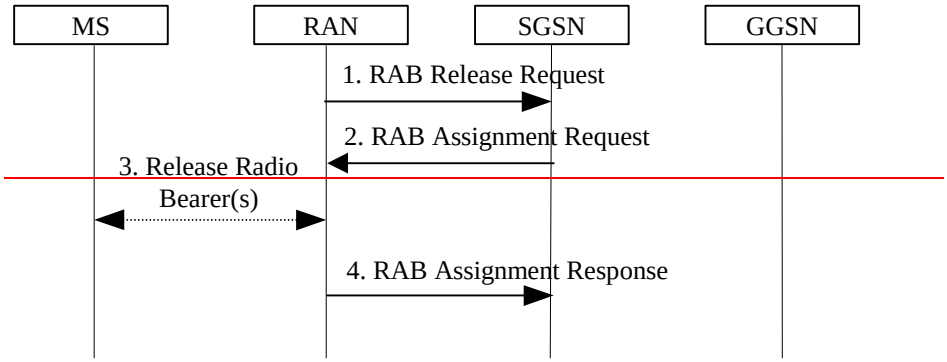
By sending a RAB Release Request or Iu Release Request message to the SGSN, an Iu mode RAN initiates the release of one or more RABs. The preservation procedure allows the active PDP contexts associated with the released RABs to be preserved ~~without modification~~ in the CN, and the RABs can then be re-established at a later stage, see clause 9.2.5.2 and clause 9.2.3.5.

An Iu mode RAN uses the Iu Release Request to request release of all RABs of an MS, and the RAB Release Request in other cases.

9.2.5.1 Release of RABs Triggered by an Iu mode RAN

9.2.5.1.1 RAB Release Procedure

An Iu mode RAN initiates a RAB release procedure to release one or several RABs. The RAB Release procedure is described in subclause 12.7.2.a. ~~illustrated in Figure 78.~~



~~**Figure 78: RAB Release Procedure**~~

~~1) The RAN initiates the procedure by sending a RAB Release Request (For each RAB to be released: RAB ID, Cause) message to the SGSN.~~

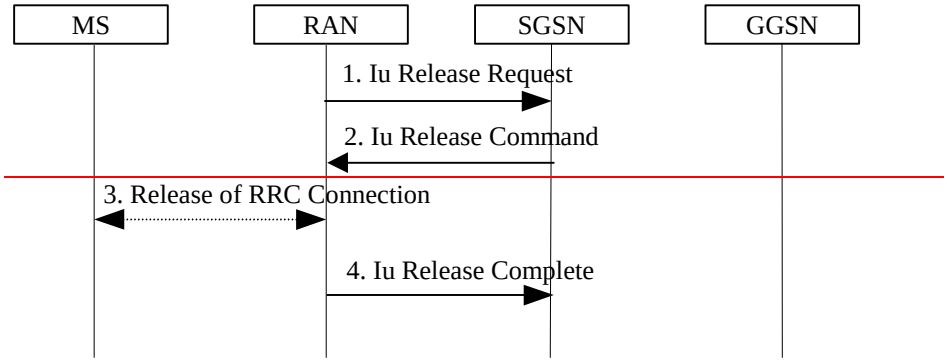
~~2) The SGSN sends a RAB Assignment Request (For each RAB to be released: RAB ID, Cause) to the RAN.~~

~~3) The Radio Bearer(s) are released if still existing.~~

~~4) The RAN sends a RAB Assignment Response (For each released RAB: RAB ID, GTP SND, GTP SNU) to the SGSN. GTP SND and GTP SNU enable the SGSN to restore the values in case the PDP context is maintained and the RAB is re-established at a later stage~~.

9.2.5.1.2 Iu Release Procedure

An Iu mode RAN initiates an Iu release procedure to release all RABs of an MS and the Iu connection. The Iu Release procedure is described in subclause 12.7.3. ~~illustrated in Figure 79.~~



~~**Figure 79: Iu Release Procedure**~~

~~1) The RAN sends an Iu Release Request (Cause) message to the SGSN.~~

~~2) The SGSN sends an Iu Release Command (Cause) message to the RAN.~~

~~3) The RRC connection is released if still existing.~~

~~4) The RAN confirms the Iu release by sending an Iu Release Complete (For each released RAB: RAB ID, GTP SND, GTP SNU) message to the SGSN. GTP SND and GTP SNU enable the SGSN to restore the values in case the PDP context is maintained and the RAB is re-established at a later stage.~~

9.2.5.2 Re-establishment of RABs

The procedure for re-establishment of RABs allows the SGSN to re-establish RABs for active PDP contexts that don't have an associated RAB.

The MS initiates the re-establishment of RABs by using the Service Request (Service Type = Data) message. This is described in the sub-clause "MS Initiated Service Request Procedure". SGSN shall not establish RABs for PDP contexts with maximum bit rate for uplink and downlink of 0 kbit/s. For these PDP contexts, the MS shall perform a MS-initiated PDP Context Modification or Deactivation procedure.

When RABs for an MS that has no RRC connection needs to be re-established, the CN must first page the MS. The clause "Network Initiated Service Request Procedure" describes this.

**********NEXT CHANGE**********

12.7.2 [void]

12.7.2a RAB Release Procedure

UTRAN initiates a RAB release procedure to release one or several RABs. The RAB Release procedure is illustrated in Figure 76

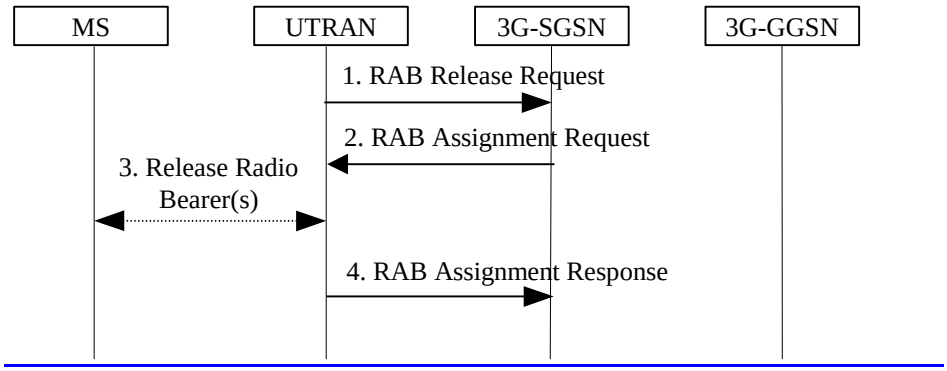


Figure 76: RAB Release Procedure

1) UTRAN initiates the procedure by sending a RAB Release Request (For each RAB to be released: RAB ID, Cause) message to the SGSN.

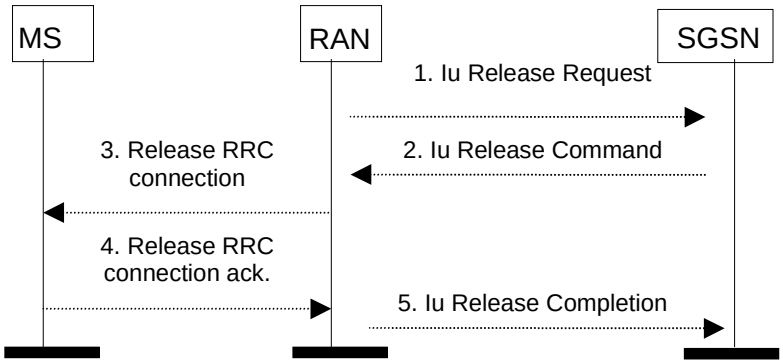
2) The SGSN sends a RAB Assignment Request (For each RAB to be released: RAB ID, Cause) to the UTRAN.

3) The Radio Bearer(s) are released if still existing.

4) UTRAN sends a RAB Assignment Response (For each released RAB: RAB ID, GTP SND, GTP SNU) to the SGSN. GTP SND and GTP SNU enable the SGSN to restore the values in case the PDP context is maintained and the RAB is re-established at a later stage.

12.7.3 Iu Release Procedure

This procedure is used to release the Iu interface. This procedure also triggers the release of all the Iu connections and changes the 3G-SGSN PMM state to PMM-IDLE. Both RAN-initiated and SGSN-initiated Iu release procedures are shown in Figure 89.



NOTE 1: Message 1 is only sent when the RAN-initiated Iu release procedure is considered.

NOTE 2: Message 1 is not sent but message 2 is sent when the SGSN-initiated Iu release procedure is considered.

Figure 89: Iu Release Procedure

1) The RAN notices that the RRC connection has been released or detects a need to release the radio resources. It sends an Iu Release Request (Cause) message to the SGSN. Cause indicates the reason for the release (e.g. O&M Intervention, Unspecified Failure, User Inactivity, Repeated Integrity Checking Failure, or Release due to UE generated signalling connection release). User Inactivity means that the RAN decided to release an MS that shows no more activity, in the case where the MS has only non real-time RABs established, in order to optimise the radio usage after the RRC-Connection-Release timer expired.

2) The SGSN releases the Iu by sending the Iu Release Command (Cause) message to the RAN. This message may be triggered either by an Iu Release Request message, or by another SGSN event (e.g., authentication failure or detach). The SGSN shall take the responsibility to release the Iu interface when the UE has no active PDP context, either immediately or after some timeout. It is optional for the SGSN to send the Iu Release Command message after an Iu Release Request message with Cause set to User Inactivity is received from the RAN.

3) If the RRC connection is not already released (Cause = User Inactivity), the RAN sends a Release RRC Connection message to the MS.

4) The MS returns a Release RRC Connection Acknowledge message to the RAN.

5) The RAN confirms the Iu release by returning an Iu Release Completion (for each released RAB: RAB ID, GTP SND, GTP SNU) message to the SGSN. GTP SND and GTP SNU enable the SGSN to restore the values in case the PDP context is maintained and the RAB is re-established at a later stage.

If the RNC does not receive the Release RRC Connection Acknowledge message and if Cause is different from Authentication Failure or Detach, it should send a failure message to the SGSN, and the SGSN should stay in the MM-CONNECTED state.

After Iu release, the MS and the SGSN shall modify PDP context(s) that use streaming or conversational traffic class according to the rules in clause "RNC-Initiated PDP Context Modification Procedure".

3GPP TSG-SA WG2 Meeting #43 ***S2-043897***

Seoul, KOREA. 15th to 19th November 2004. **(revised S2-043831)**

CR-Form-v7.1

CHANGE REQUEST

⌘ **23.060** **CR** **518** ⌘ **rev** **3** ⌘ Current version: **6.6.0** ⌘

*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 ☒

Title:	⌘	Management Based Activation Impacts
Source:	⌘	Ericsson
Work item code:	⌘	OAM-TRACE
Date:	⌘	10/11/2004
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:	⌘	The current TS 23.060 does not reflect the functional requirements for OAM tracing. These are to be included to align between the OAM specification and the required stage 3 specifications.
Summary of change:	⌘	Generic references to the OAM-TRACE specification added
Consequences if not approved:	⌘	Misalignment between stage 3 and stage 2 specifications.

Clauses affected:	⌘	2, 9.2.2.1, 9.2.3.1

Other specs affected: ⌘	Y	N	
		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.

First modification

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 – 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) – 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 – 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 – 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)".

[79] 3GPP TS 23.008: "Organization of subscriber data".

[80] 3GPP TS 23.221: "Architectural requirements".

[81] 3GPP TS 23.012: "Location Management Procedures".

[82] 3GPP TS 22.101: "Service Principles".

[83] 3GPP TS23.251: " Network Sharing; Architecture and Functional Description".

[84] 3GPP TS 32.422: "Subscriber and equipment trace; Trace control and Configuration Management (CM)".

Next modification

9.2.2 Activation Procedures

9.2.2.1 PDP Context Activation Procedure

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

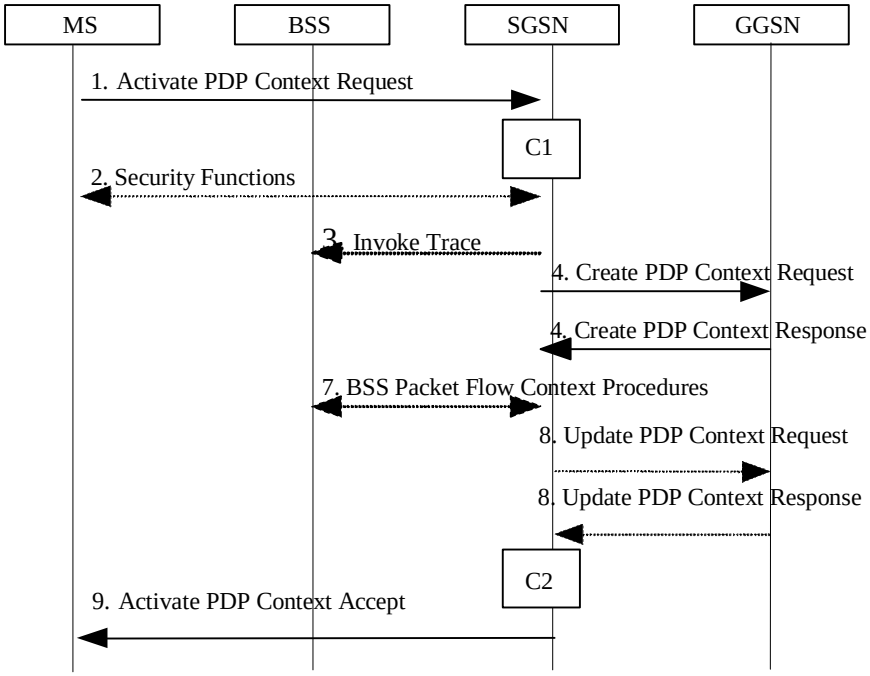


Figure 63: PDP Context Activation Procedure for A/Gb mode

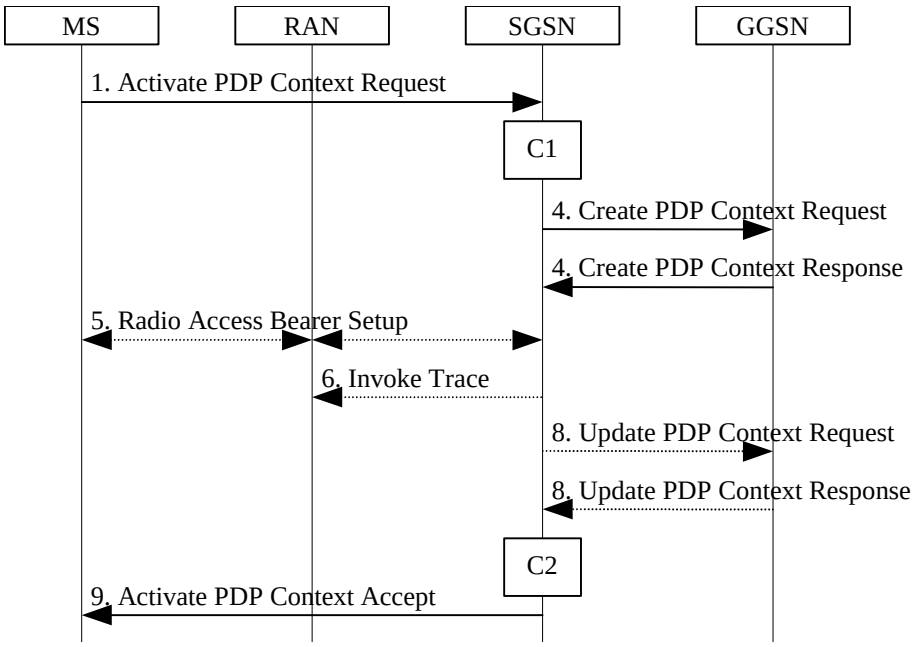


Figure 64: PDP Context Activation Procedure for Iu mode

1) The MS sends an Activate PDP Context Request (NSAPI, TI, PDP Type, PDP Address, Access Point Name, QoS Requested, 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. 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]). 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, 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 Resticion 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, 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. 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. 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.

Note: Step 6 is applied when the trace activation is triggered by means of signalling. Another alternative is the triggering of trace activation by the OMC. The details of both Trace Activation procedures are described in 3GPP TS 32.422 [84].

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, 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. Protocol Configuration Options may be used to transfer optional PDP parameters to the UE (see GSM 29.060 [26] and 24.229 [75]). 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, 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".

Next modification

9.2.3.1 SGSN-Initiated PDP Context Modification Procedure

The SGSN-Initiated PDP Context Modification procedure is illustrated in Figures 70a and 70b.

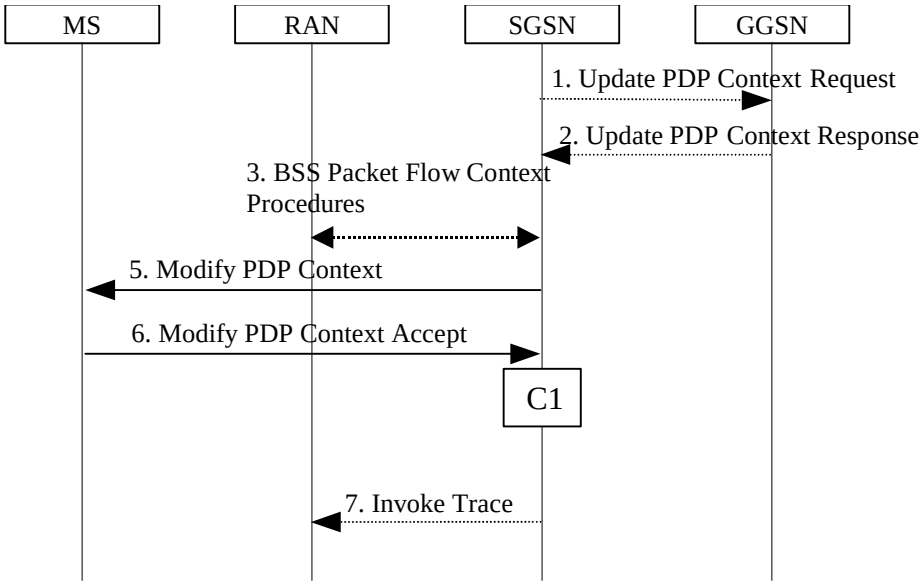


Figure 70a: SGSN-Initiated PDP Context Modification Procedure, A/Gb mode

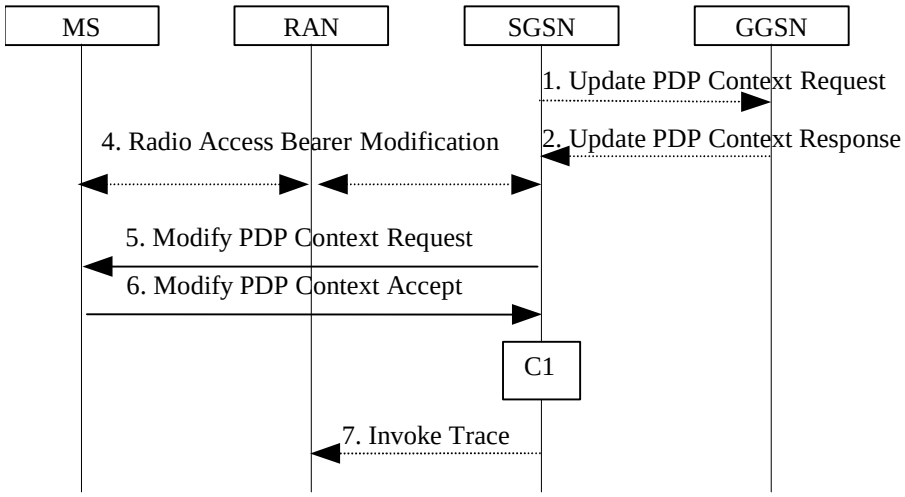


Figure 70b: SGSN-Initiated PDP Context Modification Procedure, Iu mode

1) The SGSN may send an Update PDP Context Request (TEID, NSAPI, QoS Negotiated, Trace Reference, Trace Type, Trigger Id, OMC Identity, serving network identity) message to the GGSN. The SGSN shall send the serving network identity to the GGSN. If QoS Negotiated received from the SGSN is incompatible with the PDP context being modified, the GGSN rejects the Update PDP Context Request. The GGSN operator configures the compatible QoS profiles. The SGSN shall include Trace Reference, Trace Type, Trigger Id, and OMC Identity in the message if GGSN trace is activated while the PDP context is active. The SGSN shall copy Trace Reference, Trace Type, and OMC Identity from the trace information received from the HLR or OMC.

2) The GGSN may restrict QoS Negotiated given its capabilities and the current load. The GGSN stores QoS Negotiated and returns an Update PDP Context Response (TEID, QoS Negotiated, Prohibit Payload Compression, APN Restriction, Cause) message. The Prohibit Payload Compression indicates that the SGSN should negotiate no data compression for this PDP context.

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

4) In Iu mode, radio access bearer modification may be performed by the RAB Assignment procedure.

5) The SGSN selects Radio Priority and Packet Flow Id based on QoS Negotiated, and may send a Modify PDP Context Request (TI, QoS Negotiated, Radio Priority, Packet Flow Id) 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.

6) The MS acknowledges by returning a Modify PDP Context Accept message. If the MS does not accept the new QoS Negotiated it shall instead de-activate the PDP context with the PDP Context Deactivation Initiated by the MS procedure.

7) If BSS trace is activated while the PDP context is active, 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.

Note: Step 7 is applied when the trace activation is triggered by means of signalling. Another alternative is the triggering of trace activation by the OMC. The details of both Trace Activation procedures are described in 3GPP TS 32.422 [84]

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".

End modifications