Technical Specification Group Services and System Aspects *TSGS#10(00)0588*
Meeting #10, Bangkok, Thailand, 11-14 December 2000

Source: **TSG SA WG2**
Title: **CRs on 23.060 v.3.5.0**
Agenda Item: **7.2.3**

The following Change Requests (CRs) have been approved by TSG SA WG2 and are requested to be approved by TSG SA plenary #10.
Note: the source of all these CRs is now S2, even if the name of the originating company(ies) is still reflected on the cover page of all the attached CRs.

CRs on 23.060 v.3.5.0

Spec	*Rel*	*CR #*	*Cat*	*Title*	*Input*	*Output*	*S2 tdoc #*
23.060	R99	183r2	F	MS permanent (static) PDP address allocation by External PDN	3.5.0	3.6.0	S2-001999
23.060	R99	184	F	Clarification of Routing Area update in PMM-Connected mode	3.5.0	3.6.0	S2-001882
23.060	R99	185	F	Correction to the Inters system change procedures	3.5.0	3.6.0	S2-001975
23.060	R99	188r1	F	Adding security parameters to SGSN MM Context	3.5.0	3.6.0	S2-001980
23.060	R99	189	F	Correction of the definition of class-C mobile	3.5.0	3.6.0	S2-001933
23.060	R99	190r1	F	Correction of Fig. 5 and Fig. 13	3.5.0	3.6.0	S2-001976
23.060	R99	191r3	F	Clarification of derivation of TEID	3.5.0	3.6.0	S2-001977r3
23.060	R99	192	F	Addition of the Camel Application Part interface to logical architecture.	3.5.0	3.6.0	S2-001936
23.060	R99	194	F	LS on MS Network Capability Conflict	3.5.0	3.6.0	S2-001825
23.060	R99	195r2	F	Dynamic IP v6 address allocation	3.5.0	3.6.0	S2-001973r2
23.060	R99	196	F	Removal of mapping Priority property in CS into QoS	3.5.0	3.6.0	S2-001954

3GPP TSG SA2#15 **S2-001825**
Makuhari, Japan, November 13th – 17th, 2000

3GPP TSG-CN-WG1, Meeting #13 ***Tdoc N1-001010***
14-18 August, 2000
Vancouver, Canada

Title: **Liaison Statement on MS Network Capability IE Conflict**

Source: **3GPP TSG-CN WG1**

TO: **3GPP TSG-SA WG2, 3GPP TSG-CN WG4**

Cc:

WI: **GPRS**

Contact Person:

Name: Apostolis Salkintzis, Motorola
E-mail Address: y1026c@email.mot.com
Tel. Number: +30 93 7158120

Attachments: **N1-001041**

Date: **16th August 2000**

N1 wants to bring to the attention of S2 and N4 that the previous TSGN#8 plenary has approved CR 211r1 to 24.008 (see attached N1-000722). This CR updates the Routing Area Update (RAU) message sent by the MS and, in particular, it appends the MS Network Capability IE to this message. An R99 MS shall include the MS Network Capability IE in every RAU.

This modification of RAU message may introduce some problems during inter-SGSN Routeing Area Updates. This is because the new SGSN will also receive another MS Network Capability IE from the old SGSN in a SGSN Context Response message. The two MS Network Capability IEs may or may not be identical. The suggested method to resolve this problem is to specify that the new SGSN shall ignore the MS Capability IE included in the SGSN Context Response message *only if* an MS Capability IE has already been received in an RAU message. Therefore, it is suggested to give precedence to the MS Network Capability IE sent by the MS.

S2 is kindly asked to study the attached CR to 23.060 (N1-001041) and agree the suggested revisions if they are considered acceptable.

Furthermore, N4 is kindly asked to consider if revisions are required to 3G TS 29.060.

3GPP TSG-SA2 Meeting #15
Makuhari, Japan, 13th-17th of November 2000

Tdoc S2-001882

CR-Form-v3

CHANGE REQUEST

⌘ **23.060** **CR** **184** ⌘ rev **-** ⌘ Current version: **3.5.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network **X** Core Network X

Title:	⌘	Clarification of Routing Area update in PMM-Connected mode
Source:	⌘	Ericsson
Work item code:	⌘	Release 99
Date:	⌘	2000-11-08
Category:	⌘	**F**
Release:	⌘	R99

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

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
REL-4	*(Release 4)*
REL-5	*(Release 5)*

Reason for change:	⌘	Clarification on when to initiate Routing Area Update Procedure in PMM-CONNECTED mode
Summary of change:	⌘	The Routing Area Update Procedure in PMM-CONNECTED mode is only initiated after a Serving RNS Relocation procedure.
Consequences if not approved:	⌘	

Clauses affected:	⌘	6.9.2.1		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	
Other comments:	⌘			

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. 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, then an MS that is both GPRS-attached and IMSI-attached shall perform the Combined RA / LA Update procedures.

In UMTS, an RA update is either intra-SGSN or inter-SGSN RA update, either combined RA / LA update or only RA update, either initiated by an MS in PMM-CONNECTED (only valid after a Serving RNS Relocation Procedure, see Ch. 6.9.2.2) or in PMM-IDLE state. All the RA update cases are contained in the procedure illustrated in figure 36.

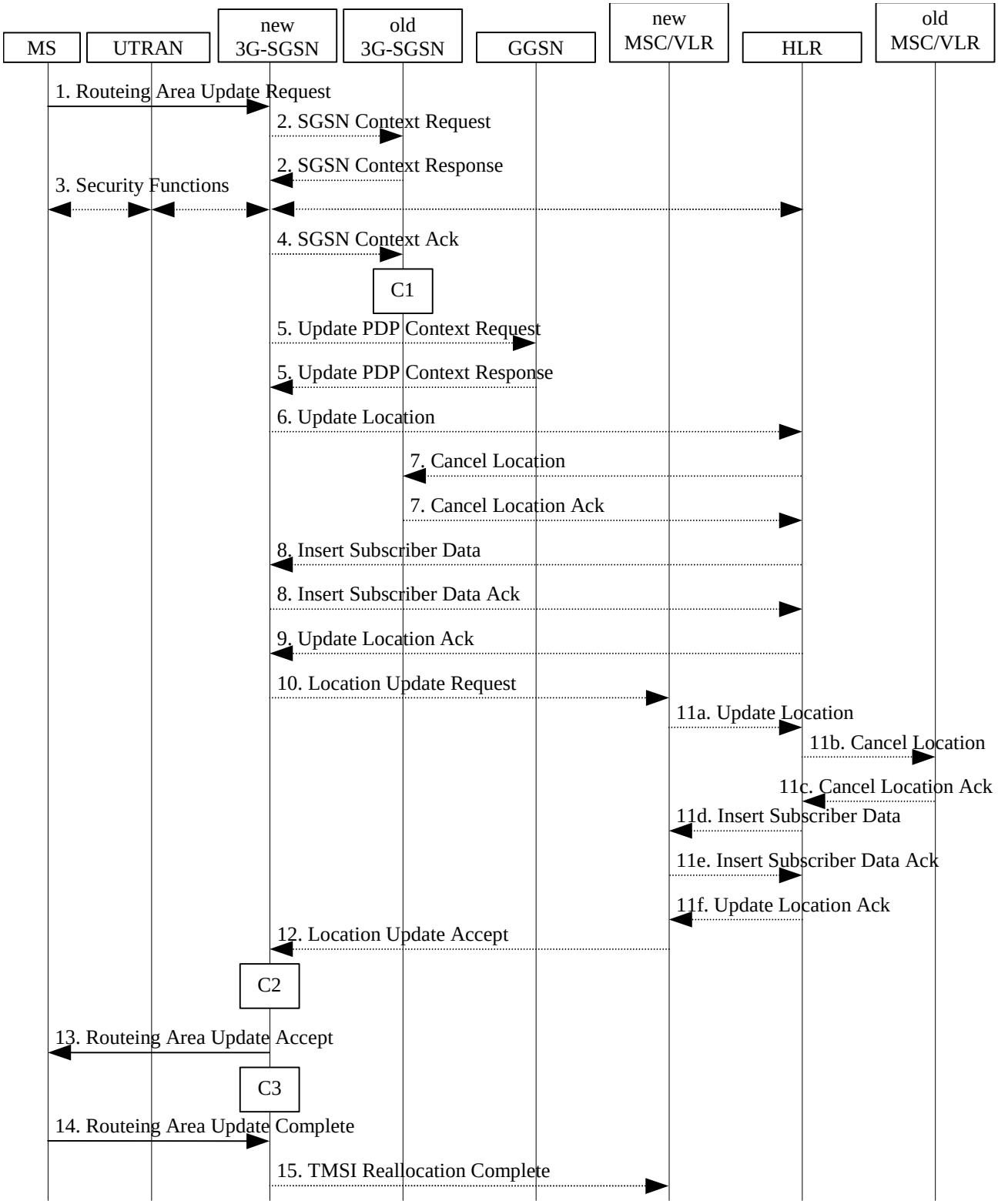

Figure 136: UMTS RA Update Procedure

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) to the new SGSN. Follow on request shall be set by MS 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 subclause "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 subclause "MS Network Capability". DRX Parameters indicates whether or not the MS uses discontinuous reception and the DRX cycle length.

NOTE: Sending the Routeing Area Update Request message to the SGSN triggers the establishment of a signalling connection between UTRAN 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 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. 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 responds with SGSN Context Response (Cause, IMSI, MM Context, PDP contexts). If the MS is not known in the old SGSN, the old SGSN responds with an appropriate error cause. The old SGSN starts a timer.

3) Security functions may be executed. These procedures are defined in subclause "Security Function". If the security functions do not authenticate the MS correctly, then 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.

4) 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.

5) If the RA update is an Inter-SGSN RA Update and if the MS was in PMM-IDLE state, the new SGSN sends Update PDP Context Request (new SGSN Address, QoS Negotiated, Tunnel Endpoint Identifier,) to the GGSNs concerned. The GGSNs update their PDP context fields and return an Update PDP Context Response (Tunnel Endpoint Identifier). Note: If the RA update is an Inter-SGSN routeing area update initiated by an MS in PMM-CONNECTED state, then the Update PDP Context Request message is sent as described in subclause "Serving RNS Relocation Procedures".

6) 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) to the HLR.

7) 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, then 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).

8) 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 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 then the SGSN constructs an MM context for the MS and returns an Insert Subscriber Data Ack (IMSI) message to the HLR.

9) 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.

10) If Update Type indicates combined RA / LA update with IMSI attach requested, or if the LA changed with the routeing area update, then 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. The VLR number is translated from the RAI via a table in the SGSN. 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.

11) 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 (this signalling is not modified from existing GSM signalling and is included here for illustrative purposes):

    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, GSM 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.

12) 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.

13) The new SGSN validates the MS's presence in the new RA. If due to roaming restrictions the MS is not allowed to be attached in the SGSN, or if subscription checking fails, then the SGSN rejects the routeing area update with an appropriate cause. If all checks are successful then 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).

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

15) The new SGSN sends a TMSI Reallocation Complete message to the new VLR if the VLR TMSI is confirmed by the MS.

NOTE: Steps 11, 12, and 15, are performed only if step 9 is performed.

In the case of a rejected routeing area update operation, due to regional subscription or roaming restrictions, 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. The RAI value shall be deleted when the MS is powered up.

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, then this should be indicated to the MS, and the MS shall not access non-PS services until a successful location update is performed.

For an MS with GPRS-CSI defined, CAMEL interaction may be performed, see referenced procedures in 3G TS 23.078:

C1) CAMEL-GPRS-SGSN-Context-Acknowledge.

C2) CAMEL-GPRS-Routeing-Area-Update-Session.

C3) CAMEL-GPRS-Routeing-Area-Update-Context.

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Makuhari, Japan - 13 - 17 November, 2000

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CHANGE REQUEST

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23.060	CR	189	Current Version:	3.3.5

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

For submission to:	SA #15	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

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

Source: Motorola **Date:** 2000-11-12

Subject: Correction of the definition of class-C mobile

Work item: Release 99

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

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

Reason for change: The CR corrects the erroneous definition of the Class-C mobile. The definition has to agree the same definition in section 5.4.5 and definition in the TS TS 22.060.

Clauses affected: 4.1

Other specs affected:

Other 3G core specifications		→ List of CRs:	
Other GSM core specifications		→ List of CRs:	
MS test specifications		→ List of CRs:	
BSS test specifications		→ List of CRs:	
O&M specifications		→ List of CRs:	

Other comments:

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MODIFIED SECTION

4.1 Main GSM Concepts

For GPRS, specific GSM radio channels are defined, and the allocation of these channels is flexible: from 1 to 8 radio interface timeslots can be allocated per TDMA frame, timeslots are shared by the active users, and up and downlink are allocated separately. The radio interface resources can be shared dynamically between speech and data services as a function of service load and operator preference. Various radio channel coding schemes are specified to allow bitrates from 9 to more than 150 kbit/s per user. EGPRS is an enhancement of GSM allowing higher bitrates on the radio interface. The higher bitrates are achieved by using a new modulation and new coding schemes in the MS and the BSS.

Three GSM MS modes of operation are supported: An MS in class-A mode of operation operates GPRS and other GSM services simultaneously. An MS in class-B mode of operation monitors control channels for GSM GPRS and other GSM services simultaneously, but can only operate one set of services at one time. An MS in class-C mode of operation exclusively operates ~~GSM~~GPRS ~~services~~.

User data can be compressed and protected with retransmission protocols for efficiency and reliability.

In GSM, GPRS security functionality is equivalent to the existing GSM security. The SGSN performs authentication and cipher setting procedures based on the same algorithms, keys, and criteria as in existing GSM. GPRS uses a ciphering algorithm optimised for packet data transmission. A GPRS ME can access the GPRS services with SIMs that are not GPRS-aware, and with GPRS-aware SIMs.

Cell selection may be performed autonomously by an MS, or the base station system instructs the MS to select a certain cell. The MS informs the network when it re-selects another cell or group of cells known as a routeing area.

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CHANGE REQUEST

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23.060	CR	192	Current Version:	3.3.5

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

For submission to:	SA #15	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

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

Source: Motorola **Date:** 2000-11-12

Subject: Addition of the CAMEL Application Part interface to logical architecture.

Work item: Release 99

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

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

Reason for change: In order to be compliant with TS 23.078, the CAP interface was added to the logical architecture in Fig. 2.

Clauses affected: 5.4

Other specs affected:

Other 3G core specifications		→ List of CRs:	
Other GSM core specifications		→ List of CRs:	
MS test specifications		→ List of CRs:	
BSS test specifications		→ List of CRs:	
O&M specifications		→ List of CRs:	

Other comments:

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MODIFIED SECTION

5.4 Logical Architecture

The packet domain Core Network functionality is logically implemented on two network nodes, the Serving GPRS Support Node and the Gateway GPRS Support Node. It is necessary to name a number of new interfaces. No inference should be drawn about the physical configuration on an interface from figure 2.

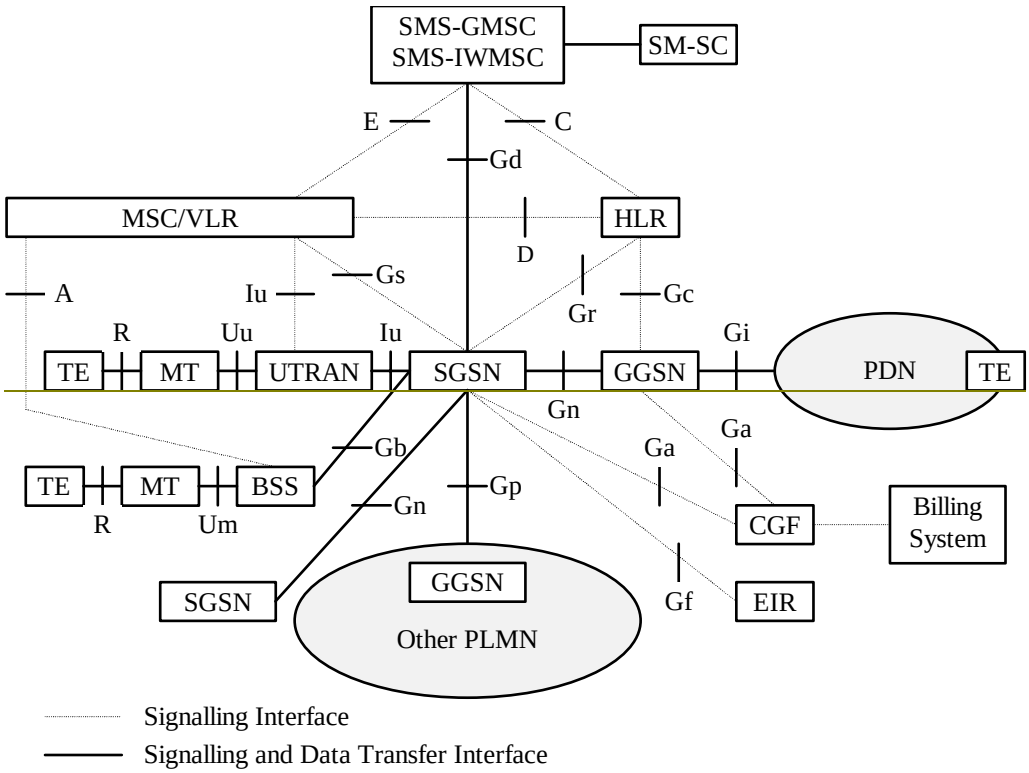

Figure 2: Overview of the Packet Domain Logical Architecture

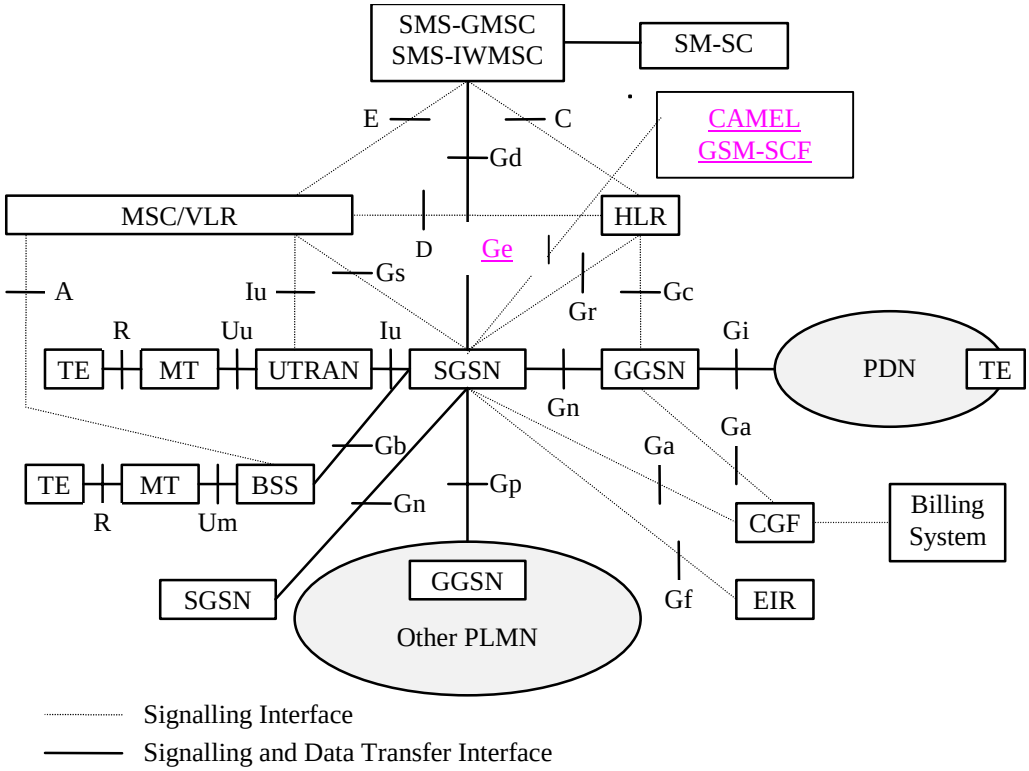

Figure 2: Overview of the Packet Domain Logical Architecture

5.4.1 Packet Domain Core Network Nodes

A GPRS Support Node (GSN) contains functionality required to support GPRS functionality for GSM and/or UMTS. In one PLMN, there may be more than one GSN.

The Gateway GPRS Support Node (GGSN) is the node that is accessed by the packet data network due to evaluation of the PDP address. It contains routeing information for PS-attached users. The routeing information is used to tunnel N-PDUs to the MS's current point of attachment, i.e., the Serving GPRS Support Node. The GGSN may request location information from the HLR via the optional Gc interface. The GGSN is the first point of PDN interconnection with a GSM PLMN supporting GPRS (i.e., the Gi reference point is supported by the GGSN). GGSN functionality is common for GSM and UMTS.

The Serving GPRS Support Node (SGSN) is the node that is serving the MS. The SGSN supports GPRS for GSM (i.e., the Gb interface is supported by the SGSN) and/or UMTS (i.e., the Iu interface is supported by the SGSN). At PS attach, the SGSN establishes a mobility management context containing information pertaining to e.g., mobility and security for the MS. At PDP Context Activation, the SGSN establishes a PDP context, to be used for routeing purposes, with the GGSN that the subscriber will be using.

The SGSN and GGSN functionalities may be combined in the same physical node, or they may reside in different physical nodes. SGSN and GGSN contain IP or other (operator's selection, e.g., ATM-SVC) routeing functionality, and they may be interconnected with IP routers. In UMTS, the SGSN and RNC may be interconnected with one or more IP routers. When SGSN and GGSN are in different PLMNs, they are interconnected via the Gp interface. The Gp interface provides the functionality of the Gn interface, plus security functionality required for inter-PLMN communication. The security functionality is based on mutual agreements between operators.

The SGSN may send location information to the MSC/VLR via the optional Gs interface. The SGSN may receive paging requests from the MSC/VLR via the Gs interface.

The SGSN interfaces with the GSM-SCF for optional CAMEL control using Ge reference point. Depending on the result from the CAMEL interaction, the session and packet data transfer may proceed normally. Otherwise, interaction with the GSM-SCF continues as described in 3G TS 23.078 [8b]. Only the GSM-SCF interworking points are indicated in the signalling procedures in this specification.

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Tokyo, Japan , 13-17 November 2000

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CHANGE REQUEST

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23.060	CR	196	Current Version:	3.3.5

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

For submission to:	SA #15	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

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

Source: Motorola **Date:** 2000-08-06

Subject: Removal of mapping Priority property in CS into QoS.

Work item: Release 99

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

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

Reason for change: The paging procedure in CS domain involves the signalling plane. QoS is not defined for signalling plane.

Clauses affected: 6.3.3

Other specs affected:

Other 3G core specifications		→ List of CRs:	
Other GSM core specifications		→ List of CRs:	
MS test specifications		→ List of CRs:	
BSS test specifications		→ List of CRs:	
O&M specifications		→ List of CRs:	

Other comments:

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6.3.3 CS Paging (GSM Only)

When an MS is both IMSI and GPRS-attached in a network that operates in mode I, then the MSC/VLR executes paging for circuit-switched services via the SGSN. If the MS is in STANDBY state, then it is paged in the routeing area and in the null routeing area (see subclause "Routeing Area Identity "). If the MS is in READY state, then it is paged in the cell. The paging procedure is supervised in the MSC by a paging timer. The SGSN converts the MSC paging message into an SGSN paging message.

The CS Paging procedure is illustrated in Figure 1. Each step is explained in the following list.

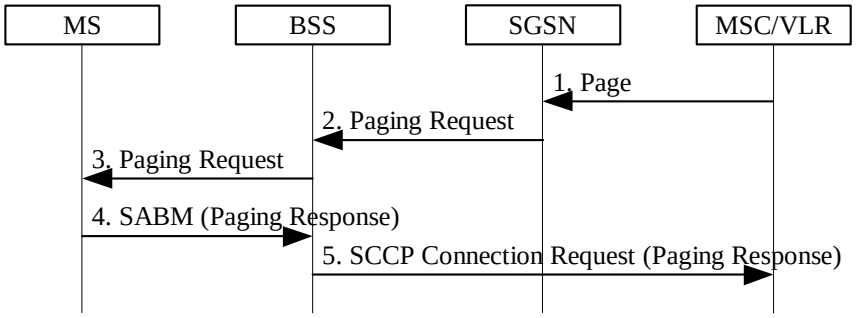

Figure 1: CS Paging Procedure in GSM

1) The SGSN receives a Page (IMSI, VLR TMSI, Channel Needed, Priority, Location Information) message from the MSC. Channel Needed is defined in GSM 08.08 [18] and indicates to the MS which type of CS channel is needed to be requested in the response. VLR TMSI and Channel Needed are optional parameters. Priority is the circuit-switched paging priority parameter as defined in GSM 08.08. ~~The SGSN maps Priority to QoS.~~

2) The SGSN sends a BSSGP Paging Request (IMSI, TLLI, VLR TMSI, Area, Channel Needed, QoS) message to the BSS serving the MS. Area is derived from either the MS's MM context in the SGSN or, if no such information is available, from the Location Information received from the MSC/VLR. Area indicates a single cell for a READY state MS or a routeing area for a STANDBY state MS. VLR TMSI and Channel Needed are included if received from the MSC. If Channel Needed was not received from the MSC, then a default Channel Needed parameter indicating circuit-switched paging is included by the SGSN. QoS indicates the priority of this Paging Request relative to other Paging Request messages buffered in the BSS. If the location area where the MS was last known to be located has an associated null routeing area, then the SGSN shall send an additional BSSGP Paging Request message to each BSS serving this null RA.

3) The BSS translates the incoming BSSGP Paging Request message into one radio Paging Request message per cell. If a dedicated radio resource is assigned to the MS in a cell, then the BSS transmits one Paging Request (VLR TMSI or IMSI, Channel Needed) message on this radio resource, without stopping possibly ongoing data transfers for the MS. Otherwise, the BSS pages the MS with one Paging Request (VLR TMSI or IMSI, Channel Needed) message on the appropriate paging channel in each addressed cell. This is described in GSM 03.64.

4) Upon receipt of a Paging Request message for a circuit-switched service the MS may accept to respond to this request and shall then follow the CS procedures for paging response (random access, immediate assignment, and paging response) as specified in GSM 04.08 [13].

5) When received at the BSS, the Paging Response message is sent to the MSC which shall then stop the paging response timer.

3GPP TSG SA2 Meeting #14
Tokyo, Japan , 13-17 November 2000

Document S2-001973
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

CR-Form-v3

CHANGE REQUEST

⌘ **23.060** **CR** **CR-195** ⌘ rev ~~1~~**2** ⌘ Current version: **3.5.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☒

Title:	⌘	Dynamic IPv6 address allocation
Source:	⌘	Motorola
Work item code:	⌘	***Date:*** ⌘ November 16, 2000
Category:	⌘	**F** ***Release:*** ⌘ R99

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

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

Reason for change:	⌘	IPv6 should be supported as a subscriber address in Release 99. The IPv6 stateless address autoconfiguration procedure currently documented in 23.060 Annex B does not provide enough clarity for a reader due to being separated from the appropriate sections describing PDP context activation, and because other cases for address allocation are not discussed. This CR proposes clarification to the dynamic IPv6 address allocation procedures, inluding descriptions of IPv6 stateless address autoconfiguration and IPv6 stateful address autoconfiguration where appropriate Finally, this CR proposes a correction to the existing IPv6 stateless address autoconfiguration procedure so that IPv6 Neighbor Unreachability Detection procedures can be supported. This CR is coordinated with CR 183r2 in document S2-001999.
Summary of change:	⌘	1) To clarify and correct existing text on IPv6 stateless autoconfiguration, ~~2)~~Move the description from the normative annex into the corresponding sections describing PDP context activation~~,~~ ~~3)Correct text in 9.2.1 for External PDN Address Allocation, and~~ ~~4)~~2)~~Provide procedures for the various cases of dynamic IPv6 address allocation.~~
Consequences if not approved:	⌘	Currently, the GGSN drops Neighbor Solication messages sent by the MS for Duplicate Address Detection. However those messages are also used for Neighbor Unreachability Detection. Therefore, not providing a response as described in RFC 2461 would have adverse affects on those procedures.

Clauses affected:	⌘	9.2.1, 9.2.1.1 (new), Annex B (deleted)
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications

	☐ 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/3G_Specs/CRs.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://www.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 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.

MODIFIED SECTION

2 References

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

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

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

[70] 3G TS 32.015: "GSM call and event data for the packet switched domain".

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

NEXT MODIFIED SECTION

9.2.1 Static and Dynamic PDP Addresses

COVERED BY S2-001999 (CR 183r2)

Only static PDP addressing is applicable in the network-requested PDP context activation case.

9.2.1.1 Dynamic IPv6 Address Allocation

IPv6 address allocation is somewhat different from the IPv4 address allocation procedure. There are two possibilities to allocate the address for an IPv6 node – stateless and stateful autoconfiguration. The stateful address allocation mechanism needs a DHCP server to allocate the address for the IPv6 node. In the stateless autoconfiguration, the IPv6 node is more involved in the allocation of the address. In addition, the stateless autoconfiguration procedure does not need any external entity involved in the address autoconfiguration.

IPv6 stateful address autoconfiguration uses the standard External PDN Address Allocation procedure, as described in TS 29.061 [27]. The MS requests stateful address autoconfiguration by using an Access Point Name referring to that service.

~~PLMN IPv6 Address Allocation~~

To support dynamic ~~PDP~~ IPv6 address ~~assignment~~allocation by the PLMN operator, the GGSN provides a unique interface identifier (see RFC 2462 [69]) to the MS. This enables the MS to perform the IPv6 stateless autoconfiguration procedures to generate its full IPv6 address. Figure 1~~Figure 1~~~~Figure 1~~~~Figure 1~~ illustrates the IPv6 stateless autoconfiguration procedures for this case.

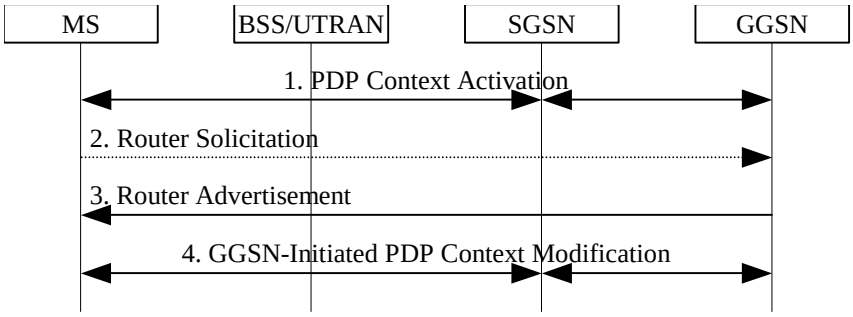

Figure 11~~1~~: IPv6 Stateless Address Autoconfiguration Procedure

1) The MS sends an Activate PDP Context Request message to the SGSN. The procedure follows that ~~is as~~ defined in subclause "PDP Context Activation Procedure" ~~except for the following~~ with below described exceptions.~~.~~ ~~see subclause "PDP Context Activation Procedure".~~

   The MS shall leave PDP Address empty and set PDP Type to IPv6. ~~Otherwise, the PDP context activation is as for PDP type IPv4. The SGSN validates the Activate PDP Context Request message. The Create PDP Context procedure from the SGSN side is as defined for PDP type IPv4 except that only dynamic address allocation shall be used.~~

   The GGSN shall create the unique link-local address for the MS and send it in the PDP Address information element in the Create PDP Context Response message. The link local address consists of a fixed 10-bit prefix (IPv6 well-known link-local prefix), zero or more 0 bits, and the interface identifier. ~~Otherwise, the procedure is as defined for PDP type IPv4.~~

2) The MS may send a Router Solicitation message to the GGSN to activate the sending of the Router Advertisement message.

3) The GGSN should automatically send the Router Advertisement message after the PDP context is activated. In release 99 the GGSN shall be configured to advertise only one network prefix per APN.

   After the MS has received the Router Advertisement message, it constructs its full IPv6 address by ~~concantenating~~concatenating the interface identifier contained in the link-local ~~prefix~~address provided in the Create PDP Context Response Message in step 1 and the network prefix of the ~~selecected~~selected APN received in the Router Advertisement. Subsequently, the MS~~and~~ is ready to start communicating to the Internet.

   Because the GGSN provides a unique interface ~~identifer~~identifier during the PDP context activation procedure~~s~~, there is no need for the MS to perform Duplicate Address Detection for this IPv6 address. Therefore, the GGSN shall intercept and discard Neighbor Solicitation messages ~~from~~that the MS may send to perform ~~used for~~ Duplicate Address Detection. It is possible for the MS to perform Neighbor Unreachability Detection, as defined in RFC 2461[71]; therefore if the GGSN receives a Neighbor Solicitation as part of this procedure, the GGSN shall provide a Neighbor Advertisement as described in RFC 2461.

4) The GGSN updates the PDP context in the SGSN and MS with the full IPv6 address, see subclause "GGSN-Initiated PDP Context Modification Procedure".

~~External PDN IPv6 Address Allocation~~

~~External PDN Ipv6 address allocation represents stateful dynamic address allocation. It shall be detailed in the TS 29.061 [27].~~

DELETED SECTION

Annex B (normative): IPv6 Stateless Address Autoconfiguration Procedure

IPv6 address allocation is somewhat different from the IPv4 address allocation procedure. There are two possibilities to allocate the address for an IPv6 node – stateless and stateful autoconfiguration. The stateful address allocation mechanism needs a DHCP server to allocate the address for the IPv6 node. In the stateless autoconfiguration, the IPv6 node is more involved in the allocation of the address. In addition, the stateless autoconfiguration procedure does not need any external entity involved in the address autoconfiguration.

IPv6 stateful address autoconfiguration uses the standard External PDN Address Allocation procedure. The MS requests stateful address autoconfiguration by using an Access Point Name referring to that service.

The IPv6 Stateless Address Autoconfiguration procedure is illustrated in Figure B.1.

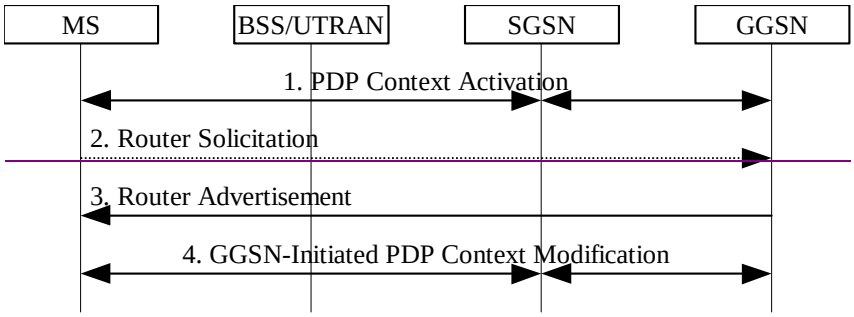

Figure B.1: IPv6 Stateless Address Autoconfiguration Procedure

1) The MS sends an Activate PDP Context Request message to the SGSN, see subclause "PDP Context Activation Procedure". The MS shall leave PDP Address empty and set PDP Type to IPv6. Otherwise, the PDP context activation is as for PDP type IPv4. The SGSN validates the Activate PDP Context Request message. The Create PDP Context procedure from the SGSN side is as defined for PDP type IPv4 except that only dynamic address allocation shall be used.

   The GGSN shall create the link-local address for the MS and send it in the PDP Address information element in the Create PDP Context Response message. The link-local address consists of a fixed 10-bit prefix (IPv6 well-known link-local prefix), zero or more 0 bits, and the interface identifier. Otherwise, the procedure is as defined for PDP type IPv4.

2) The MS may send a Router Solicitation message to the GGSN to activate the sending of the Router Advertisement message.

3) The GGSN should automatically send the Router Advertisement message after the PDP context is activated. In release 99 the GGSN shall be configured to advertise only one network prefix.

   After the MS has received the Router Advertisement message it constructs its full IPv6 address and is ready to start communicating to the Internet.

   The MS may send a Neighbour Solicitation message to the network to make sure that the IPv6 address it has is unique. The GGSN shall intercept and discard any such message.

4) The GGSN updates the PDP context in the SGSN with the full IPv6 address, see subclause "GGSN Initiated PDP Context Modification Procedure".

3GPP TSG-SA2 Meeting #15
Makuhari, Japan, 13th-17th of November 2000

Tdoc S2-001975

CR-Form-v3

CHANGE REQUEST

⌘ **23.060** **CR** **185** ⌘ rev **R1** ⌘ Current version: **3.5.0** ⌘

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Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network **X** Core Network X

Title:	⌘	Correction to the Inter system change procedures
Source:	⌘	Ericsson
Work item code:	⌘	Release 99 ***Date:*** ⌘ 2000-11-15
Category:	⌘	**F** ***Release:*** ⌘ R99

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

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

Reason for change:	⌘	The inter system change chapter has been clarified on the following issues.
Summary of change:	⌘	• Clarifications on when to initiate the Service Request Procedure after a inter system change. • Correction on the stopping of downlink n-PDU flow. • Clarification on P-TMSI Signature handling at Inter SGSN system change. • Adding the missing description on Follow-on in Update type in RAU Request GSM to UMTS. • Modification of the figure in Ch. 6.13.2.1 on Cancel location ack.
Consequences if not approved:	⌘	The description of inter system change will not be correct.

Clauses affected:	⌘	6.13
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

6.13 UMTS - GSM Intersystem Change

The UMTS - GSM intersystem change procedures may be supported for network elements conforming to GSM releases 97, 98, and 99, and to UMTS release 99. At intersystem change release 99 network elements shall use GTP release 97 or 98 on the Gn interface when interworking with release 97 or 98 network elements, respectively.

An intersystem change from UMTS to GSM or GSM to UMTS takes place when an MS supporting both UMTS and GSM changes the radio access technology. A prerequisite for an intersystem change is that the MS is GPRS-attached. The transition of the mobility management states is as specified for the corresponding mobility management procedures.

There is no transition of the session management states at an intersystem change.

6.13.1 Intra SGSN Intersystem Change

An SGSN that supports both the Gb and Iu-PS interfaces may support an intra SGSN intersystem change if the radio access technology nodes serving the MS before and after the intersystem change are both served by this SGSN.

6.13.1.1 UMTS to GSM Intra SGSN Change

The intersystem change from UMTS to GSM takes place when an MS changes from UTRAN to GSM radio access. Depending on the PMM 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 PMM-IDLE state changes to the GSM radio access without changing the RA, the MS shall follow the selective RA update procedures, see subclause "Selective RA Update".

- When an MS in PMM-IDLE state changes to the GSM radio access and the RA changes, the MS shall initiate the GPRS RA update procedure, see subclause "Intra SGSN Routeing Area Update".

- When an MS in PMM-CONNECTED state changes to the GSM radio access , the MS shall initiate the GPRS RA update procedure independent of whether the RA has changed or not. The RA update procedure is either combined RA / LA update or only RA update.

A combined RA / LA update takes place in network operation mode I when the MS enters a new RA or when a GPRS-attached MS performs IMSI attach. The MS sends a Routeing Area Update Request message indicating that an LA update may also need to be performed, in which case the SGSN forwards the LA update to the VLR. This concerns only idle mode (see 3G TS 23.122), as no combined RA / LA updates are performed during a CS connection.

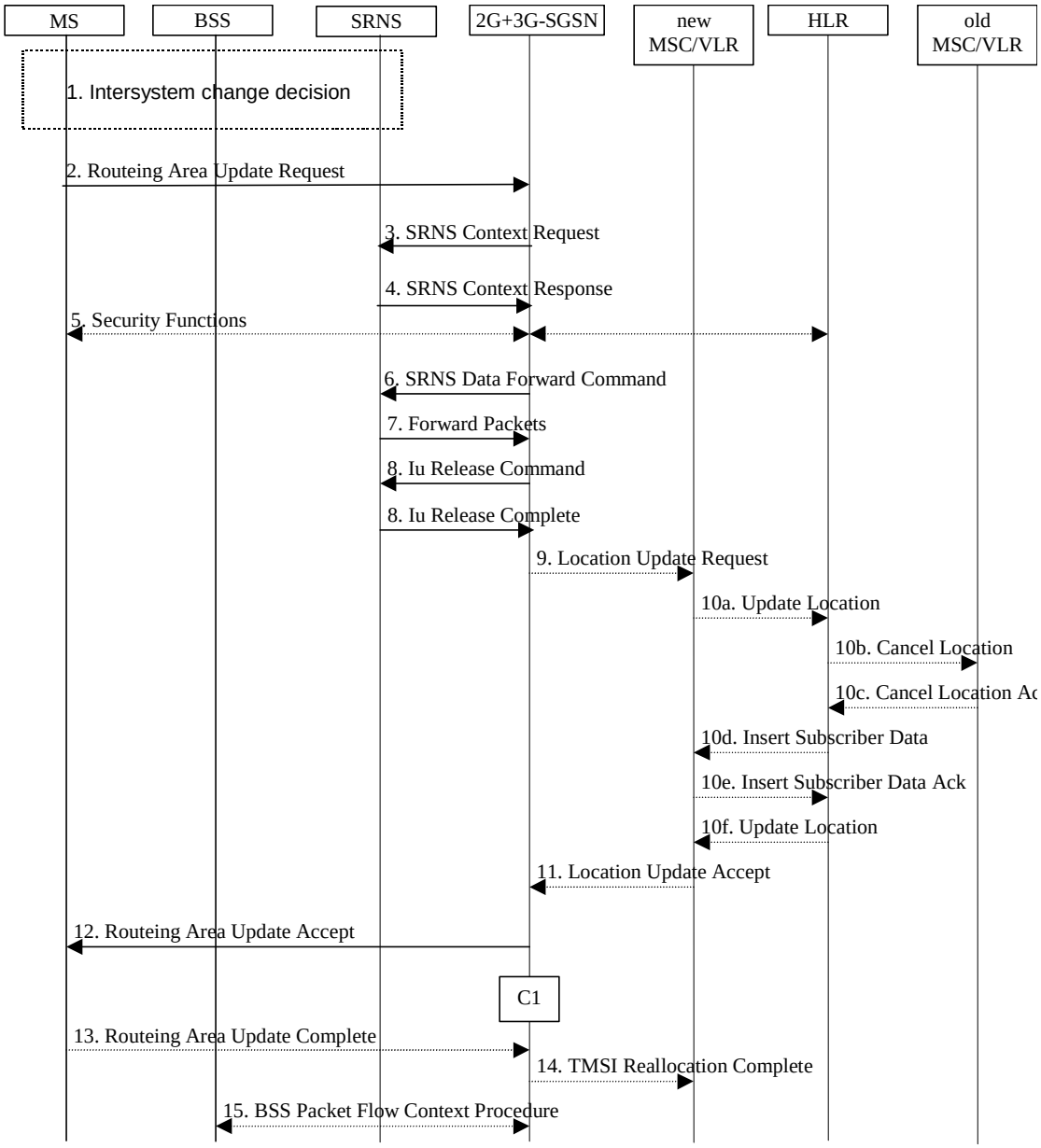


Figure 1: UMTS to GSM Intra SGSN Change

1) The MS or BSS or UTRAN decides to perform an intersystem change which makes the MS switch to a new cell that supports GSM radio technology, and stops transmission to the network.

2) The MS sends a Routeing Area Update Request (old RAI, old P-TMSI Signature, Update Type) message to the 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 attached requested. The BSS shall add the Cell Global Identity including the RAC and LAC of the cell where the message was received before passing the message to the 2G+3G-SGSN.

3) The 2G+3G-SGSN sends an SRNS Context Request (IMSI) message to the SRNS. ~~and stops transmission of GTP PDUs to the SRNS.~~

4) Upon reception of the SRNS Context Request message the SRNS starts buffer and stops sending downlink PDUs to the MS. The SRNS responds with an SRNS Context Response (IMSI, GTP-SNDs, GTP-SNUs, PDCP-SNUs) message. The GTP sequence numbers are included for each PDP context indicating the next in-sequence downlink PDU to be sent to the MS and the next in-sequence GTP PDU to be tunnelled to the GGSN. For each active PDP context using acknowledged mode, the SRNS also includes the uplink PDCP sequence number (PDCP-SNU). PDCP-SNU is the PDCP sequence number for the next expected in-sequence uplink packet to be received in acknowledged mode from the MS for each radio bearer, which requires lossless relocation. The 2G+3G-SGSN shall strip off the eight most significant bits of the passed PDCP sequence numbers, thus converting them to SNDCP N-PDU numbers of the respective 2G GPRS PDP contexts.

5) Security functions may be executed.

6) The 2G+3G-SGSN sends an SRNS Data Forward Command (RAB ID, Transport Layer Address, Iu Transport Association) message to the SRNS. This informs the SRNS that the 2G+3G-SGSN is ready to receive data packets. Upon reception of SRNS Data Forward Command message from the 2G+3G-SGSN the SRNS shall start the data-forwarding timer.

7) The transmitted but not acknowledged PDCP-PDUs together with the downlink PDCP sequence number and the buffered downlink GTP PDUs are tunnelled back to the 2G+3G-SGSN. The 2G+3G-SGSN shall strip off the eight most significant bits of the PDCP sequence numbers accompanying the received N-PDUs before sending them to the MS.

8) The 2G+3G-SGSN sends an Iu Release Command message to the SRNS. When the RNC data forwarding timer has expired the SRNS responds with an Iu Release Complete message.

9) 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, then 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. The VLR number is translated from the RAI by the 2G+3G-SGSN. The VLR creates or updates the association with the 2G+3G-SGSN by storing SGSN Number.

10) If the subscriber data in the VLR is marked as not confirmed by the HLR, then the new VLR informs the HLR. The HLR cancels the data in the old VLR and inserts subscriber data in the new VLR (this signalling is not modified from existing GSM signalling and is included here for illustrative purposes):

    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, GSM 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.

11) 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.

12) The 2G+3G-SGSN validates the MS's presence in the new RA. If due to roaming restrictions the MS is not allowed to be attached in the RA, or if subscription checking fails, then the 2G+3G-SGSN rejects the routeing area update with an appropriate cause. If all checks are successful then the 2G+3G-SGSN updates MM and PDP contexts for the MS. A new P-TMSI may be allocated. A logical link is established between the new 2G+3G-SGSN and the MS. The establishment procedure is initiated by 2G+3G-SGSN. A Routeing Area Update Accept (P-TMSI, P-TMSI Signature, Receive N-PDU Number (= converted PDCP-SNU)) message is returned to the MS. Receive N-PDU Number contains the acknowledgements for each acknowledged-mode NSAPI used by the MS, thereby confirming all mobile-originated N-PDUs successfully transferred before the start of the update procedure.

13) The MS acknowledges the new P-TMSI by returning a Routeing Area Update Complete (Receive N-PDU Number) message to the SGSN. Receive N-PDU Number (= converted PDCP-SND) contains the acknowledgements for each acknowledged-mode NSAPI used by the MS, thereby confirming all mobile-terminated N-PDUs successfully transferred before the start of the update procedure. The MS deducts Receive N-PDU Number from PDCP-SND by stripping off the eight most significant bits. PDCP-SND is the PDCP sequence number for the next expected in-sequence downlink packet to be received in acknowledged mode in the MS per radio bearer, which requires lossless handover.

14) The 2G+3G-SGSN sends a TMSI Reallocation Complete message to the VLR if the VLR TMSI is confirmed by the MS.

15) The 2G+3G-SGSN and the BSS may execute the BSS Packet Flow Context procedure.

For an MS with GPRS-CSI defined, CAMEL interaction may be performed, see referenced procedure in 3G TS 23.078:

C1) CAMEL-GPRS-Routeing-Area-Update.

6.13.1.2 GSM to UMTS Intra SGSN Change

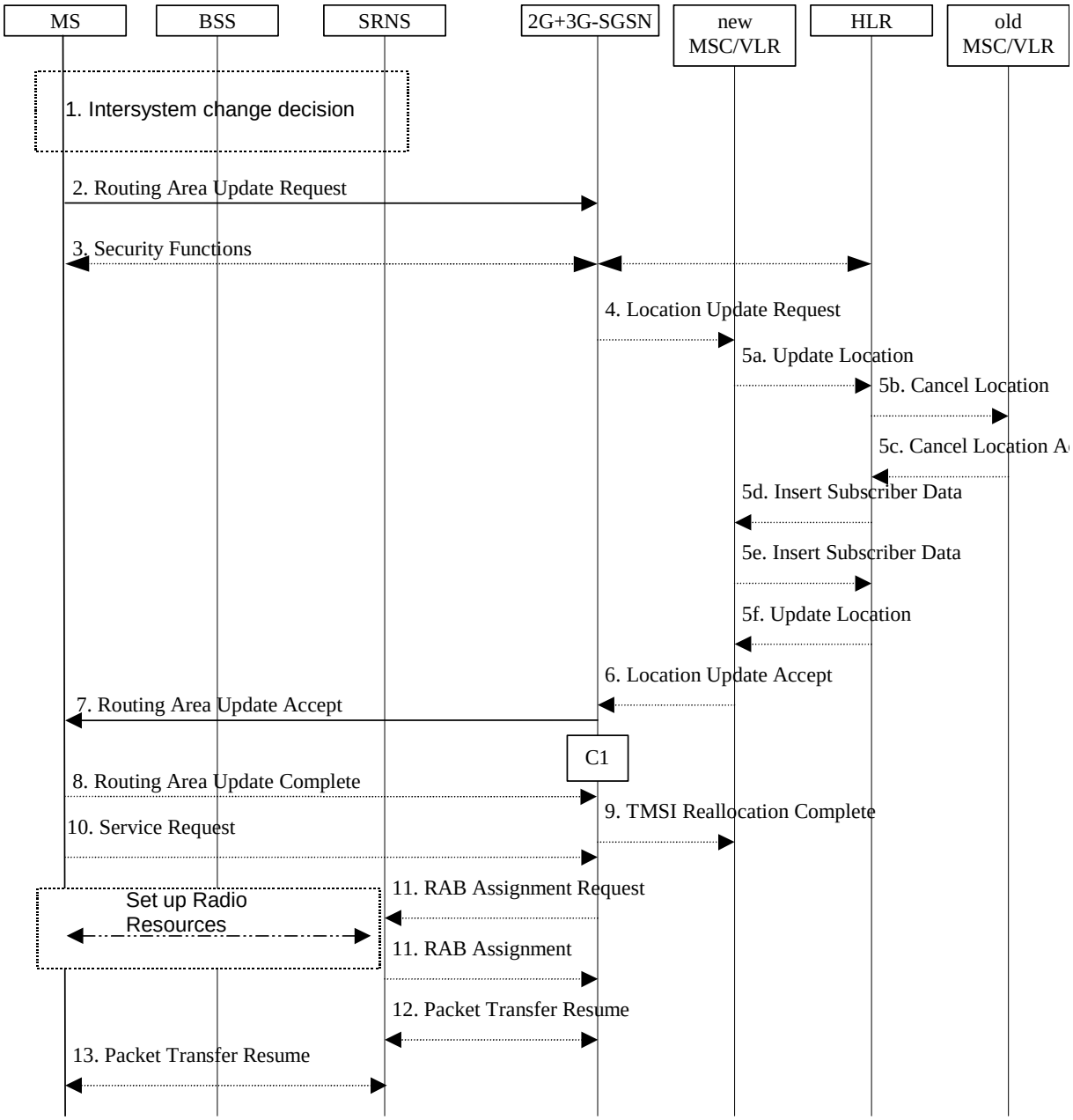
The intersystem change from GSM to UMTS takes place when a GPRS-attached MS changes from GSM radio access to UTRAN. Depending on the GPRS mobility management state before the intersystem change and whether the RA is changed or not one of the following procedures is initiated by the MS:

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

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

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

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 procedure. This concerns only idle mode (see 3G TS 23.122), as no combined RA / LA updates are performed during a CS connection.


MS
BSS
SRNS
2G+3G-SGSN
new MSC/VLR
HLR
old MSC/VLR
1. Intersystem change decision
2. Routing Area Update Request
3. Security Functions
4. Location Update Request
5a. Update Location
5b. Cancel Location
5c. Cancel Location A
5d. Insert Subscriber Data
5e. Insert Subscriber Data
5f. Update Location
6. Location Update Accept
7. Routing Area Update Accept
C1
8. Routing Area Update Complete
9. TMSI Reallocation Complete
10. Service Request
11. RAB Assignment Request
Set up Radio Resources
11. RAB Assignment
12. Packet Transfer Resume
13. Packet Transfer Resume

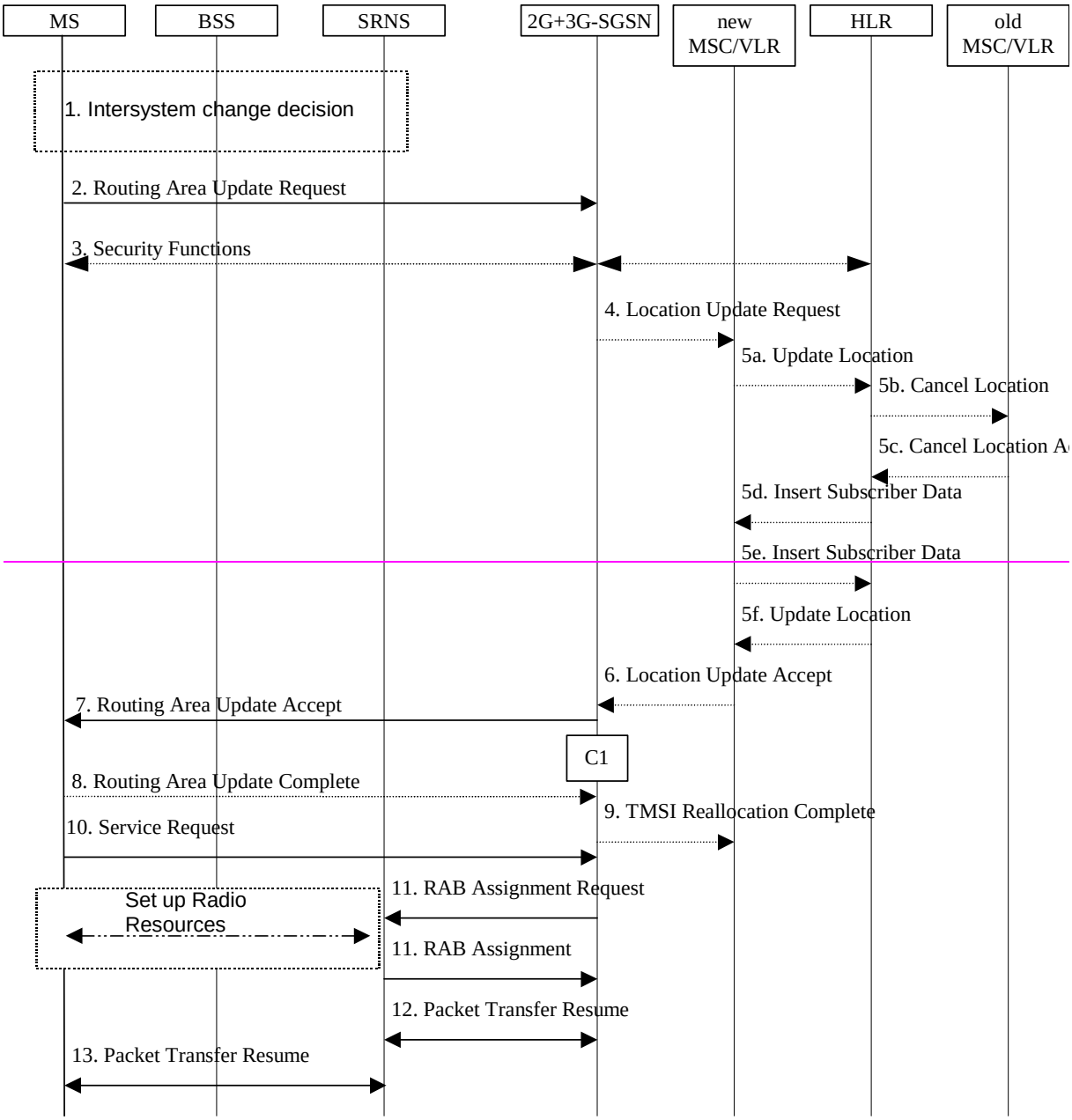


Figure 2: GSM to UMTS Intra SGSN Change

1) The MS or BSS or UTRAN decides to perform an intersystem change which makes the MS switch to a new cell that supports UMTS radio technology, and stops transmission to the network.

2) The MS initiates an RRC connection establishment and sends 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, then 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. The VLR number is translated from the RAI by the 2G+3G-SGSN. The VLR creates or updates the association with the 2G+3G-SGSN by storing SGSN Number.

5) If the subscriber data in the VLR is marked as not confirmed by the HLR, then the new VLR informs the HLR. The HLR cancels the data in the old VLR and inserts subscriber data in the new VLR (this signalling is not modified from existing GSM signalling and is included here for illustrative purposes):

   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, GSM 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 the MS is not allowed to be attached in the RA, or if subscription checking fails, then the 2G+3G-SGSN rejects the routeing area update with an appropriate cause. If all checks are successful then 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.

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 VLR TMSI is confirmed by the MS.

10) If ~~T~~the MS has pending uplink data or signalling it shall send~~s~~ 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 shall be derived from the N-PDU sequence numbers stored in the 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 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. The SRNS shall discard all N-PDUs with N-PDU sequence numbers older than the downlink N-PDU sequence number 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 GTP-SNU received from the SRNS. If this is not the case the N-PDU shall be transmitted to the SRNS.

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

For an MS with GPRS-CSI defined, CAMEL interaction may be performed, see referenced procedure in 3G TS 23.078:

C1) CAMEL-GPRS-Routeing-Area-Update.

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 access network as when it last sent data or signalling, then the procedures defined for that access system shall be followed. This shall be sending of an LLC PDU in GPRS, or for example sending of a Service Request message in UMTS.

If the MS is in a different access network 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.

6.13.1.3.2 Downlink Signalling or Data Transmission

If the 2G+3G-SGSN receives data for an MS in STANDBY or PMM-IDLE state, then the SGSN shall page in the RA where the MS is located. This may include both 2G and 3G cells.

If the MS receives this page in the same access network as when it last sent data or signalling, then the procedures defined for that access system shall be followed. This shall be sending of an LLC PDU in a GSM cell or for example sending of a Service Request message in a UMTS cell.

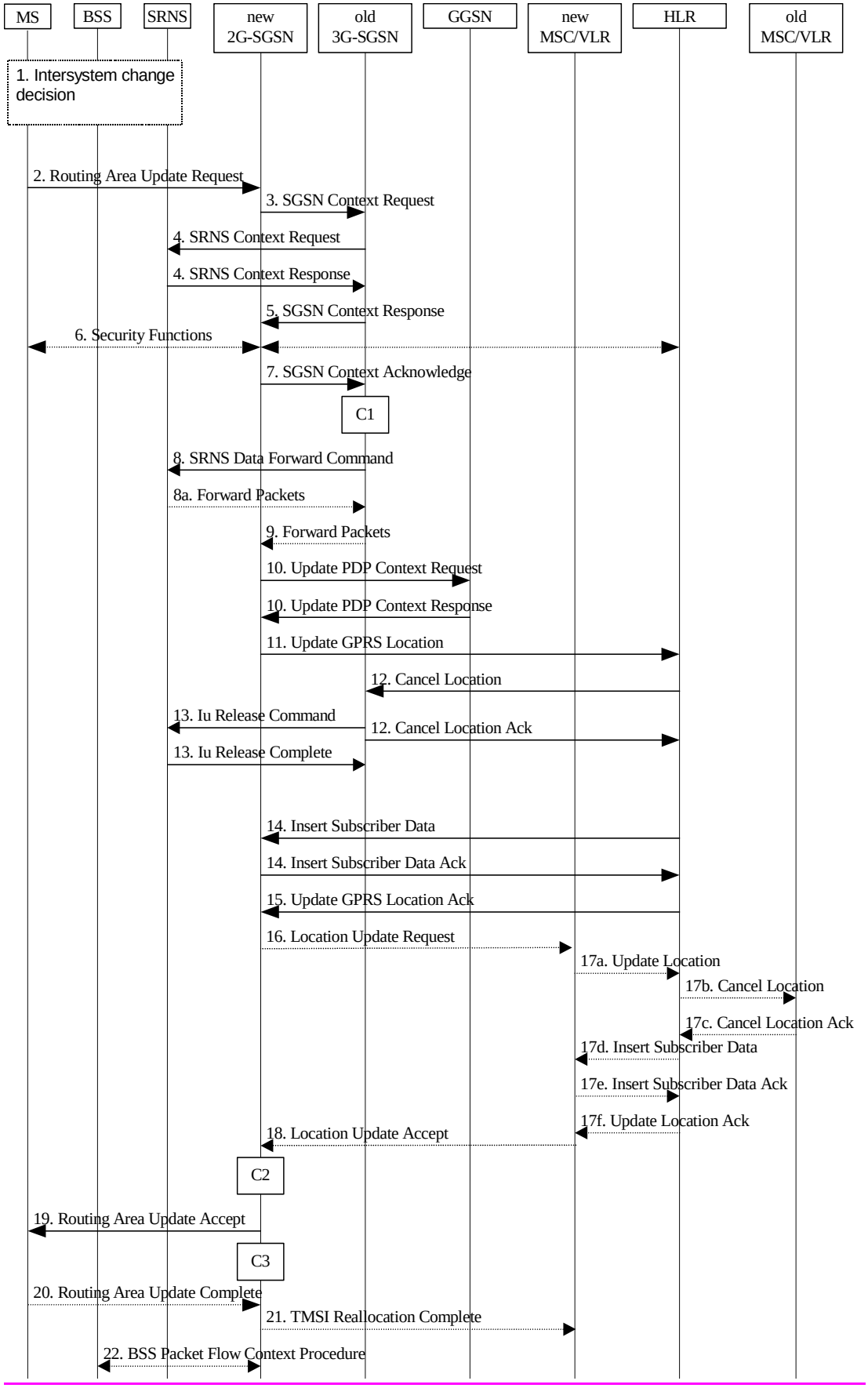
If the MS receives this page in a different access network as when it last sent data or signalling, then the RA update procedure shall be performed. The 2G+3G-SGSN shall accept this RAU as a valid response.

6.13.2 Inter SGSN Inter system Change

6.13.2.1 UMTS to GSM Inter SGSN Change

An inter SGSN intersystem change from UMTS to GSM takes place when an MS in PMM-IDLE or PMM-CONNECTED state changes from UTRAN to GSM radio access and the GSM radio access node serving the MS is served by a different SGSN. In this case the RA changes. Therefore, the MS shall initiate a GSM 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 3.

A combined RA / LA update takes place in network operation mode I when the MS enters a new RA or when a GPRS-attached MS performs IMSI attach. The MS sends a Routeing Area Update Request indicating that an LA update may also need to be performed, in which case the SGSN forwards the LA update to the VLR. This concerns only idle mode (see 3G TS 23.122), as no combined RA / LA updates are performed during a CS connection.


MS
BSS
SRNS
new 2G-SGSN
old 3G-SGSN
GGSN
new MSC/VLR
HLR
old MSC/VLR
1. Intersystem change decision
2. Routing Area Update Request
3. SGSN Context Request
4. SRNS Context Request
4. SRNS Context Response
5. SGSN Context Response
6. Security Functions
7. SGSN Context Acknowledge
C1
8. SRNS Data Forward Command
8a. Forward Packets
9. Forward Packets
10. Update PDP Context Request
10. Update PDP Context Response
11. Update GPRS Location
12. Cancel Location
13. Iu Release Command
12. Cancel Location Ack
13. Iu Release Complete
14. Insert Subscriber Data
14. Insert Subscriber Data Ack
15. Update GPRS Location Ack
16. Location Update Request
17a. Update Location
17b. Cancel Location
17c. Cancel Location Ack
17d. Insert Subscriber Data
17e. Insert Subscriber Data Ack
17f. Update Location Ack
18. Location Update Accept
C2
19. Routing Area Update Accept
C3
20. Routing Area Update Complete
21. TMSI Reallocation Complete
22. BSS Packet Flow Context Procedure

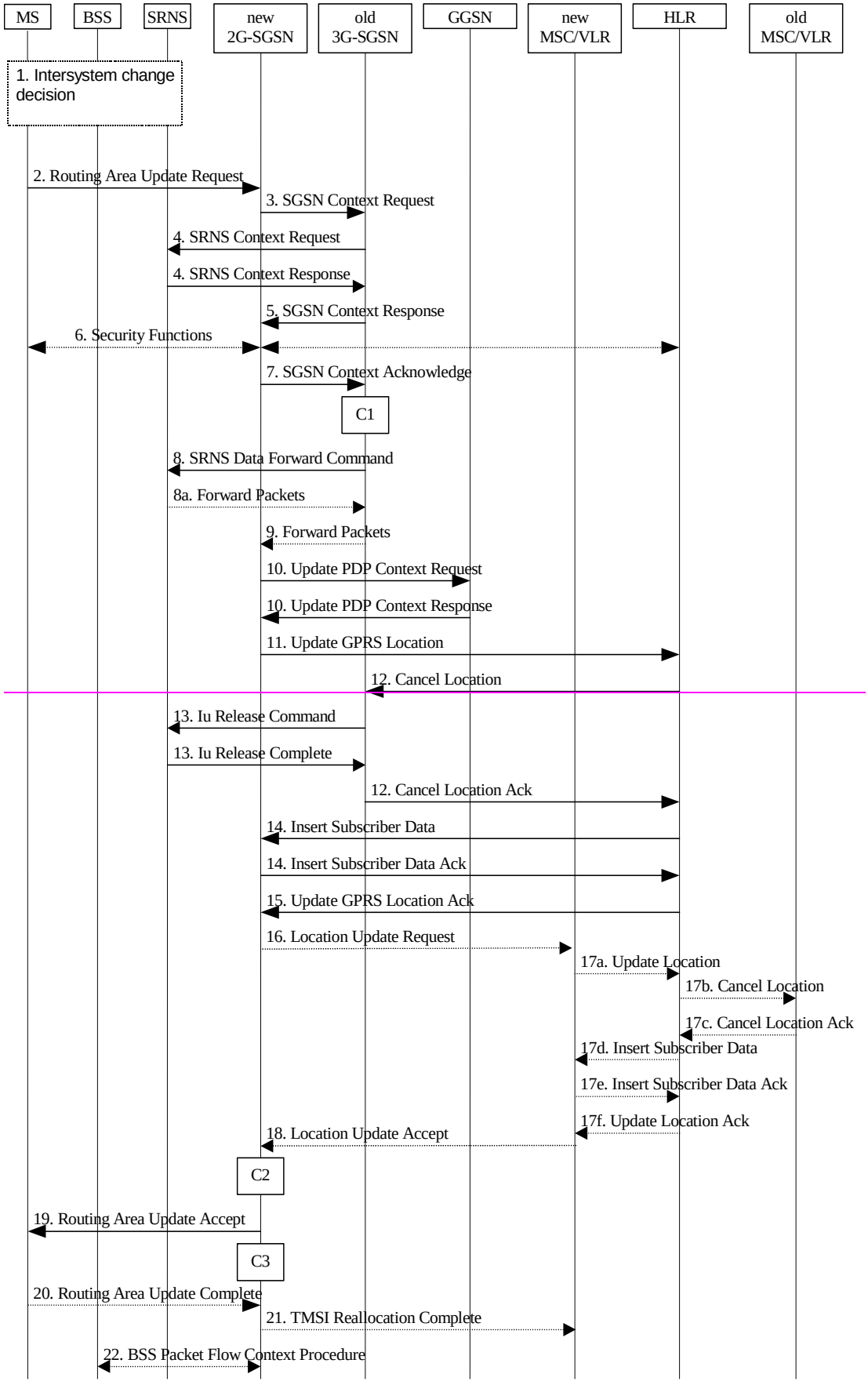


Figure 3: UMTS to GSM Inter SGSN Change

1) The MS or BSS or UTRAN decides to perform an intersystem change, which makes the MS switch to a new cell that supports GSM radio technology, and stops transmission to the network.

2) The MS sends a Routeing Area Update Request (old RAI, old P-TMSI Signature, Update Type) message to the new 2G-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. The BSS shall add the Cell Global Identity including the RAC and LAC of the cell where the message was received before passing the message to the new 2G-SGSN.

3) The new 2G-SGSN sends an SGSN Context Request (old RAI, TLLI, old P-TMSI Signature, New SGSN Address) message to the old 3G-SGSN to get the MM and PDP contexts for the MS. The old 3G-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 3G-SGSN.If the received old P-TMSI Signature not match the stored value, the security functions in the new 2G-SGSN should be initiated. If the security functions authenticate the MS correctly, the new 2G-SGSN shall send an SGSN Context Request (old RAI, TLLI, MS Validated, New SGSN Address) message to the old 3G-SGSN. MS Validated indicates that the new 2G-SGSN has authenticated the MS. If the old P-TMSI Signature was valid or if the new 2G-SGSN indicates that it has authenticated the MS correctly,. tThe old 3G-SGSN starts a timer. If the MS is not known in the old 3G-SGSN, the old 3G-SGSN responds with an appropriate error cause.

4) If the MS is PMM-CONNECTED the old 3G-SGSN sends an SRNS Context Request (IMSI) message to the SRNS. 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 using acknowledged mode, 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). The 3G-SGSN shall strip off the eight most significant bits of the passed PDCP sequence numbers, thus converting them to SNDCP N-PDU numbers.

5) 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 donwlink GTP sequence number for the next in-sequence N-PDU to be sent to the MS. Each PDP Context also includes the SNDCP Send N-PDU Number (the value is 0) for the next in-sequence downlink N-PDU to be sent in acknowledged mode to the MS and the SNDCP Receive N-PDU Number (= converted PDCP-SNU) for the next in-sequence uplink N-PDU to be received in acknowledged mode from the MS.

6) Security functions may be executed.

7) The new 2G-SGSN sends an SGSN Context Acknowledge message to the old 3G-SGSN. This informs the old 3G-SGSN that the new 2G-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 RA update procedure back to the old SGSN before completing the ongoing RA update procedure.

8) If the MS is PMM-CONNECTED the old 3G-SGSN sends an SRNS Data Forward Command (RAB ID, Transport Layer Address, Iu Transport Association) message to the SRNS. The SRNS shall start tunnelling the partly transmitted and the transmitted but not acknowledged PDCP-PDUs together with the PDCP downlink sequence number (the eight most significant bits shall be stripped off), and start duplicating and tunnelling the buffered GTP PDUs to the old 3G-SGSN. Upon reception of SRNS Data Forward Command message from the 3G-SGSN the SRNS shall start the data-forwarding timer.

9) The old 3G-SGSN tunnels the GTP PDUs to the new 2G-SGSN. The sequence numbers (= converted PDCP sequence numbers) shall not be modified in the GTP header of the tunnelled PDUs.

10) The new 2G-SGSN sends an Update PDP Context Request (new SGSN Address, TEID, QoS Negotiated) message to each GGSN concerned. Each GGSN updates its PDP context fields and returns an Update PDP Context Response (TEID) message.

11) The new 2G-SGSN informs the HLR of the change of SGSN by sending an Update GPRS Location (SGSN Number, SGSN Address, IMSI) message to the HLR.

12) The HLR sends a Cancel Location (IMSI) message to the old 3G-SGSN. The old 3G-SGSN acknowledges with a Cancel Location Ack (IMSI) message. The old 3G-SGSN removes the MM and PDP contexts if the timer described in step 3 is not running. If the timer is running then the MM and PDP contexts shall be removed when the timer expires.

13) When the MS is PMM-CONNECTED the old 3G-SGSN sends an Iu Release Command message to the SRNS. When the RNC data-forwarding timer has expired the SRNS responds with an Iu Release Complete message.

14) The HLR sends an Insert Subscriber Data (IMSI, GPRS Subscription Data) message to the new 2G-SGSN. The 2G-SGSN construct an MM context and PDP contexts for the MS and return an Insert Subscriber Data Ack (IMSI) message to the HLR.

15) The HLR acknowledges the Update GPRS Location by returning an Update GPRS Location Ack (IMSI) message to the new 2G-SGSN.

16) 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, then the new 2G-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. The VLR number is translated from the RAI by the 2G-SGSN. The 2G-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 14). The VLR creates or updates the association with the 2G-SGSN by storing SGSN Number.

17) 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 (this signalling is not modified from existing GSM signalling and is included here for illustrative purposes):

   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, GSM 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.

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

19) The new 2G-SGSN validates the MS's presence in the new RA. If due to roaming restrictions the MS is not allowed to be attached in the 2G-SGSN, or if subscription checking fails, then the new 2G-SGSN rejects the routeing area update with an appropriate cause. If all checks are successful then the new 2G-SGSN constructs MM and PDP contexts for the MS. A logical link is established between the new 2G-SGSN and the MS. The establishment procedure is initiated by 2G-SGSN. The new 2G-SGSN responds to the MS with a Routeing Area Update Accept (P-TMSI, P-TMSI Signature, Receive N-PDU Number (= converted PDCP-SNU)) message. Receive N-PDU Number contains the acknowledgements for each acknowledged-mode NSAPI used by the MS, thereby confirming all mobile-originated N-PDUs successfully transferred before the start of the update procedure.

20) The MS acknowledges the new P-TMSI by returning a Routeing Area Update Complete (Receive N-PDU Number (= converted PDCP-SND)) message to the SGSN. Receive N-PDU Number contains the acknowledgements for each acknowledged-mode NSAPI used by the MS, thereby confirming all mobile-terminated N-PDUs successfully transferred before the start of the update procedure. The MS deducts Receive N-PDU number from PDCP-SND by stripping off the eight most significant bits. PDCP-SND is the PDCP sequence number for the next expected in-sequence downlink packet to be received in acknowledged mode in the MS per radio bearer, which requires lossless handover.

21) The new 2G-SGSN sends TMSI Reallocation Complete message to the new VLR if the VLR TMSI is confirmed by the MS.

22) The 2G-SGSN and the BSS may execute the BSS Packet Flow Context procedure.

For an MS with GPRS-CSI defined, CAMEL interaction may be performed, see referenced procedures in 3G TS 23.078:

C1) CAMEL-GPRS-SGSN-Context-Acknowledge.

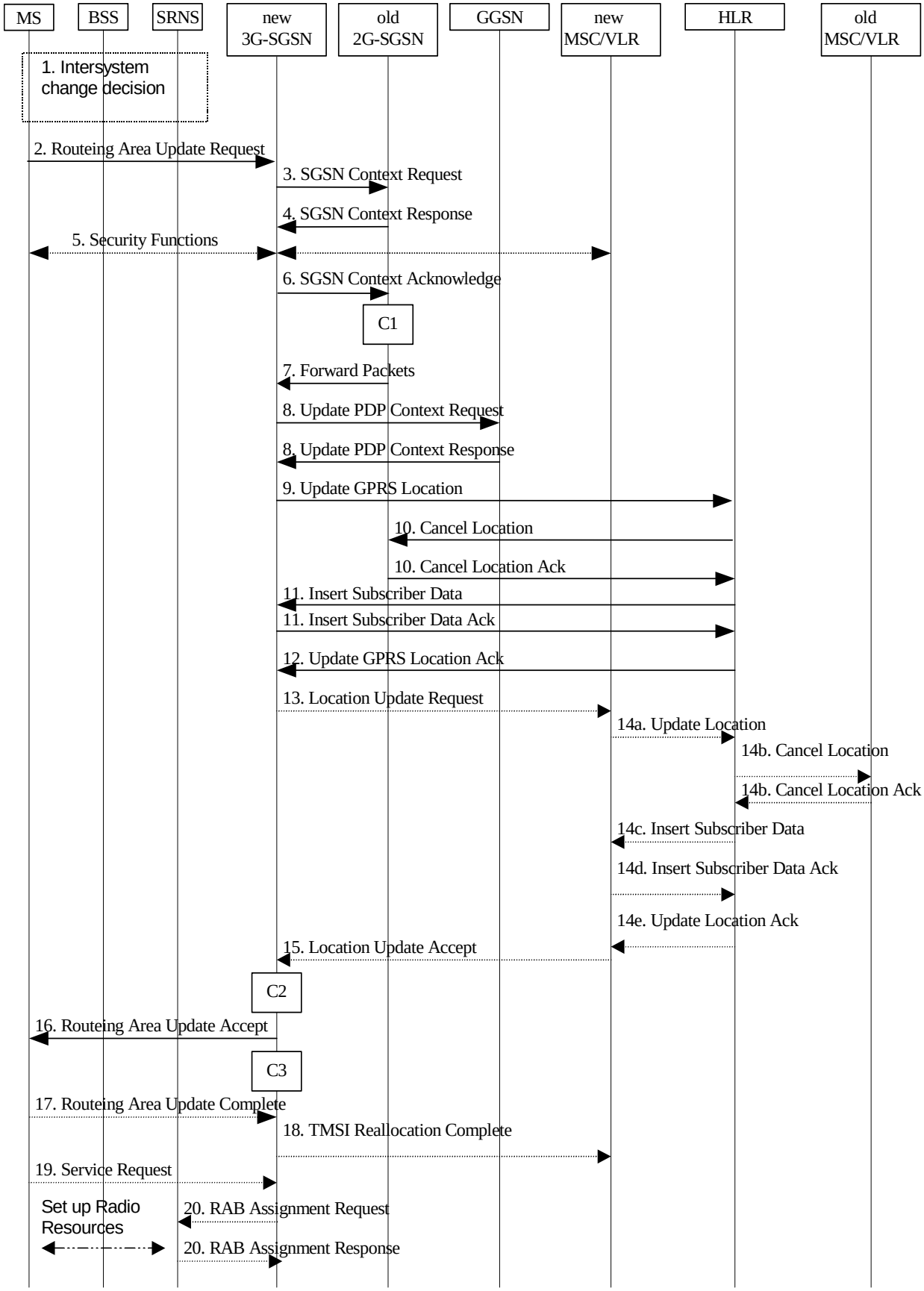
C2) CAMEL-GPRS-Routeing-Area-Update-Session.

C3) CAMEL-GPRS-Routeing-Area-Update-Context.

6.13.2.2 GPRS to UMTS Inter SGSN Change

The intersystem change from GSM to UMTS takes place when a GPRS-attached MS changes from GSM radio access to UTRAN and the UTRAN node serving the MS is served by a different SGSN. In this case the RA changes. Therefore, the MS shall initiate a UMTS RA update procedure by establishing a 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 4.

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 3G TS 23.122), as no combined RA / LA updates are performed during a CS connection.


MS
BSS
SRNS
new 3G-SGSN
old 2G-SGSN
GGSN
new MSC/VLR
HLR
old MSC/VLR
1. Intersystem change decision
2. Routeing Area Update Request
3. SGSN Context Request
4. SGSN Context Response
5. Security Functions
6. SGSN Context Acknowledge
C1
7. Forward Packets
8. Update PDP Context Request
8. Update PDP Context Response
9. Update GPRS Location
10. Cancel Location
10. Cancel Location Ack
11. Insert Subscriber Data
11. Insert Subscriber Data Ack
12. Update GPRS Location Ack
13. Location Update Request
14a. Update Location
14b. Cancel Location
14b. Cancel Location Ack
14c. Insert Subscriber Data
14d. Insert Subscriber Data Ack
14e. Update Location Ack
15. Location Update Accept
C2
16. Routeing Area Update Accept
C3
17. Routeing Area Update Complete
18. TMSI Reallocation Complete
19. Service Request
Set up Radio Resources
20. RAB Assignment Request
20. RAB Assignment Response

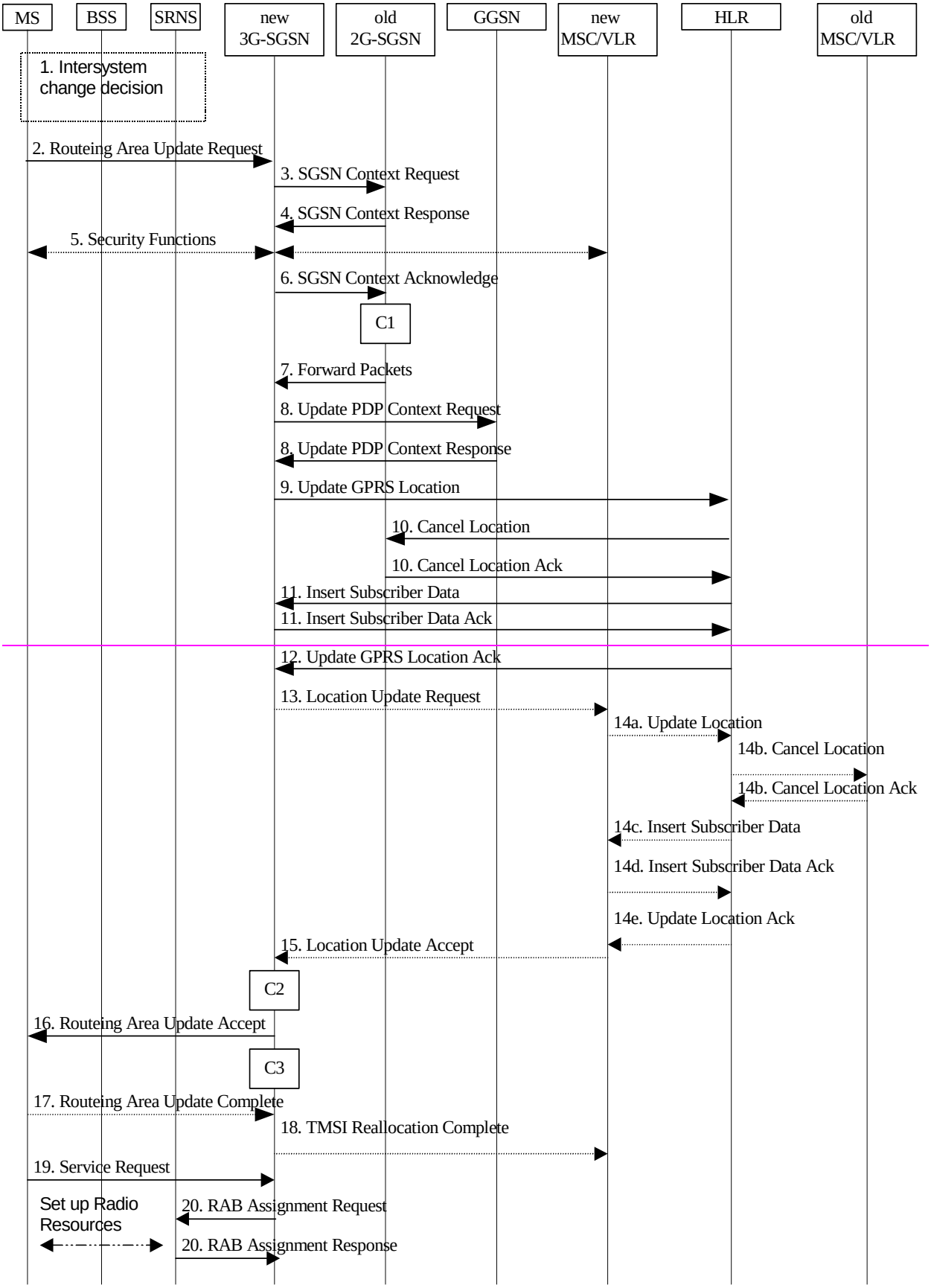


Figure 4: GSM to UMTS Inter SGSN Change

1) The MS or BSS or UTRAN decides to perform an intersystem change, which makes the MS switch to a new cell that supports UMTS radio technology, 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) 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. 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 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, TLLI, 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, t~~T~~he 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 to the MS and the SNDCP Receive N-PDU Number for the next uplink N-PDU to be received in acknowledged mode from the MS. The new 3G-SGSN shall use the GTP sequence numbers for in-sequence delivery over the Iu interface.

5) Security functions may be executed.

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. 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) message to each GGSN concerned. Each GGSN updates its PDP context fields and return an Update PDP Context Response (TEID) message.

9) The new 3G-SGSN informs the HLR of the change of SGSN by sending an Update GPRS Location (SGSN Number, SGSN Address, IMSI) message to the HLR.

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, then 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. The VLR number is translated from the

RAI by the 3G-SGSN. 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.

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 (this signalling is not modified from existing GSM signalling and is included here for illustrative purposes):

   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, GSM 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 the MS is not allowed to be attached in the 3G-SGSN, or if subscription checking fails, then the new 3G-SGSN rejects the routeing area update with an appropriate cause. If all checks are successful then 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 VLR TMSI is confirmed by the MS.

19) If the MS ~~was in GPRS MM state READY~~has uplink data or signalling pending it shall send~~s~~ 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 send 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 shall be derived from the N-PDU sequence numbers stored in the 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 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 PDCP-SNDs 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 PDCP-SNUs received from the SRNS. Other N-PDUs shall be transmitted to the SRNS.

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

For an MS with GPRS-CSI defined, CAMEL interaction may be performed, see referenced procedures in 3G TS 23.078:

C1) CAMEL-GPRS-SGSN-Context-Acknowledge.

C2) CAMEL-GPRS-Routeing-Area-Update-Session.

C3) CAMEL-GPRS-Routeing-Area-Update-Context.

3GPP TSG SA2 Meeting #15
Makuhari, Japan - 13 - 17 November, 2000

Document S2-~~001934~~001976
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

23.060	**CR**	**191r1**	Current Version:	3.3.5

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

For submission to:	SA #15	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

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

Source: Motorola **Date:** 2000-11-12

Subject: Correction of Fig. 5 and Fig. 13

Work item: Release 99

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

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

Reason for change: The CR clarifies and corrects Fig. 5 and Fig. 13 and its title in sections 5.6.1.2 and 5.6.3.7, respectively by addition of the Gp interface.

Clauses affected: 5.6.1.2 and 5.6.3.7

Other specs affected:

Other 3G core specifications	[ ]	→ List of CRs:
Other GSM core specifications	[ ]	→ List of CRs:
MS test specifications	[ ]	→ List of CRs:
BSS test specifications	[ ]	→ List of CRs:
O&M specifications	[ ]	→ List of CRs:

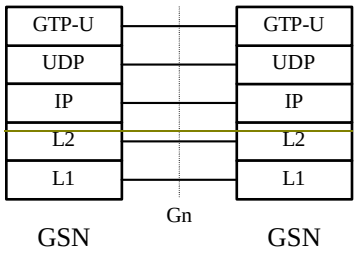
Other comments:

help.doc

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

MODIFIED SECTION

5.6.1.2 GSN – GSN



~~**Figure 5: User Plane GSN - GSN**~~

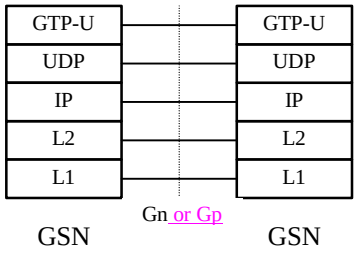


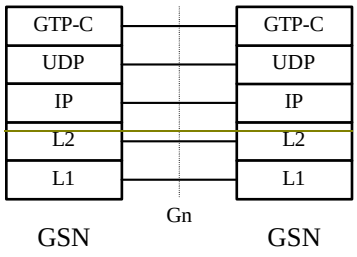
Figure 2: User Plane for SGSN – GGSN and SGSN – SGSN Interfaces.

Legend:

- GPRS Tunnelling Protocol for the user plane (GTP-U): This protocol tunnels user data between SGSNs and GGSNs (Gn), and between SGSNs~~,~~ in the backbone network (Gp).
- User Datagram Protocol (UDP): This protocol transfers user data between GSNs. UDP is defined in RFC 768.

NEXT MODIFIED SECTION

5.6.3.7 GSN - GSN



~~**Figure 13: Control Plane GSN - GSN**~~

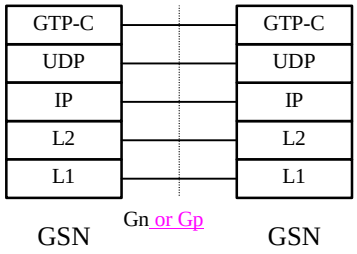


Figure 4: Control Plane for SGSN – GGSN and SGSN – SGSN interfaces.

Legend:

- GPRS Tunnelling Protocol for the control plane (GTP-C): This protocol tunnels signalling messages between SGSNs and GGSNs (Gn) , and between SGSNs , in the backbone network (Gp).

- User Datagram Protocol (UDP): This protocol transfers signalling messages between GSNs. UDP is defined in RFC 768.

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***Document* S2-001977**
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

23.060	CR	191r1	Current Version:	3.5.0

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

For submission to:	SA #15	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

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

Source: Motorola, Ericsson **Date:** 2000-11-12

Subject: Clarification of derivation of TEID

Work item: Release 99

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

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

Reason for change: The CR clarifies and corrects the description of derivation of TEID.

Clauses affected: 14.6

Other specs affected:

Other 3G core specifications		→ List of CRs:	
Other GSM core specifications		→ List of CRs:	
MS test specifications		→ List of CRs:	
BSS test specifications		→ List of CRs:	
O&M specifications		→ List of CRs:	

Other comments:

help.doc

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

MODIFIED SECTION

14.6 TEID

A Tunnel Endpoint Identifier (TEID) is used by the GPRS tunnelling protocol between GSNs, and between RNCs and SGSNs, to identify a tunnel endpoint in the receiving GTP-C or GTP-U protocol entity and to identify a PDP context (or in the Iu case a Radio Access Bearer). The receiving end side of a GTP-U tunnel locally assigns the TEID value that the transmitting side has to use. The TEID values are exchanged between tunnel endpoints using GTP-C (or RANAP in the Iu case) messages.

The TEID is ~~assigned defined in TS 29.060 [26]. based on the NSAPI and the IMSI (or in the Iu case the RAB ID and the IMSI). The algorithm for computing the value of the TEID is implementation dependent. It is~~ a unique identifier within one IP address of a logical node, i.e., RNC, SGSN, or GGSN, which has meaning only within the GTP protocol. For the user plane, i.e. GTP-U, each PDP context has ~~There is~~ a one-to-one relationship between the TEID on one hand and ~~the~~ NSAPI and IMSI on the other hand, or in the Iu reference point case, between the TEID and ~~the~~ RAB ID and IMSI ~~of the corresponding PDP context on the other hand~~. However, ~~T~~the algorithm for computing the value of the TEID is ~~however~~ implementation dependent.

The TEID is forwarded to the GGSN upon PDP Context Activation and it is used in subsequent tunnelling of user data between the GGSN and the SGSN to identify the MS's PDP contexts in the SGSN and GGSN. The TEID is also used to forward N-PDUs from the old SGSN to the new SGSN at and after an inter SGSN routeing area update. In UMTS, the TEID is also forwarded to the RNC upon RAB assignment and it is used in subsequent tunnelling of user data between the 3G-SGSN and the RNC in order to identify the MS's PDP contexts in the SGSN and the MS's RNC RAB contexts in the RNC. It is also used to forward N-PDUs from the SRNC to the target RNC at SRNS relocation.

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Makuhari, Japan, 13-17 November 2000

CR-Form-v3

CHANGE REQUEST

⌘ **23.060** **CR** **188** ⌘ rev **1** ⌘ Current version: **3.5.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network **X**

Title:	⌘	Adding security parameters to SGSN MM Context
Source:	⌘	Nokia
Work item code:	⌘	Release 99
Date:	⌘	13.11.2000
Category:	⌘	**F**
Release:	⌘	R99

Use one of the following categories:
- ***F*** *(essential correction)*
- ***A*** *(corresponds to a correction in an earlier release)*
- ***B*** *(Addition of feature),*
- ***C*** *(Functional modification of feature)*
- ***D*** *(Editorial modification)*

Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
REL-4	*(Release 4)*
REL-5	*(Release 5)*

Reason for change: ⌘ Aligning 23.060 with 33.102 and 29.060

Summary of change: ⌘ According to 33.102 and 29.060, during Intersystem change for a UMTS subscriber, a Release-99 enabled 2G-SGSN should send unused authentication Quintuplets as well as CK & IK, to the new 3G-SGSN (Security Type 0, as defined in 29.060).

On authentication of a UMTS subscriber at a 2G-SGSN, the HLR gives the 2G-SGSN a fresh array of authentication Quintuplets. 2G-SGSN converts one set of CK, IK keys to Kc. However, according to sub clause 13.2, the 2G-SGSN MM Context cannot store CK, IK and array of fresh UMTS authentication Quintuplets.

It is proposed to change sub clause 13.2 allowing the 2G-SGSN to store the above mentioned parameters. This change therefore aligns 23.060 with 33.102 and 29.060.

Likewise sub clause 13.2 at present forbids the 3G-SGSN from storing used Kc and Ciphering Algorithm within the MM Context. This restriction should be lifted as well because of the following reason. Once GSM subscriber has been authenticated with 3G-SGSN, fresh Kc key is converted to CK, IK keys. However, 3G-SGSN needs to store original Kc and Ciphering Algorithm in order to send them later to the new SGSN as required by 33.102 and 29.060 (Security Type 1).

GSM applies the ciphering algorithms (GEA) between SGSN and MS, while in UMTS ciphering takes place between MS and UTRAN. Therefore, in UMTS the 3G-SGSN does not need to keep information on ciphering algorithm UEA. In order to avoid ambiguity, it is proposed to clarify this issue in sub clause 13.2 by adding to the description of Ciphering Algorithm a comment "(GEA)".

Finally, it is proposed to clarify an issue of CKSN / KSI relationship during the Intersystem Change. According to 24.008v3.5.0 the MS sends either CKSN, or

		KSI with the Routing Area Update Request. Unless AKA is performed, KSI shall be assigned the value of the CKSN, which has been sent by MS, and vice versa.
Consequences if not approved:	⌘	Inconsistency between specifications on security parameters

Clauses affected:	⌘	13.2		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ 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/3G_Specs/CRs.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://www.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 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.

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 des not take place, the CKSN shall be assigned the value of the KSI, which has been sent by the MS.

Note: 2G-SGSN and 3G-SGSN refer to R99 SGSNs with either GSM or UMTS access.

Table 6: SGSN MM and PDP Contexts

Field	Description	GSM	UMTS
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
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 Triplets	Authentication and ciphering parameters.	X	X
Authentication Vectors	Authentication and ciphering parameters for UMTS.	X	X
Kc	Currently used ciphering key.	X	X
CKSN	Ciphering key sequence number of Kc.	X	
Ciphering algorithm	Selected ciphering algorithm (GEA).	X	X
CK	Currently used ciphering key.	X	X
IK	Currently used integrity key.	X	X
KSI	Key Set Identifier.		X
MS Radio Access Capability	MS radio access capabilities.	X	
MS Network Capability	MS network capabilities.	X	X
DRX Parameters	Discontinuous reception parameters.	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
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 3G TS 23.016	X	X

Field	Description	GSM	UMTS
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.	X	X
NSAPI	Network layer Service Access Point Identifier.	X	X
TI	Transaction Identifier.	X	X
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 currently used.		X

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Makuhari, Japan - 13 - 17 November, 2000

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CHANGE REQUEST

⌘ **23.060** **CR** **CR 183** ⌘ rev **r2** ⌘ Current version: **3.5.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE [X] Radio Access Network ☐ Core Network [X]

Title:	⌘	MS permanent (static) PDP address allocation by External PDN
Source:	⌘	Qualcomm, Inc./Motorola
Work item code:	⌘	***Date:*** ⌘ 08/17/00
Category:	⌘ **F**	***Release:*** ⌘ R99

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

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

Reason for change: ⌘ ~~23.060 is missing a description of a possible fifth way an MS can be allocated a PDP address. This pertains to the scenario when an MS has a permanent static address allocated by an external PDN e.g., a user's corporate network. The user should be able to register and use this address through mechanisms such as Mobile IP. 29.061 already has a reference to this particular scenario (clause 11.2.1.3):~~

~~"Address allocation – at PDP context activation no IP address is allocated to the MS indicated by 0.0.0.0. in the "Requested PDP Address" field. If the MS does not have a static IP address which it could register with the HA, it will acquire a dynamic IP address from the HA [25]."~~

~~The purpose of this CR is to explicitly recognise this manner of MS address allocation and thus align stage 2 description with 29.061.~~

In 23.060 clause 9.2.1 paragraph 4, the following text restricts the scope of the External PDN Address Allocation to only dynamic address allocation:

"When External PDN Address Allocation is used, it is the responsibility of the MS and the PDN to allocate and release the dynamic PDP address by means of protocols such as DHCP or MIP. In case of DHCP, the GGSN provides the function of a DHCP Relay Agent as defined in RFC 2131 [47] and RFC 1542 [45]."

The purpose of this CR is to clarify that External PDN Address Allocation allows both static and dynamic address allocation between the MS and the PDN.

Summary of change: ⌘ Modification ~~Inclusion~~ of text in clause 9.2.1 bullet item 1 of paragraph 1 and paragraph 4 to clarify that the "External PDN dynamic Address Allocation" case allows permanent and dynamic PDP address allocation betrween the MS and the PDN. ~~reflect the fifth way of PDP address allocation and to qualify the fourth bullet~~

		~~item to represent the "External PDN dynamic Address Allocation" case.~~ The text was coordinated with CR 195 r1 in S2-001973.
Consequences if not approved:	⌘	Ambiguity in interpretation of scope of the text related to PDP address allocation by the external PDN operator or administrator, i.e., whether or not static PDP address allocation by an external PDN operator is a valid scenario.

Clauses affected:	⌘	9.2.1		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	
Other comments:	⌘			

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

9.2.1 Static and Dynamic PDP Addresses

PDP addresses can be allocated to an MS in ~~four~~ ~~five~~ four different ways:

- the HPLMN operator assigns a PDP address permanently to the MS (static PDP address);
- the HPLMN operator assigns a PDP address to the MS when a PDP context is activated (dynamic HPLMN PDP address);
- the VPLMN operator assigns a PDP address to the MS when a PDP context is activated (dynamic VPLMN PDP address); or
- the PDN operator or administrator ~~allocates~~ assigns ~~assigns~~ a~~n~~ permanent or dynamic IP address~~.~~ to the MS~~. after a PDP context has been activated~~ (External PDN ~~dynamic~~ Address Allocation)~~.;or.~~

~~the PDN operator or administrator assigns a PDP address permanently to the MS (External PDN static Address Allocation).~~

It is the HPLMN operator that defines in the subscription whether a dynamic HPLMN or VPLMN PDP address can be used.

For every IMSI, zero, one, or more dynamic PDP address per PDP type can be assigned. For every IMSI, zero, one, or more static PDP addresses per PDP type can be subscribed to.

When dynamic addressing from the HPLMN or the VPLMN is used, it is the responsibility of the GGSN to allocate and release the dynamic PDP address. When External PDN Address Allocation is used, the PLMN may obtain a PDP address from the PDN and provide it to the MS during PDP context activation, or the MS may directly ~~obtain~~ negotiate a PDP address ~~from~~ with the PDN after the PDP context activation procedures are executed. If the PLMN provides the address during PDP context activation for External PDN Address Allocation, then it is the responsibility of the GGSN and PDN to allocate and release the dynamic PDP address by means of protocols such as DHCP. If DHCP is used, the GGSN provides the function of a DHCP Client. If the MS ~~obtains~~ negotiates a PDP address with ~~from~~ the PDN after PDP context activation for External PDN Address Allocation, ~~When External PDN Address Allocation is used, it~~ it is the responsibility of the MS and the PDN to allocate and release the PDP address ~~to allocate and release the dynamic PDP address~~ by means of protocols such as DHCP, RADIUS or MIP. In case of DHCP, the GGSN provides the function of a DHCP Relay Agent as defined in RFC 2131 [47] and RFC 1542 [45]. In case of MIP, the GGSN provides the function of a Foreign Agent as defined in RFC 2002 [46].

Only static PDP addressing is applicable in the network-requested PDP context activation case.

3GPP TSG-SA WG2 Meeting #15
Makuhari, Japan, 13-17 November, 2000

Tdoc S2-002084

CR-Form-v3

CHANGE REQUEST

⌘ **23.002** **CR** **CR-Num** ⌘ rev **R1** ⌘ Current version: **4.0.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network **X** Core Network **X**

Title:	⌘	Introduction of Iu-CS and Iu-PS interfaces to BSS of type GERAN in the network architecture for REL-4
Source:	⌘	Ericsson
Work item code:	⌘	***Date:*** ⌘ 2000-11-15
Category:	⌘ **B**	***Release:*** ⌘ REL-4

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

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
REL-4	*(Release 4)*
REL-5	*(Release 5)*

Reason for change:	⌘	• Introduction of Iu-CS and Iu-PS connected to BSS according to ref. Tdoc GERAN GP-000930. • Editorial corrections.
Summary of change:	⌘	- Iu-CS and Iu-PS has been introduced in the description part of BSS and in the interface description between Core Network and Access Network (BSS). - The figure for “Basic Configuration of a PLMN supporting CS and PS services and interfaces” has been updated with Iu-CS and Iu-PS intefaces connected to BSS. - Editorial corrections in chapter 6.3.2, and Iubis changed to Iub.
Consequences if not approved:	⌘	Missguiding description of BSS.

Clauses affected:	⌘	2, 4.2.1, 5.1, 6.2, 6.3.2		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	
Other comments:	⌘			

First Change

2 References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

This specification may contain references to pre-Release-4 GSM specifications. These references shall be taken to refer to the **Error! No text of specified style in document.** version where that version exists. Conversion from the pre-Release-4 number to the Release 4 (onwards) number is given in subclause 6.1 of 3GPP TR 41.001.

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

[1a] 3GPP TR 21.905: "3G Vocabulary".

[2] 3GPP TS 22.016: "Digital cellular telecommunications system (Phase 2+); International Mobile station Equipment Identities (IMEI)".

[2a] 3GPP TS 22.060: "Digital cellular telecommunications system (Phase 2+); General Packet radio Service (GPRS); Service Description; Stage 1".

[2b] 3GPP TS 22.071: "Digital cellular telecommunications system (Phase 2+); Location Services (LCS); Service Description; Stage 1".

[2c] 3GPP TS 22.078: "Customised Applications for Mobile network Enhanced Logic (CAMEL); Service description, Stage 1".

[3] 3GPP TS 23.003: "Digital cellular telecommunications system (Phase 2+); Numbering, addressing and identification".

[4] [void]

[5] 3GPP TS 23.008: "Digital cellular telecommunications system (Phase 2+); Organisation of subscriber data".

[6] 3GPP TS 23.009: "Digital cellular telecommunications system (Phase 2+); Handover procedures".

[7] 3GPP TS 23.012: "Digital cellular telecommunications system (Phase 2+); Location registration procedures".

[8] 3GPP TS 23.041: "Technical realization of Cell Broadcast Service (CBS)".

[9] 3GPP TS 23.054: "Digital cellular telecommunications system (Phase 2+); Description for the use of a Shared Inter Working Function (SIWF) in a GSM PLMN".

[9a] 3GPP TS 23.060: "Digital cellular telecommunication system (Phase 2+); General Packet Radio Service (GPRS); Service Description; Stage 2".

[10] 3GPP TS 23.068: "Digital cellular telecommunications system (Phase 2+); Voice Group Call Service (VGCS) stage 2".

[10a] GSM 03.64: "Digital cellular telecommunication system (Phase 2+); Overall Description of the General Packet Radio Service (GPRS) Radio Interface; Stage 2".

[10b] 3GPP TS 23.071: "Digital cellular telecommunications system (Phase 2+); Location Services (LCS); Functional Description; Stage 2".

[10c] TS 23.078: "Customised Applications for Mobile network Enhanced Logic (CAMEL) Phase 3 - Stage 2".

[11] ITU-T Recommendation Q.1214 (05/1995): "Distributed Functional Plane for Intelligent Network CS-1"

[11a] 3GPP TS 23.101: "General UMTS Architecture".

[11b] 3GPP TS 23.110: "Access Stratum (AS): Services and Functions".

[12] GSM 04.02 R98: "Digital cellular telecommunications system (Phase 2+); GSM Public Land Mobile Network (PLMN) access reference configuration".

[13] GSM 08.01: "Digital cellular telecommunications system (Phase 2+); Base Station System - Mobile-services Switching Centre (BSS - MSC) interface General aspects".

[14] GSM 08.02: "Digital cellular telecommunications system (Phase 2+); Base Station System - Mobile-services Switching Centre (BSS - MSC) interface Interface principles".

[14a] 3GPP TS 25.410: "UTRAN Iu Interface: General Aspects and Principles".

[14b] 3GPP TS 25.41x-series on definition of the Iu interface.

[15] GSM 08.04: "Digital cellular telecommunications system (Phase 1); Base Station System - Mobile-services Switching Centre (BSS - MSC) interface Layer 1 specification".

[16] GSM 08.06: "Digital cellular telecommunications system (Phase 2+); Signalling transport mechanism specification for the Base Station System - Mobile-services Switching Centre (BSS - MSC) interface".

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

[18] 3GPP TS 28.020: "Digital cellular telecommunications system (Phase 2+); Rate adaption on the Base Station System - Mobile-services Switching Centre (BSS - MSC) interface".

[19] GSM 08.51: "Digital cellular telecommunications system (Phase 2+); Base Station Controller - Base Transceiver Station (BSC - BTS) interface - General aspects".

[20] GSM 08.52: "Digital cellular telecommunications system (Phase 2+); Base Station Controller - Base Transceiver Station (BSC - BTS) interface - Interface principles".

[21] GSM 08.54: "Digital cellular telecommunications system (Phase 2+); Base Station Controller (BSC) to Base Transceiver Station (BTS) interface - Layer 1 structure of physical circuits".

[22] GSM 08.56: "Digital cellular telecommunications system (Phase 2+); Base Station Controller (BSC) to Base Transceiver Station (BTS) - Layer 2 specification".

[23] GSM 08.58: "Digital cellular telecommunications system (Phase 2+); Base Station Controller (BSC) to Base Transceiver Station (BTS) interface - Layer 3 specification".

[24] GSM 08.60: "Digital cellular telecommunications system (Phase 2+); Inband control of remote transcoders and rate adaptors".

[25] GSM 08.61: "Digital cellular telecommunications system (Phase 2+); Inband control of remote transcoders and rate adaptors (half rate)".

[26] 3GPP TS 29.002: "Digital cellular telecommunications system (Phase 2+); Mobile Application Part (MAP) specification".

[27] GSM 09.03 R98: "Digital cellular telecommunications system (Phase 2+); Signalling requirements on interworking between the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN) and the Public Land Mobile Network (PLMN)".

[28] 3GPP TS 29.004: "Digital cellular telecommunications system (Phase 2+); Interworking between the Public Land Mobile Network (PLMN) and the Circuit Switched Public Data Network (CSPDN)".

[29] 3GPP TS 29.005: "Digital cellular telecommunications system (Phase 2+); Interworking between the Public Land Mobile Network (PLMN) and the Packet Switched Public Data Network (PSPDN) for Packet Assembly/Disassembly facility (PAD) access".

[30] 3GPP TS 29.006: "Digital cellular telecommunications system (Phase 2+); Interworking between a Public Land Mobile Network (PLMN) and a Packet Switched Public Data Network/Integrated Services Digital Network (PSPDN/ISDN) for the support of packet switched data transmission services".

[31] 3GPP TS 29.007: "Digital cellular telecommunications system (Phase 2+); General requirements on interworking between the Public Land Mobile Network (PLMN) and the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN)".

[32] 3GPP TS 29.010: "Digital cellular telecommunications system (Phase 2+); Information element mapping between Mobile Station - Base Station System and BSS - Mobile-services Switching Centre (MS - BSS - MSC) - Signalling procedures and the Mobile Application Part (MAP)".

[33] 3GPP TS 29.011: "Digital cellular telecommunications system (Phase 2+); Signalling interworking for supplementary services".

[34] 3GPP TR 41.001: "GSM Release specifications".

[35] 3GPP TS 43.051: "GERAN Overall Description, Stage 2".

Next Change

4.2.1 The Base Station System (BSS)

The Base Station System (BSS) is the system of base station equipments (transceivers, controllers, etc...) which is viewed by the MSC through a single A or Iu-CS -interface as being the entity responsible for communicating with Mobile Stations in a certain area. Similarly, in PLMNs supporting GPRS, the BSS is viewed by the SGSN through a single Gb or Iu-PS interface. The functionality for the A interface is described in GSM 08.02 and for the Gb interface in TS 23.060. The functionality for the Iu-CS interface is described in TS 25.410 and for the Iu-PS interface in TS 23.060.

The radio equipment of a BSS may support one or more cells. A BSS may consist of one or more base stations. Where an Abis-interface is implemented, the BSS consists of one Base Station Controller (BSC) and one or more Base Transceiver Station (BTS).

The split of functions between BSS and CN for a A/Gb interface is described in the 08-series of GSM Technical Specifications. The split of functions between BSS and CN for a Iu interface is desribed in the 25-series of UMTS Technical Specifications.

NOTE: The mobile station shall operate using **only the following modes:**

a. **A / G_b mode**, e.g. for pre-Release 4 terminals, for Release 4 terminals when connected to a BSS with no Iu interface towards the Core Network.
b. **Iu mode** (i.e. Iu-CS and Iu-PS), e.g. for Release 4 terminals when connected to a BSS with Iu interfaces towards the Core Network

No other modes (e.g. A/Iu-PS or Iu-CS/Gb) shall be allowed.

See also TS 43.051.

4.2.1.1 Base Station Controller (BSC)

A Base Station Controller (BSC) is a network component in the PLMN with the functions for control of one or more BTS.

4.2.1.2 Base Transceiver Station (BTS)

A Base Transceiver Station (BTS) is a network component which serves one cell.

Next Change

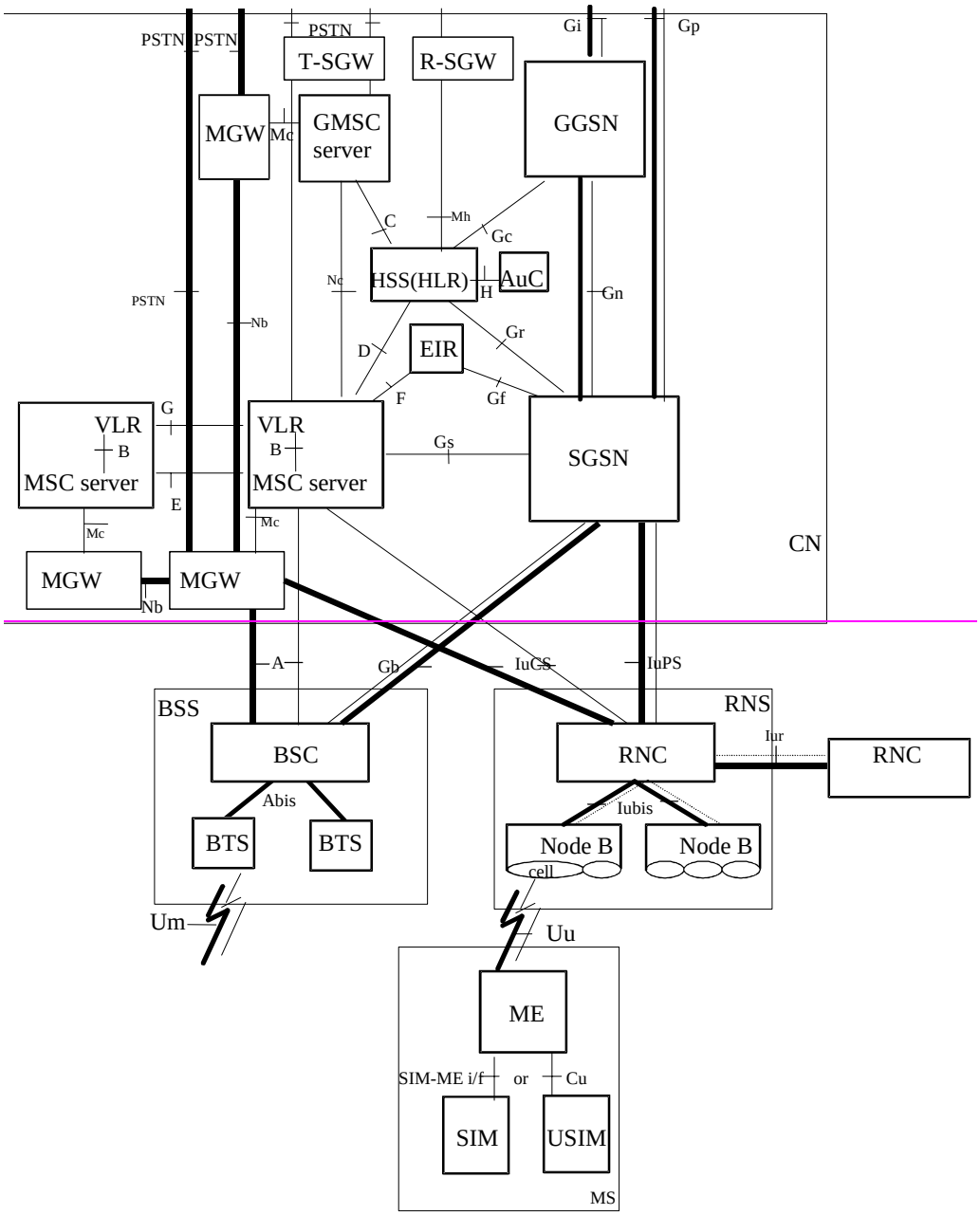
5.1 Basic configuration

The basic configuration of a Public Land Mobile Network (PLMN) supporting GPRS and the interconnection to the PSTN/ISDN and PDN is presented in figure 1. This configuration presents signalling interfaces which can be found in a PLMN. Implementations may be different: some particular functions may be gathered in the same equipment and then some interfaces may become internal interfaces.

In the basic configuration presented in figure 1, all the functions are considered implemented in different equipments. Therefore, all the interfaces within PLMN are external. Interfaces A and Abis are defined in the GSM 08-series of Technical Specifications. Interfaces Iu, Iur and Iub~~is~~ are defined in the UMTS 25.4xx-series of Technical Specifications. Interfaces B, C, D, E, F and G need the support of the Mobile Application Part of the signalling system No. 7 to exchange the data necessary to provide the mobile service. No protocols for the H-interface and for the I-interface are standardized. All the GPRS-specific interfaces (G- series) are defined in the UMTS 23-series and 24-series of Technical Specifications.

[editor's note: the Technical Specifications defining Interfaces Nb, Mc and Nc have not been started yet.]

From this configuration, all the possible PLMN organisations can be deduced. In the case when some functions are contained in the same equipment, the relevant interfaces become internal to that equipment.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GMSC server
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Gn
PSTN
Nb
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Gr
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BSS
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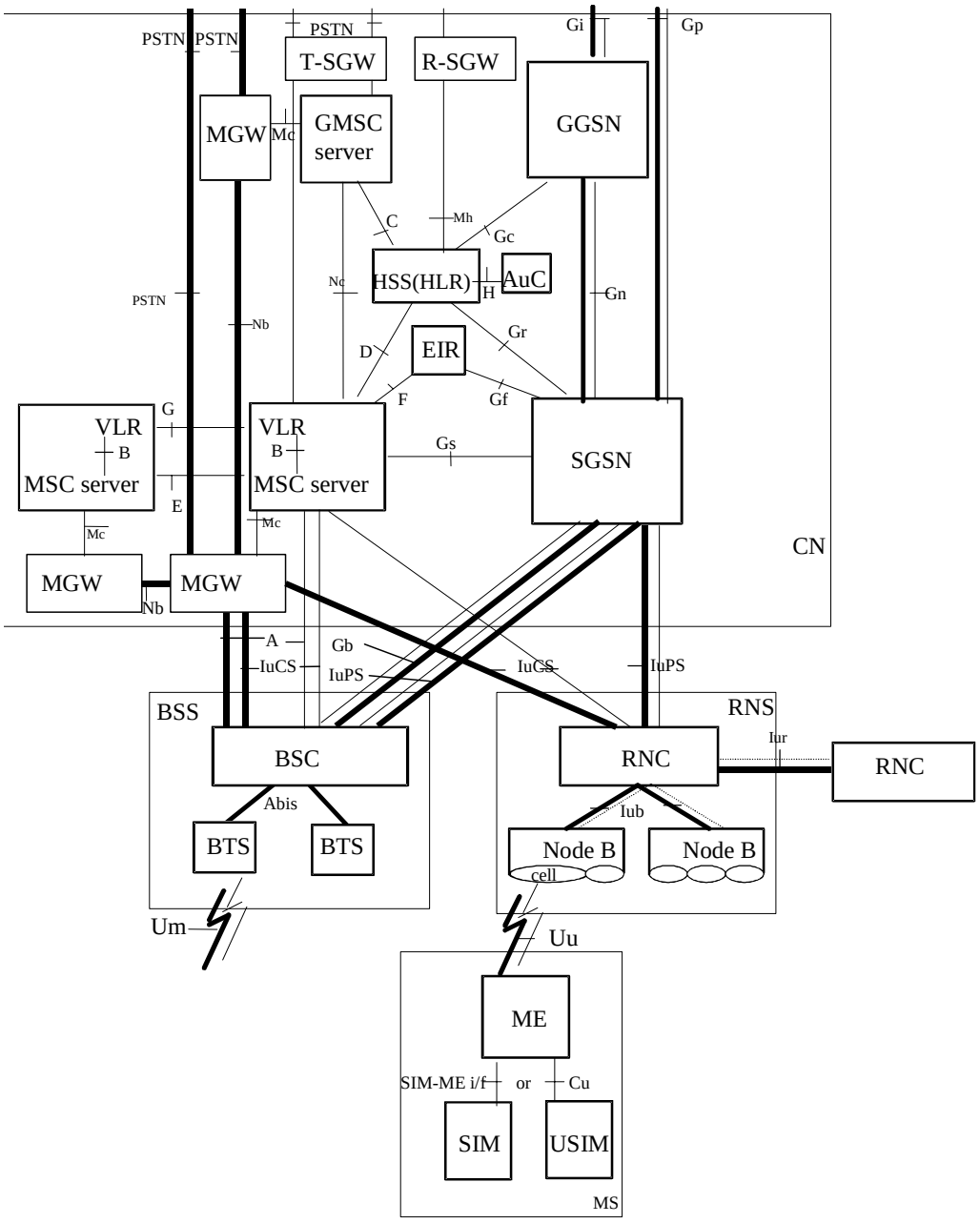

Legend:
Bold lines: interfaces supporting user traffic;
Dashed lines: interfaces supporting signalling.

NOTE 1: The figure shows direct interconnections between the entities. The actual links may be provided by an underlying network (e.g. SS7 or IP): this needs further studies.

NOTE 2: When the MSC and the SGSN are integrated in a single physical entity, this entity is called UMTS MSC (UMSC).

NOTE 3: A (G)MSC sever and associated MGW can be implemented as a single node: the (G)MSC.

NOTE 4: The Gn interface (between two SGSNs) is also part of the reference architecture, but is not shown for layout purposes only.

Figure 1: Basic Configuration of a PLMN supporting CS and PS services and interfaces

Next Change

6.2 Interface between the Core Network and the Access Network

6.2.1 Interfaces between the CS domain and the Access Network

6.2.1.1 Interface between the MSC and Base Station System (A-interface)

The interface between the MSC and its BSS is specified in the 08-series of GSM Technical Specifications.

The BSS-MSC interface is used to carry information concerning:

- BSS management;
- call handling;
- mobility management.

6.2.1.2 Interface between the MSC and Base Station System (Iu_CS interface)

The interface between the MSC and its BSS is specified in the 25.41x-series of UMTS Technical Specifications.

The BSS-MSC interface is used to carry information concerning:

- BSS management;
- call handling;
- mobility management;

6.2.1.~~2~~3 Interface between the MSC and RNS (Iu_CS interface)

The interface between the MSC and its RNS is specified in the 25.41x-series of UMTS Technical Specifications.

The RNS-MSC interface is used to carry information concerning:

- RNS management;
- call handling;
- mobility management.

6.2.2 Interfaces between the PS domain and the Access Network

6.2.2.1 Interface between SGSN and BSS (Gb-interface)

The BSS-SGSN interface is used to carry information concerning:

- packet data transmission;
- mobility management.

The Gb interface is defined in GSM 08.14, 08.16 and 08.18.

6.2.2.2 Interface between SGSN and BSS (Iu_PS-interface)

The BSS-SGSN interface is used to carry information concerning:

- packet data transmission;
- mobility management.

The Iu_PS interface is defined in the 25.41x-series of UMTS Technical Specifications.

6.2.2.~~3~~2 Interface between SGSN and RNS (Iu_PS-interface)

The RNS~~-3G~~-SGSN interface is used to carry information concerning:

- packet data transmission;
- mobility management.

The Iu_PS interface is defined in the 25.41x-series of UMTS Technical Specifications.

Next Change

6.3.2 Interface between RNC and Node B (Iub~~is~~-interface)

When the RNS consists of a Radio Netwok~~Base Station~~ Controller (RNC) and one or more Node B~~Base Transceiver Stations (BTS)~~, this interface is used between the RNC and Node B~~BTS~~ to support the services offered to the UMTS~~GSM~~ users and subscribers.

The interface also allows control of the radio equipment and radio frequency allocation in the Node B~~BTS~~.

The interface is specified in the 28.5x-series of UMTS~~GSM~~ Technical Specifications.