Source: **TSG SA WG2**
Title: **CRs on 23.121 v 3.1.0**
Agenda Item: **5.2.3**

The following CRs have been approved by TSG SA WG2 and are requested to be approved by TSG SA plenary #6.

On 23.121 v.3.1.0

TDoc #	CR #	spec	Title	cat
S2-99B81	042r1	23.121	Gateway Location Register	C
S2-99B58	043r1	23.121	Clarification of SMS sending in UMTS	F
S2-99B63	044r1	23.121	SRNS Relocation for PS domain for the case of RT	C
S2-99E63	045r1	23.121	Cell Broadcast System Architecture	B
S2-99B61	046r1	23.121	Additional modifications related to UMTS area concept change	C
S2-99C02	047	23.121	Correction of criteria for data volume reporting from RNC to SGSN	F
S2-99D31	051	23.121	Mobile IP	B
S2-99E06	052	23.121	Termination point of the GTP-U tunnel	F

3GPP/SMG Meeting #9
Location, Country, 25-29 OCT 1999

Document S2-99B81
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.

23.121	CR	042r1	Current Version:	3.1.0

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

For submission to: SA#6 *list expected approval meeting # here ↑*

for approval [X] for information [ ]

strategic [ ] non-strategic [ ] *(for SMG use only)*

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

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

Source: FUJITSU **Date:** 26/10/99

Subject: Gateway Location Register

Work item:

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

F	Correction	[ ]
A	Corresponds to a correction in an earlier release	[ ]
B	Addition of feature	[ ]
C	Functional modification of feature	[X]
D	Editorial modification	[ ]

Release:

Phase 2	[ ]
Release 96	[ ]
Release 97	[ ]
Release 98	[ ]
Release 99	[X]
Release 00	[ ]

Reason for change: The CN2 group started stage 2 and 3 work on GLR concept for R99, therefore the content of chapter 4.1 on GLR concept in 23.920 has been removed. This CR proposes to add the removed section to TS 23.121 as annex.

Clauses affected: Annex~~New Section~~

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.

Annex A (Informative)Reduction of UMTS signalling

A.1.1 GLR Concept

The benefits of the Gateway Location Register (GLR) is thearе: reduction in signalling traffic between networks. GLR is an optional network element which shall not does not change affect the MAP protocol.

- potential enhancements to mobile terminated call handling

A.1.1.1 Overview of the GLR Concept

The GLR is a node between the VLR and the HLR, which may be used to optimise the handling of subscriber location data across network boundaries.

In Figure 1, the GLR interacts with HLRa and VLRb for roamers on Network B. The GLR is part of the roaming subscriber's Home Environment. When a subscriber to HLRa is roaming on Network B the GLR plays the role of an HLR towards VLRb and the role of a VLR towards HLRa. The GLR handles any location change between different VLR service areas in the visited network without involving HLRa.

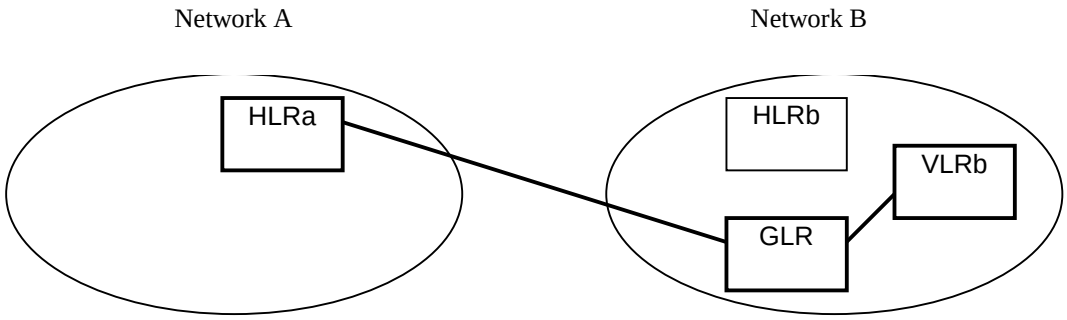


Figure 1: GLR Overview

The sequence of events when the subscriber roams to network B is as follows:

- VLRb sends the registration message to HLRa via the GLR, (i.e. HLRa stores the GLR's SCCP address and the GLR stores VLRb's SCCP address).
- HLRa returns the subscriber profile data
- The subscriber profile is stored in the GLR and VLRb

As the roaming subscriber moves between VLRs in network B, then the GLR is updated, but no message is sent to HLRa, therefore the number of messages between Network A and Network B is reduced. The reduction in signalling traffic is a significant benefit when the two networks are far apart, e.g. between Europe and Japan.

~~A.1.1.2 Applications of the GLR~~

~~In addition to reducing the amount of mobility related signalling between networks, the GLR's function might also be extended to other aspects. These include the following:~~

~~• Enhancements for mobile terminated call handling~~

~~• Support for the Virtual Home Environment of a roaming subscriber~~

~~• Reduction of CAMEL signalling traffic between the visited and home network~~

~~• Hiding local variations in signalling between networks~~

~~• Further study is needed on these issues~~

3GPP TSG-SA meeting #9 ***Document*** ***S2-99B58***

London, UK, 25th-29th October 1999

3G CHANGE REQUEST

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

23.121 **CR** **043r1** Current Version: 3.1.0

3G specification number ↑ *↑ CR number as allocated by 3G support team*

For submision to TSG SA#6 *list TSG meeting no. here ↑*

for approval [X] for information [ ] *(only one box should be marked with an X)*

Form: 3G CR cover sheet, version 1.0 *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/3GCRF-xx.rtf*

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

Source: Nokia **Date:** 28/10/99

Subject: Clarfication of SMS sending in UMTS

3G Work item: UMTS R99

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

F	Correction	X
A	Corresponds to a correction in a 2G specification	
B	Addition of feature	
C	Functional modification of feature	
D	Editorial modification	

Reason for change: Currently 23.121 defines, that SMS sub-layer uses services of the RRC directly to send SMS on C-plane. However, for the CS-domain SMS uses service of the MM similarly than already defined in GSM. Also, for the PS-domain similar service request procedure has been approved for GMM in order to establish a secure connection between UE and 3G-SGSN. This CR proposes to clarify the issue in 23.121 and to remove any possibilities for inconsistency between different specifications.

Clauses affected:

Other specs affected:

Other 3G core specifications	[ ]	→ List of CRs:
Other 2G 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.

4.9 Short Message Service for UMTS

UMTS will continuously support Short Message Service which already exists for GSM/GPRS system.

4.9.1 Protocols and architecture

~~When assuming that there is no LLC for the PS Domain Layer2 protocol,~~ The LLC layer is only applicable for GPRS and not for UMTS. Due to that there is a need to reconsider the functionality which ~~had been~~ is done at LLC in GPRS. There are two alternative described below.

- Use U-plane as the alternative of LLC functionality.
-
- Use C-plane as the alternative of LLC functionality.

It is too much to establish U-plane connection to transfer small amount of data when focusing on the resource of the entire system.

If C-plane was used for data transfer, it can save resource compared with establishing U-plane connection(by using common channel, efficient use of radio resource is possible). It also possess the advantage of making it possible to use same SMS transfer procedure for CS domain and PS domain. Therefore, it comes to a conclusion that the C-plane ~~should~~ shall be used for SMS transfer in UMTS system.

The C-plane is a signalling connection between UE and MSC or SGSN, respectively. Establishment of a secure signalling connection is offered by the GMM in the PS domain and by the MM in the CS domain. SMS is a user of that secure signalling connection.

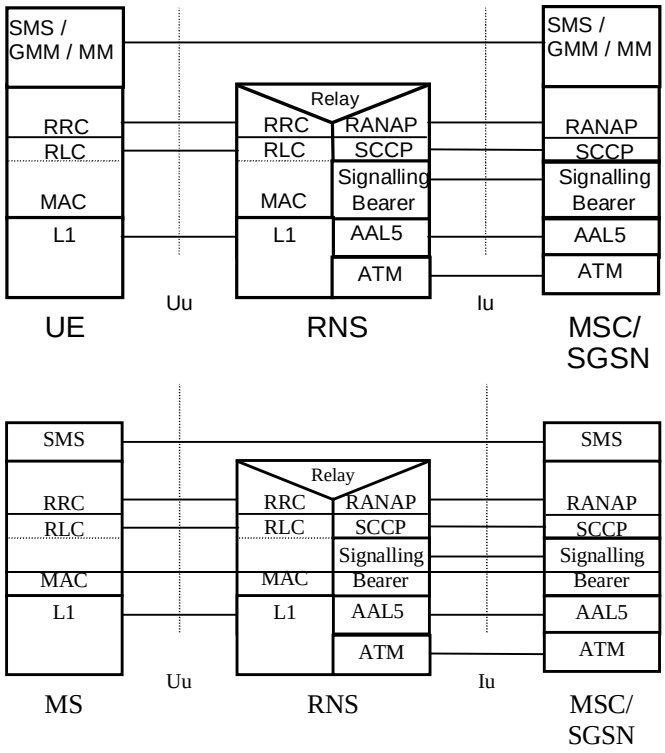


Figure 53 : Protocol architecture for 3G SMS for both a CS service domain and a PS service domain

3GPP TSG SA meeting # 10
Abiko, Japan, 29 Nov - 03 Dez 1999

***Document* S2-99E63**
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.

23.121	CR	A45r1	Current Version:	3.1.0

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

For submission to:	SA#6	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 [ ] UTRAN / Radio [X] Core Network [X]

Source: CBS Drafting Group (Alcatel, Ericsson, Nokia, Siemens, Telia, Mannesmann) **Date:** 30.11.1999

Subject: Cell Broadcast System Architecture

Work item:

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

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

Reason for change:

The responsibilities for the cell broadcast specification are clarified now and work has started in RAN and T. RAN3 has considered the CBC-RNC protocol as part of Release 99. Therefore the Cell Broadcast Architecture described in the 23.920 ~~should~~is ~~be~~ moved to 23.121 with additional clarification. This CR covers the needed changes.
~~In addition some editorial changes are proposed:~~
Main Changes:

- Clarification of the role of the BC reference point and the relation between the RNC and the CBC
- Deletion of the section on the common communication channel
- Option for second CBC for LCS

Editorial Changes:

- Short Message Service Cell Broadcast → Cell Broadcast Service
- References to GSM 03.41 → 3G TS 23.041
- Open Issues section deleted because transfered to RAN3
- Responsibility section deleted because transfered to ICG Plan

Clauses affected: ~~4.5.1 (new)~~, 4.10 (new)

Other specs affected:

Other 3G core specifications	X	→ List of CRs:	23.920
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.

4.5 Core network layer 3

In UMTS/GPRS, it should be possible for operators to use different packet switching protocol (e.g. ATM-SVC) under single GTP standard.

Between GSNs GTP uses UDP/IP (or TCP/IP) for addressing regardless whether IP routing or ATM-SVC switching is used. The use of ATM-SVC will not impact on GTP standardisation. “

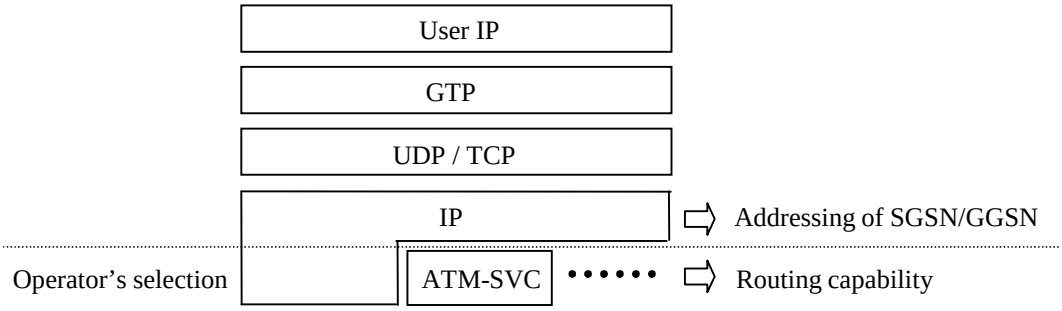
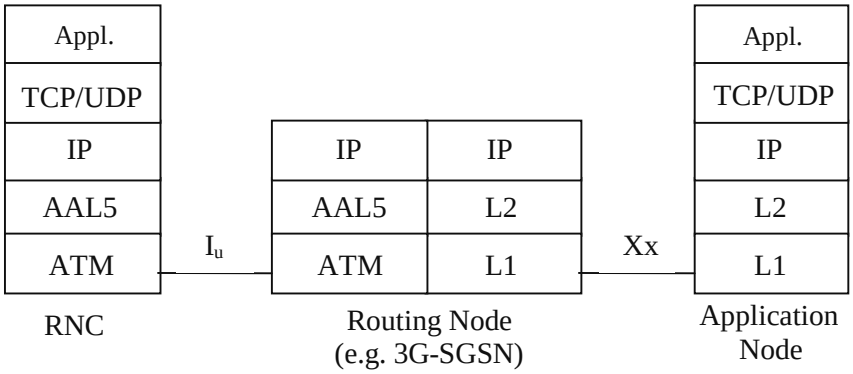


Figure 4-41: Core network layer 3

~~4.5.1 Common Communication Channel~~

~~A common communication channel (name to be defined) provides nodes of the Core Network the ability to reach every RNC of the UTRAN. This communication channel can be used for application like SMS cell broadcast or location services (LCS).~~

~~This communication mechanism would use e.g. an IP routing functionality of the 3G-SGSN. The according protocol stack is outlined in figure 1.~~



~~Figure 4-42: Protocol Stack of the Common Communication Channel~~

~~The placeholder Xx should be replaced by the according reference points of the applications e.g. Bc for cell broadcast.~~
~~The following issues until now are identified and have to be solved:~~
~~1.IP Routing functionality in the 3G-SGSN.~~
~~2.An appropriated layer 3 protocol has to be chosen (TCP or UDP) per application,~~

~~3.Addressing of the Application and Application node by the RNC(s),~~
~~4.Addressing (dynamic or static) of the application (e.g. CBC) on the RNC(s).~~

4.9 Short Message Service for UMTS

UMTS will continuously support Short Message Service which already exists for GSM/GPRS system.

4.9.1 Protocols and architecture

When assuming that there is no LLC for the PS Domain Layer2 protocol, there is a need to reconsider the functionality which had been done at LLC in GPRS. There are two alternative described below.

- Use U-plane as the alternative of LLC functionality.
- Use C-plane as the alternative of LLC functionality.

It is too much to establish U-plane connection to transfer small amount of data when focusing on the resource of the entire system.

If C-plane was used for data transfer, it can save resource compared with establishing U-plane connection(by using common channel, efficient use of radio resource is possible). It also possess the advantage of making it possible to use same SMS transfer procedure for CS domain and PS domain. Therefore, it comes to a conclusion that the C-plane should be used for SMS transfer in UMTS system.

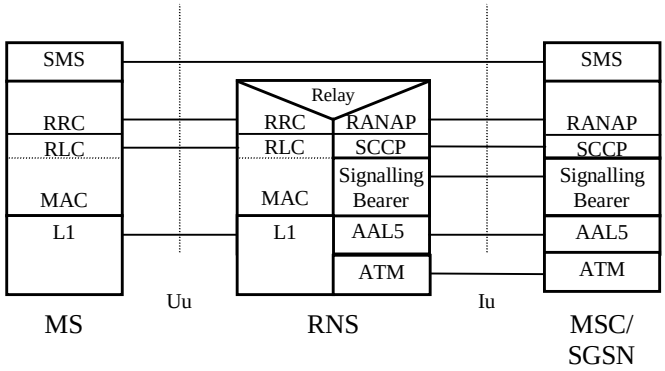


Figure 4-45: Protocol architecture for 3G SMS for both a CS service domain and a PS service domain

4.10 ~~Short Message Service~~ Cell Broadcast Service in UMTS

The ~~*Short Message Service*~~ *Cell Broadcast Service* (~~SMS.~~CBS) ~~was~~ is defined as a UMTS ~~Phase 1~~R99 requirement to guarantee the continuity of the corresponding GSM services. It shall be provided seamlessly (as far as the user or the users terminal equipment is concerned) across the UMTS and GSM network.

4.10.1 Network Architecture

Figure ~~20~~4-46 proposes a straight forward adoption of the GSM cell broadcast architecture in UMTS.

The basic network structure replaces the GSM BSS with the UTRAN containing the RNC and the Node B. The cell broadcast center (CBC) is part of the core network and connected ~~to a routing node e.g. a 3G SGSN~~ via the Bc reference point to the RNC. ~~Thus the CBC can reach every RNC via the user plane of the Iu interface by using the newly introduced common communication channel.~~ On the logical interface- between the CBC and the RNC a mandatory protocol shall be defined~~. to~~ to meet the requirements defined in 3GPP TS 23.041.~~which should mainly be adopted from the corresponding GSM specification (see GSM 03.41). The other UTRAN related interfaces are described in the according UTRAN specifications based on the RAN 2 TR 25.925.~~ Based on this architecture and the current requirements for cell broadcast the core network elements like MSC, VLR, HLR etc are not involved for the service delivery.

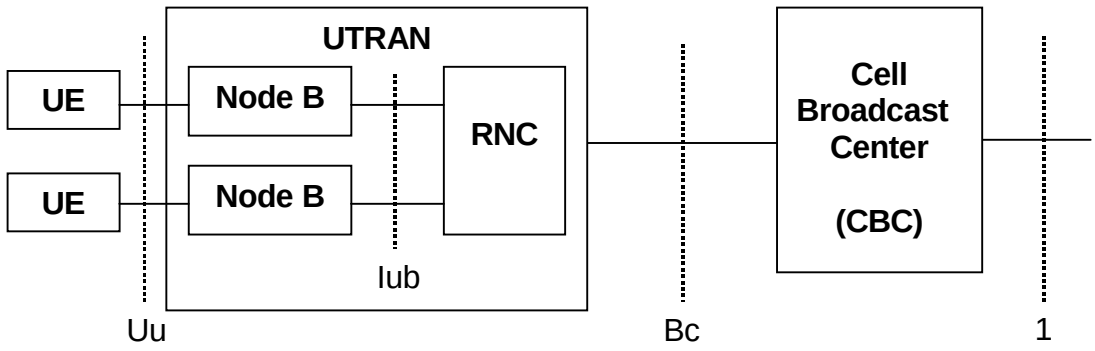


Figure- 4-46: Architecture for ~~SMS~~ the Cell Broadcast Service in UMTS

Bc is the reference point between the CBC and the RNC. The protocol stack between the CBC and the RNC is given in figure ~~2~~04-47. ~~Protocol primitives for the cell broadcast application defined by GSM 03.413GPP TS 23.041 are used for the Cell Broadcast application.~~

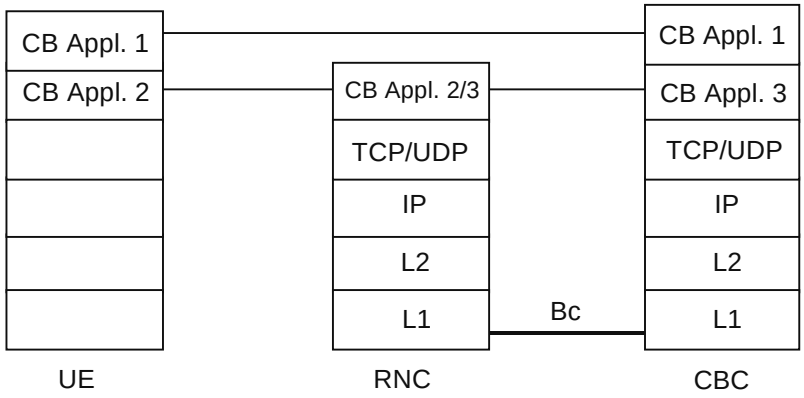


Figure 4-47: ~~Common Communication Channel used by the~~ Protocol architecture for the Cell Broadcast ~~Application~~Service

CB Appl 1 provides the description of the information passed from the CBC to the UE at the highest layer. This is not changed by the RNC. CB Appl. 2 provides the lower level UE function and CB Appl 3 runs between the CBC and RNC. The protocol primitives of the CB application are described in TS23.041.

The Layer 4 between RNC and CBC (UDP or TCP) shall be selected depending on the requirements of the CB Application 3.

It should be possible for one CBC to reach every RNC of one PLMN. It should be possible that an RNC is connected to at least two CBC at the same time (the "normal" one as in GSM and a second one for LCS).

Note that even if CBS is supported by a separate protocol suite over the Bc reference point it shall be possible to share the transport resources of the Iu interface (i.e. ATM/AAL5/IP) as shown in Figure 4-48~~7~~.

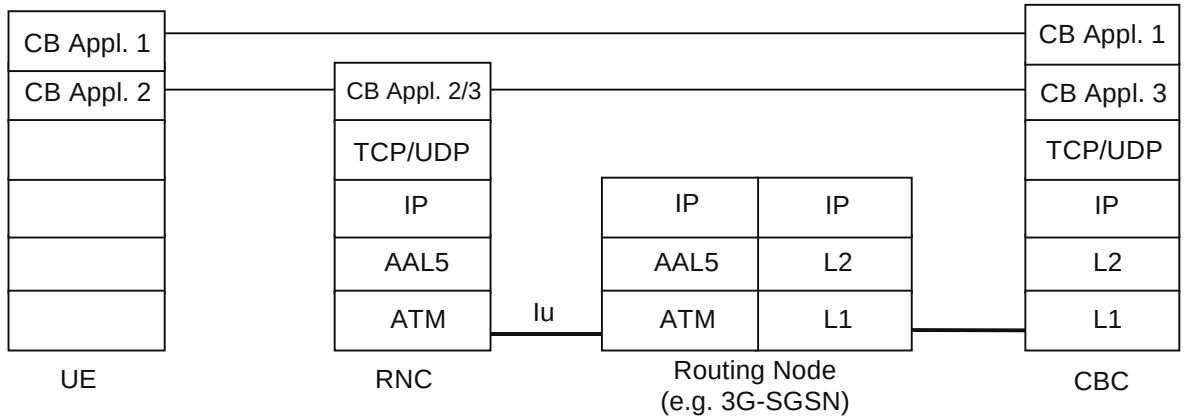


Figure 4-~~47820~~: ~~Common Communication Channel used by the Cell Broadcast Application~~Possible mapping of the Bc reference point onto the transport resources of the Iu interface

3GPP TSG-SA2 meeting #9

Document S2-99B63
(revision of S2-99B12)

London, England,10/ 1999

CHANGE REQUEST

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

23.121	CR	044r1	Current Version:	3.1.0

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

For submission to: SA#6	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 [ ] UTRAN / Radio [ ] Core Network [X]

Source: Alcatel **Date:** 27/10/99

Subject: SRNS Relocation for PS domain for the case of RT

Work item:

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

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

Reason for change: Current TS 23.121 describes mainly SRNS Relocation procedure in case of PS domain non real time data service with high reliability. The case of Real Time services needs also to be described.

Clauses affected: 4.3.12.2.3 SRNS relocation (UE connected to a single CN node, 3G_SGSN) followed by Location Registration in new Location Area.

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.

4.3.12.2.3 SRNS relocation (UE connected to a single CN node, 3G_SGSN) followed by Location Registration in new Location Area

[The beginning of the section is not modified up to Figure 4-27 included]

"Resource reservation" Phase

During this phase, the transmission of packets between GGSN and UE through the source SRNC goes on.

1) UTRAN (source SRNC) makes the decision to perform the Serving RNC relocation procedure. This includes decision on into which RNC (Target RNC) the Serving RNC functionality is to be relocated. The source SRNC sends SRNC Relocation required messages to the SGSN1. This message includes parameters such as target RNC identifier and an information field that shall be passed transparently to the target RNC.

2) Upon reception of SRNC Relocation required message the SGSN1 determines from the received information that the SRNC relocation will (in this case) result in change of SGSN.
The SGSN will then send a Forward SRNC relocation request to the applicable SGSN, SGSN2, including the information received from the Source SRNC and necessary information for the change of SGSN (e.g. MM context, PDP context). The PDP context information contains the list of the PDP context (including PDP type, requested / negotiated QoS) currently established by the UE along with the address of the associated GGSN. It does not contain any information linked with packet transmission (sequence numbers) because such information is under the responsibility of the UTRAN

3) The SGSN2 sends a SRNC Relocation Request message to the target RNC. This message includes information for building up the SRNC context, transparently sent from Source SRNC (e.g. UE id., no of connected CN nodes, UE capability information), and directives for setting up Iu user plane transport bearers.
When the Iu user plane transport bearers have been established, and target RNC completed its preparation phase, SRNC Relocation Proceeding 1 message is sent to the SGSN2. The SRNC Relocation Proceeding 1 message contains the IP address(es) (possibly one address per PDP context) on which the target RNC is willing to receive these packets.

4) When the traffic resources between target RNC and SGSN2 has been allocated and the SGSN2 is ready for the SRNC move, then the Forward SRNC Relocation Response is sent from SGSN2 to SGSN1. This message indicates that necessary resources have been allocated for the SRNC relocation: SGSN2 / target RNC are ready to receive from source SRNC the downstream packets not yet acknowledged by UE. *The Forward SRNC Relocation Response message* contains the IP address(es) that were given in the SRNC Relocation Proceeding 1 message.

5) When the Forward SRNC Relocation Response has been received in the SGSN1, the SGSN1 indicates the completion of preparation phase at the CN PS domain side for the SRNC relocation by sending the SRNC Relocation Proceeding 2 message to the Source RNC. . This message contains the IP address(es) (possibly one address per PDP context) on which to send the downstream packets not yet acknowledged by UE.

"Actual hand-over of Serving RNC" Phase

6) When the source RNC has received the SRNC Relocation Proceeding 2 message, the source RNC sends a SRNC Relocation Commit message to the target RNC(list of (SNU, UP_RLC_ack, SND)). SND is the GTP sequence number for the next downlink packet received from the GGSN. SNU is the GTP sequence number for the next uplink packet to be tunnelled to the GGSN. UP_RLC_Ack contains the acknowledgements for upstream PDU received by the source SRNC on each Non Real Time RLC connection used by the UE (i.e. the Receive State Variable V(R) for all RLC SAPI in acknowledged mode). For Real Time connections (conversational and streaming QoS class), UP_RLC_ACK is not used. The source SRNC starts a timer T3-TUNNEL , stops the exchange of the packets with the UE (point (a)), and starts tunnelling the buffered downstream packets towards the target SRNC. The target RNC executes switch for all bearers at the earliest suitable time instance.

7) The target RNC starts acting as SRNC. The target SRNC :

- Restarts the RLC connections. This includes, for Non Real Time bearers, the exchange between the target SRNC and the UE of the UP_RLC_Ack and DOWN_RLC_ACK. DOWN_RLC_ACK confirms all mobile-terminated packets successfully transferred before the start of the relocation procedure. If DOWN_RLC_ACK confirms reception of packets that were forwarded from the source SRNC, then these packets shall be discarded by the target SRNC. UP_RLC Ack confirms all mobile-originated packets successfully transferred before the start of the relocation procedure. From now on the exchange

of the packets with the UE can restart (point (b)). For bearers with header compression, the header compression entities ~~resynchronize~~renegotiate / restart between UE and target RNC. From now on the exchange of data between UE and network can restart.

- Sends New MM System Information to the UE indicating e.g. relevant Routing Area and Location Area. A new RAI triggers a routing area update procedure. Additional RRC information may then also be sent to the UE, e.g. new RNTI identity. This may trigger a location update procedure (see 9 and 12)

8) Immediately after a successful switch at RNC, target RNC (=SRNC) sends SRNC Relocation Detect message to the SGSN2. After sending out the New MM System Information, the target RNC sends SRNC Relocation Complete message to the SGSN2.

9) The UE sends a Routing area update request (old RAI; old P-TMSI; old PTMSI signature, Update type) to SGSN2 when the New MM System Information included a new RAI.

10) Upon reception of RAU request, the SGSN2 updates the GGSN(s) with a Update PDP Context Request including the new SGSN address. The GGSN(s) then update the PDP context and return Update PDP Context Response. The SGSN2 sends a Complete SRNC Relocation towards the SGSN1. The target RNC then receiving downstream packets from both the old path (source SRNC) and from the new path (SGSN2), may f~~F~~or RT bearers have too much packets in its queues. The way to discard these packets in excess is implementation dependant, ~~as soon as it has received a downstream packet coming from the GGSN via SGSN2 (and not via source RNC), target RNC stops taking into account downstream packets coming from source RNC and transmits to the UE only downstream packets coming from GGSN via SGSN2.~~

11) At reception of the Complete SRNC Relocation, SGSN1 will send a release indication towards the Source RNC. All resources allocated to this UE by the source RNC are released only when this message has been received and timer T3-TUNNEL has expired. Before timer T3-TUNNEL expires, all downstream packets received from the GGSN are sent towards the target SRNC..

12) The SGSN2 informs the HLR of the change of SGSN by sending Update GPRS location (IMSI, new SGSN address etc.) to the HLR. The HLR cancels the context in the old SGSN, SGSN1, by sending Cancel Location (IMSI). The SGSN1 removes the context and acknowledges with Cancel Location Ack. The HLR sends Insert subscriber data (IMSI, subscription data) to the SGSN2. The SGSN2 acknowledges with Insert Subscriber Data Ack. The HLR acknowledges the Update GPRS location by sending Update GPRS Location Ack to the SGSN2.

13) At reception of Insert subscriber data from HLR, the SGSN2 will send a Routing Area Update Accept message to the UE. This message will include new RAI, and possible also new P-TMSI. When the UE has made necessary updates it answers with Routing Area Update Complete.

14) When receiving new MM system information indicating a new Location Area, the UE will, in this case, initiate a Location Area update procedure towards the MSC2. This implies that the Location Area update will be performed in parallel to the above indicated activities related to the SGSN side of the Core Network.

It has to be noted that the sequence chart of Figure 4-27 may be further refined.

UE-GGSN Communication path during the SRNS relocation procedure

Before point (a), in Figure 4-27, the connection is established between UE and GGSN via Source SRNC and SGSN1.

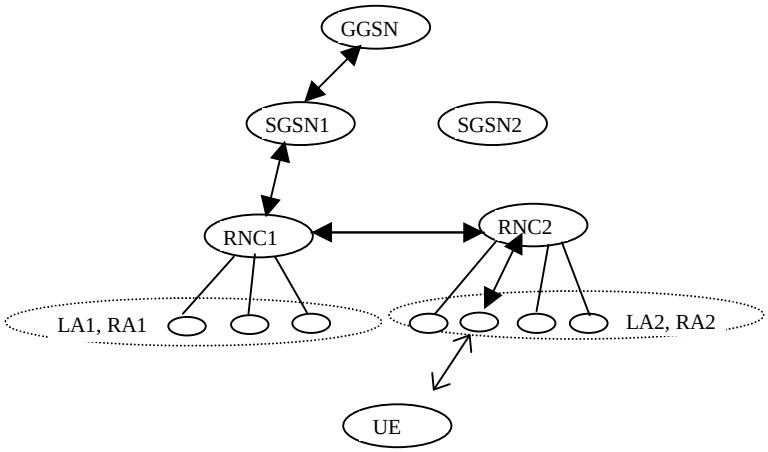


Figure 4-28:Data paths before the SRNS relocation has been actually committed (before point (a) in Figure 4-27)

After transmission of the "SRNS relocation commit" to the target SRNC (after point (a) in Figure 4-27), the source RNC cannot exchange data with the UE because its RLC should be frozen after the transmission of the RLC sequence numbers to the target RNC. Before the restart of the RLC between target SRNC and UE (before point (b) in Figure 19), data transfer cannot go on. All downstream packets received by the target SRNC during this phase are buffered until restart of the RLC between target SRNC and UE.

After point (b), in Figure 4-27, packet transfer between UE and network can restart. Upstream packets are sent to GGSN via SGSN2 while up to point (c) downstream packets are still sent to the UE via SGSN1, source RNC and target SRNC..

After point (c), in Figure 4-27, the connection is established between UE and GGSN via Target RNC and SGSN2.

Before resource release in source RNC (before T3-TUNNEL expiry), target SRNC may receive downstream packet from 2 paths. Packets remaining on the backbone are sent on the "old path" (via SGSN1 and RNC1) and forwarded by source RNC1 to target SRNC2 while packets received by the GGSN on its Gi interface are sent on the new path (via SGSN2) to target SRNC2.

For services requiring high reliability, during T3-Tunnel, the target SRNC listens to the two GTP tunnels at the same time and transfers to the UE packets coming from both paths. For RT services, if target SRNC ~~continues to receive frames from the source SRNC as long as the GGSN has not changed its PDP context towards the target SGSN.~~ has too much packets in its queues (e.g. queues not coherent with maximum transfer delay), the way to discard the packets in excess is implementation dependant ~~Then, as soon as it has received a downstream PDU from the new path (via SGSN2), it considers only PDU received on this path and ignores PDU that might come from the old path.~~

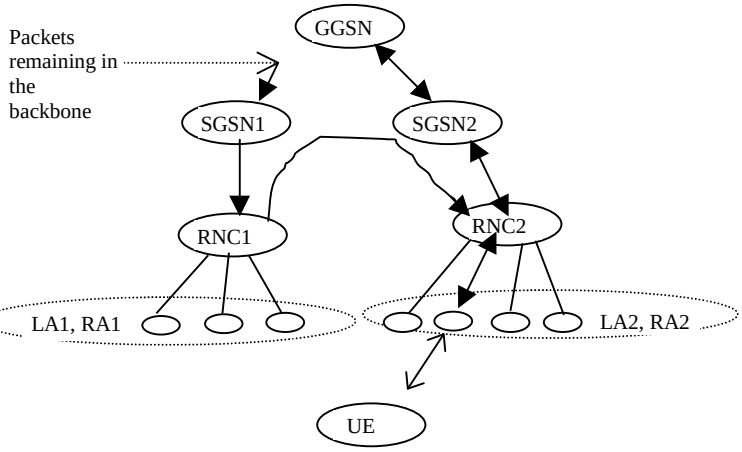


Figure 4-29: Data paths after the GGSN update (after point (c) in Figure 4-27)

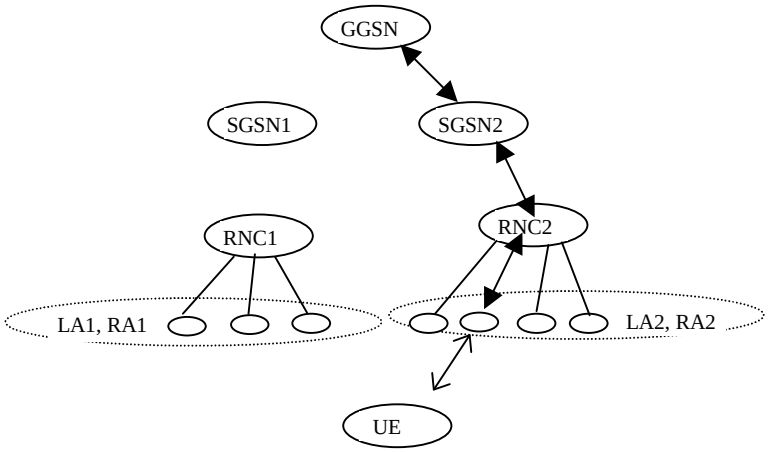


Figure 4-30: Data paths after the resource release in source RNC (after point (d) in Figure 4-27)

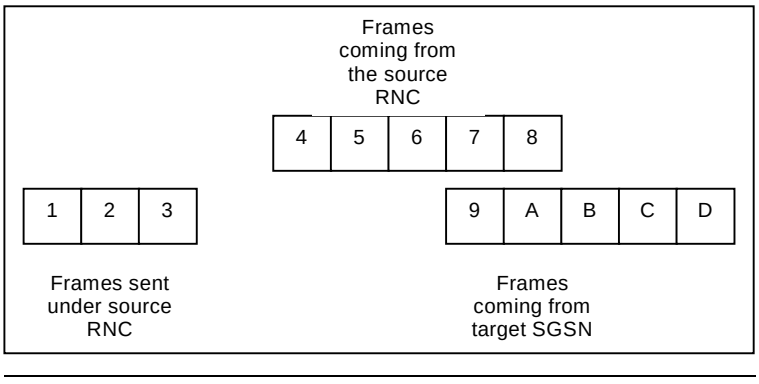
Advantage of this mechanism:

- A common mechanism works for both RT and NRT services. This mechanism works also for GPRS R97 <--> UMTS hand-over.

- The mechanism works for both SRNS relocation and Hand-Over impacting the CN: in the latter case there may be~~is~~ no time to prepare the Hand-Over and hence no possibility to request anything (e.g. to duplicate PDU for bi-casting) from the GGSN before the commit as e.g. when this Hand-Over impacting the CN corresponds in fact to a cell update. ~~There is no obligation to duplicate PDU in advance, and therefore no obligation to have common transport channels on Iur.~~

Drawbacks:

- There are two breaks in transmission (one when the data stream starts from source RNC to target RNC, and one when the data stream starts from GGSN via target SGSN) as described in the following figure: speech frames 4,5,6 sent from the source RNC may be delayed by a few tens of milliseconds, speech frames 7,8 are discarded by the target RNC since frames 9, 10 are coming from target SGSN at the same time. So, we have one blank and one frame slip.



Note: concerns that this might not work properly for RT services have been raised. If the service interruption can~~was found~~ not meet service requirements, ~~too disturbing~~ then a feasibility study could be made on ~~whether~~alternative mechanisms to meet these requirements for R00 (e.g. bi-casting) ~~could be used for R00~~.

3GPP Meeting TSG SA2 #9
London, UK, 25-29 Oct 1999

Document S2-99B61
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.

23.121	**CR**	**046r1**	Current Version:	3.1.0

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

For submission to: SA#6 *list expected approval meeting # here ↑*

for approval [X] for information [ ]

strategic [ ] non-strategic [ ] *(for SMG use only)*

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 [X] Core Network [X]

Source: NTT Communicationware **Date:** 25.10.99

Subject: Additional modifications related to UMTS area concept change

Work item: Architecture Requirements for Release 99

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

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

Reason for change: In Bonn meeting, it was agreed that the area concept for UMTS should be as same as GPRS R97. In 4.3.12.1.4, 4.3.13.6, 4.3.13.7 there are also descriptions which still obey old concept according to CRA16(S2-99530). This CR proposes the deletion of those descriptions.

Clauses affected: 4.3.12.1.4, 4.3.13.6, 4.3.13.7

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.

4.3.12.1.4 Periodic Registration with use of Gs/UMSC

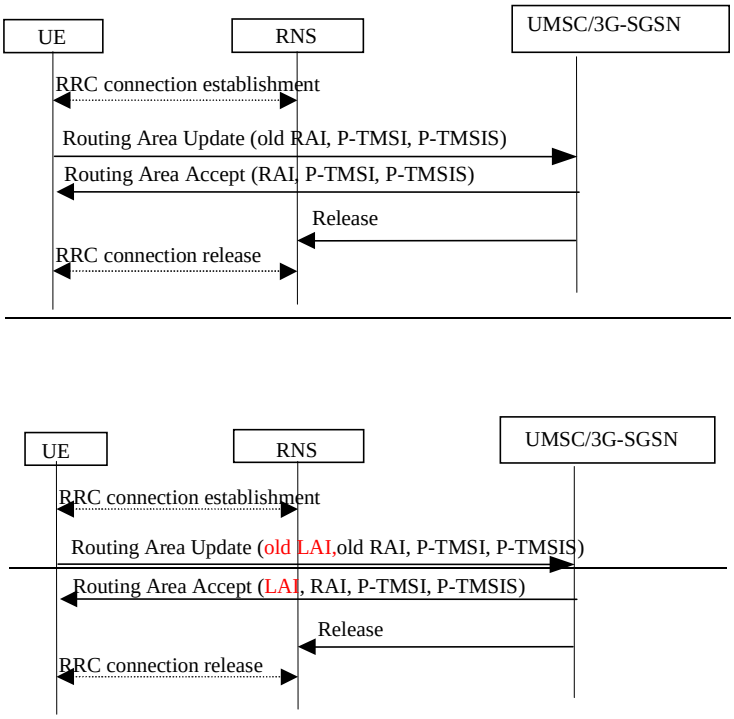


Figure 25: Periodic update procedure when the MS is attached for both CS and PS services

An RRC connection is established for the periodic registration. Note that this procedure is invoked only when the UE is in MM-idle state. The UE sends a Routing Area Update to the UMSC. The UMSC authenticates the P-TMSI signature. If the update is successful it sends a Routing Area Accept message. The RRC connection is then released.

4.3.13.6 Combined attach case where the previous attach was towards 2 CN elements

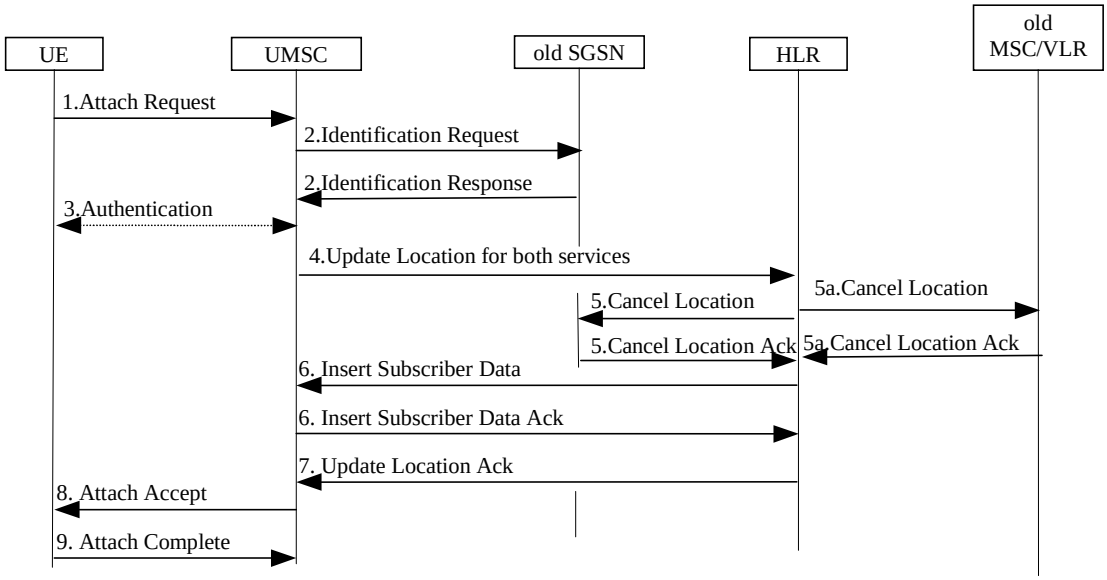


Figure 43 Combined attach procedure when the Ms moves from 2 CN element to a UMSC

1) The UE initiates the attach procedure by the transmission of an Attach Request (IMSI or P-TMSI and ~~old LAI,~~ old RAI, Attach Type, old P-TMSI Signature) message to the UMSC. Attach Type indicates which type of attach that is to be performed, i.e., PS attach only, CS attach only, or combined attach (the example given is for combined attach).

2) If the UE identifies itself with P-TMSI and the 3G-SGSN/UMSC has changed since detach, the new UMSC sends an Identification Request (P-TMSI, old RAI, old P-TMSI Signature) to the old SGSN to request the IMSI. The old SGSN responds with Identification Response (IMSI, Authentication Triplets). If the UE is not known in the old SGSN, the old SGSN responds with an appropriate error cause. The old SGSN also validates the old P-TMSI Signature and responds with an appropriate error cause if it does not match the value stored in the old SGSN.

3) The authentication functions are optional and may be used for example if P-TMSI signature authentication was not successful. If the UMSC number has changed since the detach, or if it is the very first attach, routing/location area update procedures are executed:

4) The UMSC sends a Combined Update Location (UMSC Number, UMSC Address, IMSI) to the HLR.

5) The HLR sends Cancel Location (IMSI, Cancellation Type) to the old SGSN and MSC. The old SGSN and MSC acknowledges with Cancel Location Ack (IMSI).

6) The HLR sends Insert Subscriber Data (IMSI, PS and CS subscription data) to the new UMSC. The new UMSC validates the UE's presence in the (new) RA. If all checks are successful then the UMSC constructs an MM context for the UE and returns an Insert Subscriber Data Ack (IMSI) message to the HLR.

7) The HLR acknowledges the Update Location message by sending an Update Location Ack to the UMSC. If the Update Location is rejected by the HLR, the UMSC rejects the Attach Request from the UE with an appropriate cause.

8)The UMSC sends an Attach Accept (P-TMSI, TMSI, P-TMSI Signature) to the UE.

9)If P-TMSI or TMSI was changed, the UE acknowledges the received TMSI(s) with Attach Complete (P-TMSI, TMSI).

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

4.3.13.7 Combined location/routing area update where the previous LA/RA belonged to a 2 CN element

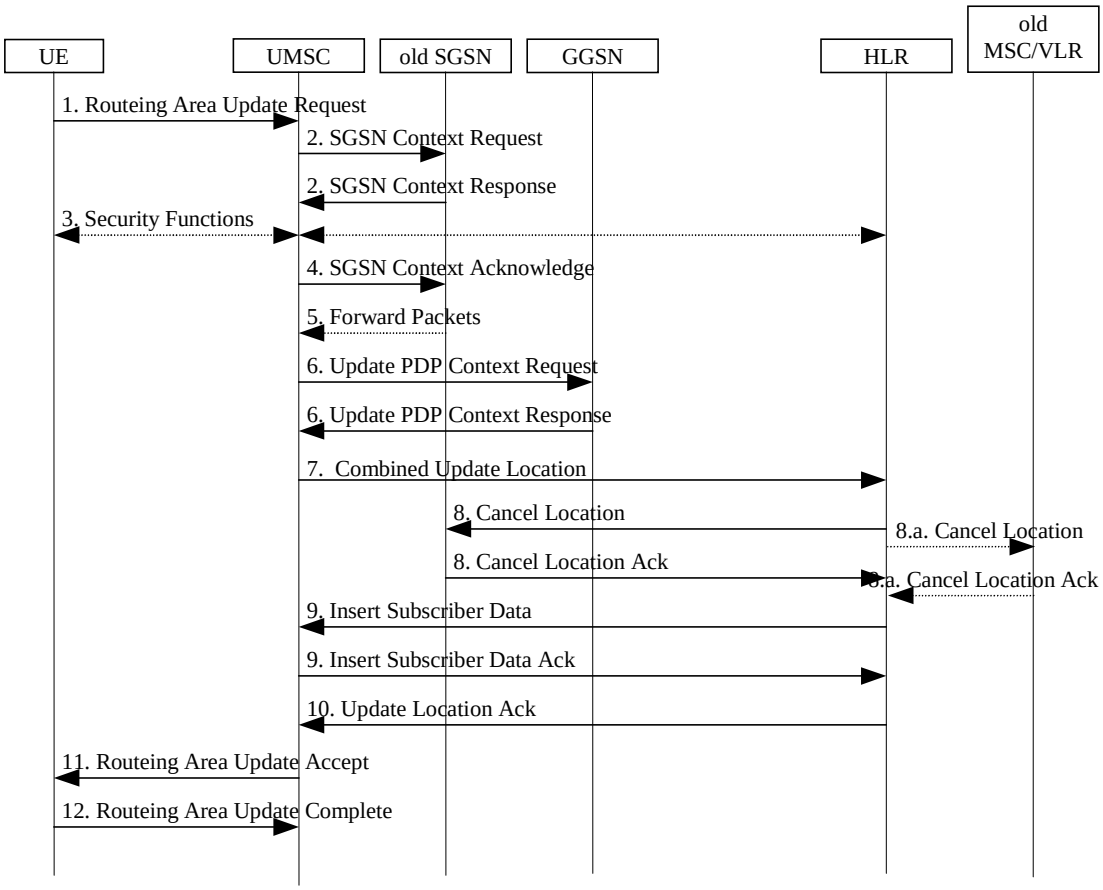


Figure 44 Combined LA/RA update when the MS moves from 2 CN element to UMSC

The UE sends a Routing Area Update Request (~~old LAI,~~ old RAI, old P-TMSI Signature, Update Type) to the new UMSC. Update Type example given here is for combined RA / LA update.

The new UMSC sends SGSN Context Request (old RAI, P-TMSI, old P-TMSI Signature, New UMSC Address) to the old SGSN to get the MM and PDP contexts for the UE. 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 UMSC.

Security functions may be executed. These procedures are defined in subclause "Security Function".

If the user has at least one activated PDP context, then the new UMSC shall send an SGSN Context Acknowledge message to the old SGSN. This informs the old SGSN that the new UMSC is ready to receive data packets belonging to the activated PDP contexts.

The old SGSN starts tunnelling of buffered N-PDUs to the new UMSC. However, the possibility of this happening is remote since the UE is in MM-idle indicating that it was not in active communication.

The new UMSC sends Update PDP Context Request to the GGSNs concerned. The GGSNs update their PDP context fields and return an Update PDP Context Response (TID).

The new UMSC informs the HLR of the change of SGSN/MSC by sending Combined Update Location (UMSC Number, UMSC Address, IMSI) to the HLR.

The HLR sends Cancel Location (IMSI, Cancellation Type) to the old SGSN and MSC. The old SGSN acknowledges with Cancel Location Ack (IMSI).

The HLR sends Insert Subscriber Data (IMSI, PS and CS subscription data) to the new UMSC. The new UMSC validates the UE's presence in the (new) RA. If due to regional subscription the UE is rejected, the UMSC rejects the

Attach Request with an appropriate cause and returns an Insert Subscriber Data Ack (IMSI, UMSC Area Restricted Due To Regional Subscription) message to the HLR. If all checks are successful then the UMSC constructs an MM context for the UE and returns an Insert Subscriber Data Ack (IMSI) message to the HLR.

The HLR acknowledges the Update Location by sending Update Location Ack (IMSI) to the new UMSC.

The new UMSC validates the UE's presence in the new RA. If due to regional, national or international restrictions the UE is not allowed to attach in the RA or subscription checking fails, then the UMSC rejects the routing area update with an appropriate cause. If all checks are successful then the new UMSC establishes MM and PDP contexts for the UE. The new UMSC responds to the UE with Routing Area Update Accept (P-TMSI, TMSI, P-TMSI Signature).

The UE confirms the reallocation of the TMSIs by sending Routing Area Update Complete to the UMSC.

3GPP TSG-SA meeting #9 ***Document S2-99C02***

London, UK, 25th-29th October 1999

3G CHANGE REQUEST

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

23.121 **CR** **047** Current Version: 3.1.0

3G specification number ↑ *↑ CR number as allocated by 3G support team*

For submision to TSG SA#6 *list TSG meeting no. here ↑*

for approval [X] for information [ ] *(only one box should be marked with an X)*

Form: 3G CR cover sheet, version 1.0 *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/3GCRF-xx.rtf*

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

Source: Siemens **Date:** 27/10/99

Subject: Correction of criteria for data volume reporting from RNC to SGSN

3G Work item: UMTS R99

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

F	Correction	X
A	Corresponds to a correction in a 2G specification	
B	Addition of feature	
C	Functional modification of feature	
D	Editorial modification	

Reason for change: Currently 23.121 defines in chapter 4.2.2.1user data retrieval to transfer data from RNC to RNC without reporting this volume to the 3G-SGSN for correction of the data volume counters. However in chapter 4.2 is was overseen to remove the reporting of data volume forwarded from RNC to RNC. This is corrected by this CR.

Clauses affected: 4.2

Other specs affected:

Other 3G core specifications	[ ]	→ List of CRs:
Other 2G 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.

4.2 Iu Interface

- Transport protocol across the Iu interface for UTRAN shall be according to 23.930
- The UTRAN shall support two logically separate signalling flows via Iu to combined or separate network nodes of different types (MSC and SGSN).
- The UTRAN shall contain a "domain distribution function" to route transparent application-level control signalling from the UE to the correct core network domain. The UE shall indicate the type of application being addressed (eg via a protocol discriminator). The UTRAN shall map this on to the correct Iu instance to forward the signalling.
- UTRAN-services (including radio access bearers) shall be independent from the core network domain used to access them. Either core network domain can access any appropriate UTRAN-service (eg it should be possible to access a "speech" radio access bearer from the PS-domain).
- The protocol architecture for the User Plane of the Iu interface towards the IP domain shall be based on the same principles as for the (evolved) Gn interface, i.e. the user plane part of GTP over UDP/IP shall be used for tunneling of end user data packets over the Iu interface. If the Iu data transport bases on ATM PVCs then the Iu IP layer provides the Iu network layer services, e.g. routing, addressing, load sharing and redundancy. In this case an IP network may be configured to transfer Iu data units between RNSs and 3G-SGSNs.
- One or several AAL5/ATM Permanent VCs may be used as the common layer 2 resources between the UTRAN and the 'IP domain' of the CN. The reason for usage of several permanent AAL5/ATM VCs may e.g. be for load sharing and redundancy. It is also possible to use one switched VC per user flow (PDP context or radio access bearer). Switched VCs may be used, however the standardization of the procedures and protocols for use of Switched VCs is outside the scope of the 3GPP. If operators use switched VC, the specification of procedures and protocol for switched VCs are up to operators and out of scope of the UMTS/IMT-2000 specification.

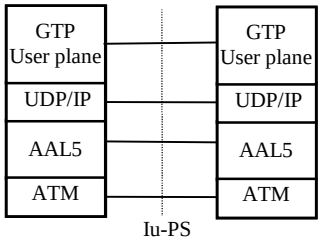


Figure 4-1: Protocol Architecture for the Iu user plane towards the IP domain

Note: The termination point of the GTP-U tunnel in the IP domain of the Core Network is FFS.

- Charging functionality is located at the 3G-SGSN. On the other hand, only RNC can identify the actual packet volume successfully transferred to a UE. In order for 3G-SGSN to provide the volume based charging for IP domain, the standard shall support the following procedures over Iu interface.
- The RNC indicates the volume of all not transferred downlink data (discarded or forwarded to ~~another entity (~~2G-SGSN~~ or target RNC)~~) to the 3G-SGSN so that the 3G-SGSN can correct its counter. Partially transferred packets are handled as not transferred.
- The RNC delivers to the 3G-SGSN the discarded or forwarded volume accumulated over an implementation dependent time and not per discarded or forwarded packet.
- The 3G-SGSN can ask the RNC to provide the volume of buffered downlink data to correct its counter at any time the 3G-SGSN wants.

3GPP_TSG_WG2 Meeting #10
Abiko, Japan, 29 Nov. – 3 Dec. 1999

***Document* S299D31**
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.

23.121	CR	051	Current Version:	3.1.0

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

For submission to: SA# *list expected approval meeting # here ↑*	for approval	X	strategic		*(for SMG use only)*
	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: Telia, Telenor, Nokia **Date:** 99/11/28

Subject: Mobile IP

Work item: "Combined GSM and Mobile IP mobility handling in UMTS IP CN", "GPRS Mobile IP interworking"

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

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

Reason for change: The definition of the APN has been enlarged in 23.060 to also include external PDN address allocation. This CR aligns the chapter in 23.121 on Mobile IP with this enlargement.

Clauses affected: 4.10

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: The approved CR 025 to 23.060 at the Bonn meeting triggers this CR.


help.doc

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

4.10 Mobile IP for UMTS/GPRS End Users

4.10.1 Mobile IP for UMTS/GPRS End Users

A single generic mobility handling mechanism that allows roaming between all types of access networks would allow the user to conveniently move between fixed and mobile networks, between public and private as well as between PLMN's with different access technologies. The ongoing work in IETF Mobile IP working group [13] is targeted towards such a mechanism[1] and a set of standards are planned to be finalised during 1999. Thus, it is important to offer Mobile IP also to UMTS and GPRS users to allow them to roam to and from other access technologies while keeping ongoing data sessions, e.g. TCP or UDP. A typical UMTS network supporting Mobile IP is shown in Figure 4-46.

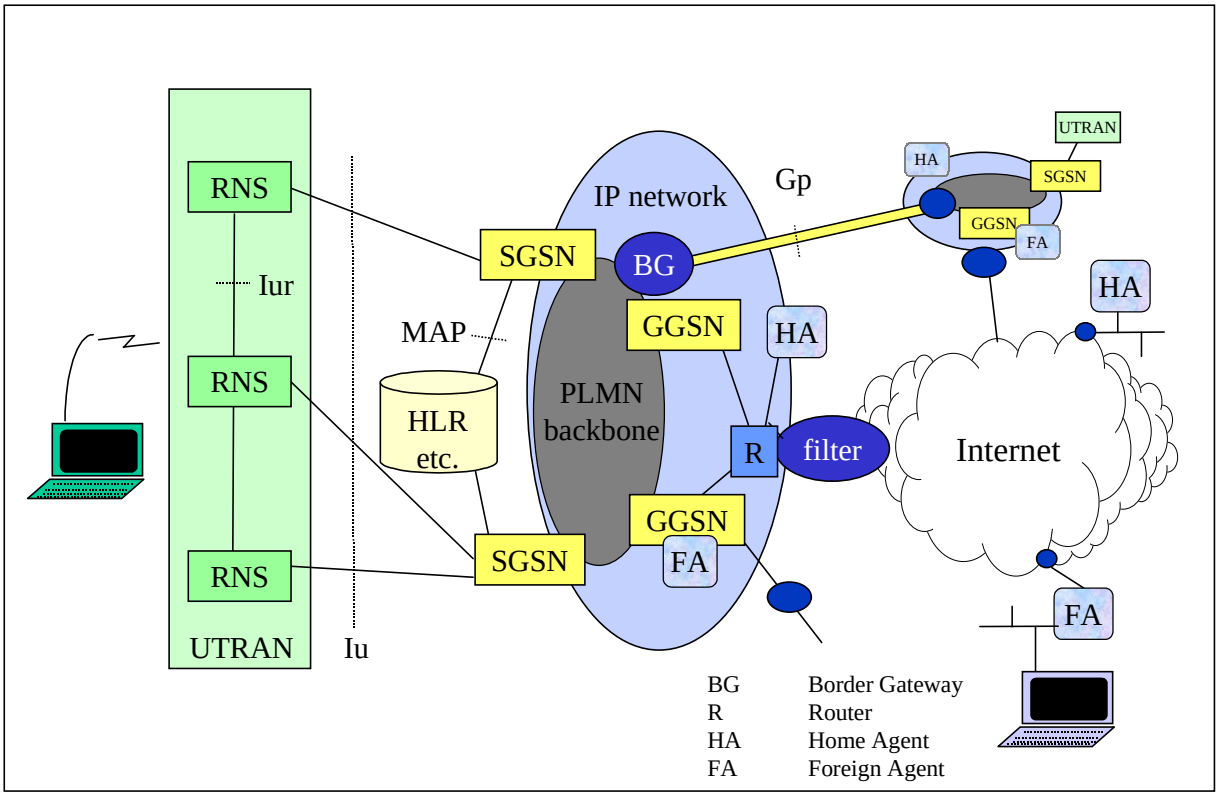


Figure 4-46. Core network architecture with GPRS MM within the PLMN's and Mobile IP MM between different types of systems.

As IP addresses in IPv4 are scarce, it has to be assumed that Mobile IPv4 preferably will be used with the Foreign Agent (FA) care-of addresses [10]. Compared to using co-located care-of addresses, FA care-of addresses does not only conserve IP addresses, it is also more efficient over the radio interface. We assume here that the MS keeps the same care-of address as long as the PDP context is activated, i.e. does not change GGSN/FA during a UMTS/GPRS session. It is further assumed that PDP type "IP" is used. It is, however, likely that PDP type" PPP" also could be used. Roaming between PLMN's can be realized with GPRS roaming or Mobile IP.

To offer Mobile IP with FA care-of addresses over the UMTS/GPRS network, some requirements need to be fulfilled. Some of these will cause changes to the current GPRS standards.

---

[1] Note that in this text, Mobile IP is used in a wide sense. It refers to [~~RFC2002~~10] **and** the RFC's planed to be finalized this year.

A signalling scheme, shown in figure 4-47, is described below. The PPP set-up and the UMTS/GPRS attach procedures and "GGSN-Initiated PDP Context modification procedure" have been omitted for clarity.

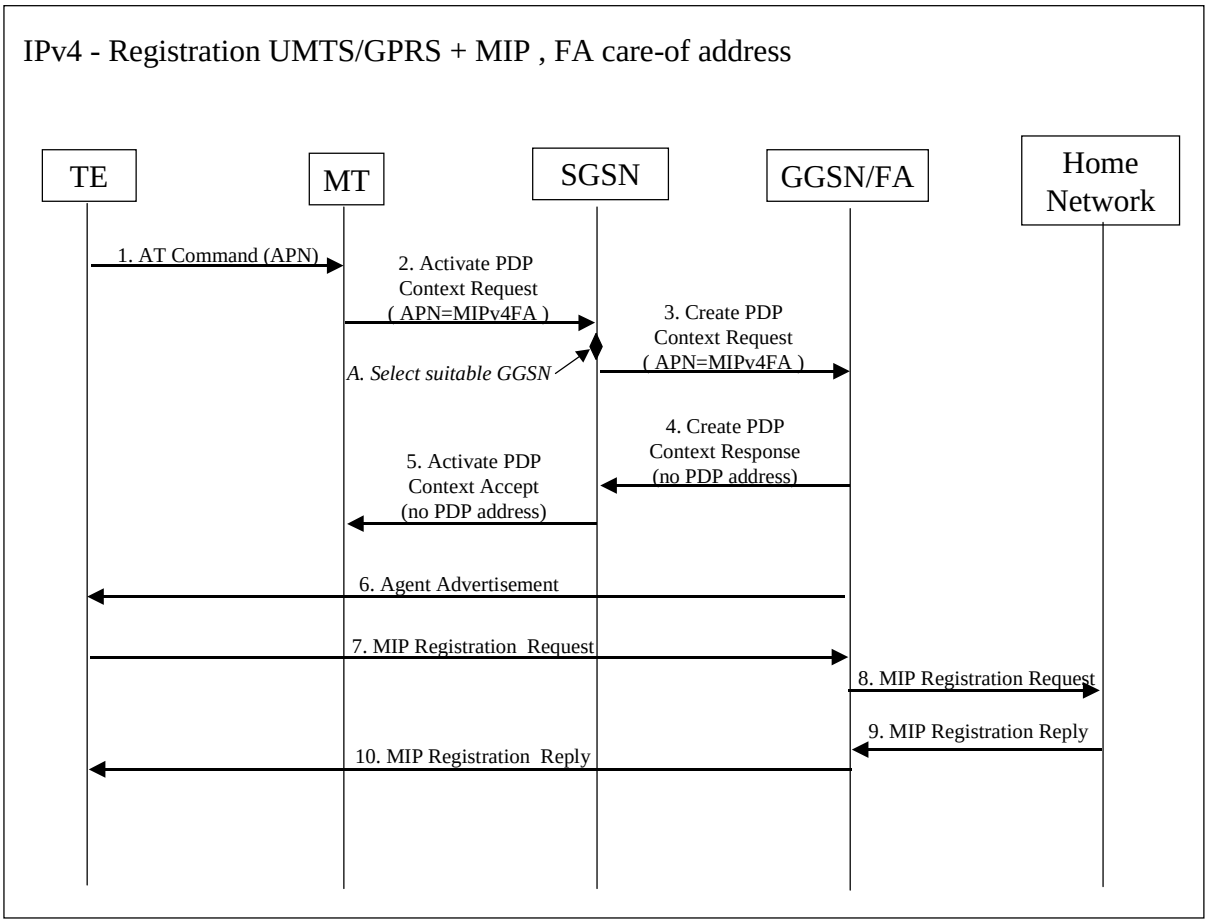


Figure 4-47. PDP Context activation with Mobile IP registration (the PPP set-up and UMTS/GPRS attach procedures not included)

1. The AT command carries parameters that the MT needs to request the PDP Context Activation. The important parameter here, is the APN (Access Point Name), see section A below. The AT command is followed by a set-up of the PPP connection between the MT and the TE, which are not included in the figure.

2. The MT sends the "Activate PDP Context Request" to the SGSN. The message includes various parameters of which the "APN" (Access Point Name) and the "Requested PDP Address" are of interest here~~. The APN, which is discussed in detail below, points at a requested GGSN.~~ The MS may use APN to select a reference point to a certain external network and/or to select a service. APN is a logical name referring to the external packet data network and/or to a service that the subscriber wishes to connect to. The "Requested PDP Address" should be omitted for all MS's using Mobile IP. This is done irrespective of if the MT has a permanently assigned Mobile IP address from its Mobile IP home network, a previously assigned dynamic home address from its Mobile IP home network or if it wishes the Mobile IP home network to allocate a "new" dynamic home address.

A. The SGSN will base the choice of GGSN ~~is based~~ on the APN that is given by the MS.

The APN consists of two parts: the Network ID and the Operator ID. If no APN is given and PDP type is "IP", the SGSN chooses a suitable GGSN according to operator's configuration of the SGSN. Similarly, a Network ID of the format vvv (one label, no dots) can be used to specify any GGSN with a specific service (vvv), e.g. Internet access, gateway for voice over IP, Mobile IP FA. If the SGSN is not configured to identify the requested service it may try with a DNS interrogation for vvv.current-operator.current-country.gprs or, if that is not successful, with vvv.home-operator.home-country.gprs, where the home parameters are taken from the subscription data.

3. The SGSN requests the selected GGSN to set up a PDP Context for the MS. The PDP address and APN fields are the same as in the "Activate PDP Context Request" message.

4. A Create PDP Context Response is sent from the GGSN/FA to the SGSN. If the creation of PDP Context was successful, some parameters will be returned to the SGSN, if not, error code will be returned. ~~For Mobile IP users, the PDP address should be omitted.~~ If the GGSN has been configured by the operator to use a Foreign Agent for the requested APN, the PDP adress returned by the GGSN shall be set to 0.0.0.0. indicating that the PDP adress shall be negotiated by the MS with a Home Agent after the PDP context activation procedure.

5. The Activate PDP Context Accept message is sent by the SGSN to the MS and contains similar information as the Create PDP Context Response message. ~~The PDP address should be omitted.~~

6. The Agent Advertisement [10] is an ICMP (Internet Control Message Protocol) Router Advertisement message with a mobility agent advertisement extension. The latter part contains parameters of the FA that the mobile node needs, among those are one or more care-of addresses that the FA offers. This message should be sent, in the UMTS/GPRS user plane, as an IP limited broadcast message, i.e. destination address 255.255.255.255, however only on the TID for the newly arrived MS to avoid broadcast over the radio interface.

7. The Mobile IP Registration Request is sent from the mobile node to the GGSN/FA across the GPRS/UMTS backbone as user traffic. The mobile node includes its (permanent) home address as a parameter [10]. Alternatively, it can request a temporary address assigned by the home network by including the Network Access Identifier (NAI) in a Mobile-Node-NAI Extension [12][11].

8. The FA forwards the Mobile IP Registration Request to the home network of the mobile node, where it get processed by a Home Agent (HA). Meanwhile, the GGSN/FA needs to store the home address of the mobile node or the NAI and the local link address of the MS, i.e. the TID (GPRS Tunnel ID).

9. ~~**9.**~~ The Registration Reply is sent from the home network to the FA, which extracts the information it needs (e.g. the home address of the mobile node if allocated by the home network).

10. The FA~~and~~ forwards the message to the mobile node in the UMTS/GPRS user plane. As the FA/GGSN knows the **T**ID and the NAI or home address, it can pass it on to the correct MS. A home adress of the MS allocated by the home network is sent to the SGSN by means of the "GGSN-Initiated PDP Context modification procedure" described in [23.060]

TSG SA WG2 #10
29.11.-3.12. Abiko, Japan

Document S2-99E06
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.

23.121	**CR**	052	Current Version:	3.1.0

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

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

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

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

Source: Siemens AG **Date:** 29 Nov. 1999

Subject: Termination point of the GTP-U tunnel

Work item: Iu interface

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: Deletion of the note "*The termination point of the GTP-U tunnel in the IP domain of the Core Network is FFS.*" as the termination of the GTP-U tunnel over the Iu interface is clarified and is the 3G-SGSN

Clauses affected: 4.2.

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:

4.2 Iu Interface

- Transport protocol across the Iu interface for UTRAN shall be according to 23.930
- The UTRAN shall support two logically separate signalling flows via Iu to combined or separate network nodes of different types (MSC and SGSN).
- The UTRAN shall contain a "domain distribution function" to route transparent application-level control signalling from the UE to the correct core network domain. The UE shall indicate the type of application being addressed (eg via a protocol discriminator). The UTRAN shall map this on to the correct Iu instance to forward the signalling.
- UTRAN-services (including radio access bearers) shall be independent from the core network domain used to access them. Either core network domain can access any appropriate UTRAN-service (eg it should be possible to access a "speech" radio access bearer from the PS-domain).
- The protocol architecture for the User Plane of the Iu interface towards the IP domain shall be based on the same principles as for the (evolved) Gn interface, i.e. the user plane part of GTP over UDP/IP shall be used for tunneling of end user data packets over the Iu interface. If the Iu data transport bases on ATM PVCs then the Iu IP layer provides the Iu network layer services, e.g. routing, addressing, load sharing and redundancy. In this case an IP network may be configured to transfer Iu data units between RNSs and 3G-SGSNs.
- One or several AAL5/ATM Permanent VCs may be used as the common layer 2 resources between the UTRAN and the 'IP domain' of the CN. The reason for usage of several permanent AAL5/ATM VCs may e.g. be for load sharing and redundancy. It is also possible to use one switched VC per user flow (PDP context or radio access bearer). Switched VCs may be used, however the standardization of the procedures and protocols for use of Switched VCs is outside the scope of the 3GPP. If operators use switched VC, the specification of procedures and protocol for switched VCs are up to operators and out of scope of the UMTS/IMT-2000 specification.

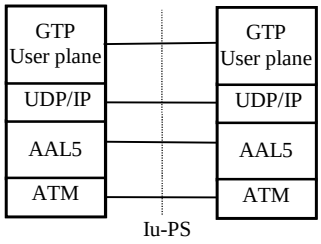


Figure 4-1: Protocol Architecture for the Iu user plane towards the IP domain

~~Note: The termination point of the GTP-U tunnel in the IP domain of the Core Network is FFS.~~

- Charging functionality is located at the 3G-SGSN. On the other hand, only RNC can identify the actual packet volume successfully transferred to a UE. In order for 3G-SGSN to provide the volume based charging for IP domain, the standard shall support the following procedures over Iu interface.
- The RNC indicates the volume of all not transferred downlink data (discarded or forwarded toanother entity (2G-SGSN or target RNC)) to the 3G-SGSN so that the 3G-SGSN can correct its counter. Partially transferred packets are handled as not transferred.
- The RNC delivers to the 3G-SGSN the discarded or forwarded volume accumulated over an implementation dependent time and not per discarded or forwarded packet.
- The 3G-SGSN can ask the RNC to provide the volume of buffered downlink data to correct its counter at any time the 3G-SGSN wants.