Technical Specification Group Services and System Aspects **TSGS#17(02)0528**

Meeting #17, Biarritz, France, 9-12 September 2002

Source: **TSG SA WG2**
Title: **CRs on 23.060 and 03.60**
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 #17.
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 03.60 and 23.060:

Tdoc #	Title	Spec	CR #	cat	Version in	WI	S2 meeting
S2-022332	No MT calls after resumption of GPRS when using NMO=1	03.60	215	F	R97	TEI	26
S2-022419	No MT calls after resumption of GPRS when using NMO=1	03.60	216	A	R98	TEI	26
S2-022586	No MT calls after resumption of GPRS when using NMO=1	23.060	407 r1	A	R99	TEI	26
S2-022587	No MT calls after resumption of GPRS when using NMO=1	23.060	408 r1	A	4	TEI4	26
S2-022588	No MT calls after resumption of GPRS when using NMO=1	23.060	409 r1	A	5	TEI5	26

CRs on 23.060 only:

Tdoc #	Title	Spec	CR #	cat	Version in	WI	S2 meeting
S2-021999	Clarification to preserved real-time PDP contexts RAB establishment	23.060	373 r2	F	3.12.0	TEI	25
S2-021776	Clarification to preserved real-time PDP contexts RAB establishment	23.060	374	A	4.5.0	TEI4	25
S2-021777	Clarification to preserved real-time PDP contexts RAB establishment	23.060	375	A	5.2.0	TEI5	25
S2-021781	Addition of PCO IE to PDP Modification procedure	23.060	379	F	5.2.0	IMS-CCR	25
S2-021891	Handling of PDP contexts using a extended TI	23.060	383 r1	F	3.12.0	TEI	25
S2-021892	Handling of PDP contexts using a extended TI	23.060	384 r1	A	4.5.0	TEI4	25
S2-021893	Handling of PDP contexts using a extended TI	23.060	385 r1	A	5.2.0	TEI5	25
S2-021894	Clarification on MS Initiated Service Request Procedure	23.060	388 r1	F	5.2.0	TEI5	25
S2-021895	Considering Gb mode in description of PDP context modification and deactivation	23.060	391 r1	F	5.2.0	TEI5	25
S2-021829	Correction of LCS reference	23.060	392	F	4.5.0	TEI4	25
S2-021830	Correction of LCS reference	23.060	393	A	5.2.0	TEI5	25
S2-021956	Sending downlink packet during	23.060	394	F	5.2.	TEI5	25

	SRNS relocation				0		
S2-021863	Introduction of flow control per PFC between the SGSN and BSS	23.060	395	F	5.2.0	TEI5	25
S2-022058	QoS attributes requested in case of RT QoS	23.060	396 r1	F	3.12.0	E2EQoS	25
S2-022059	QoS attributes requested in case of RT QoS	23.060	397 r1	A	4.5.0	E2EQoS	25
S2-022060	QoS attributes requested in case of RT QoS	23.060	398 r1	A	5.2.0	E2EQoS	25
S2-022271	Handling of preserved PDP contexts	23.060	400	F	3.12.0	TEI	26
S2-022272	Handling of preserved PDP contexts	23.060	401	A	4.5.0	TEI4	26
S2-022273	Handling of preserved PDP contexts	23.060	402	A	5.2.0	TEI5	26
S2-022390	Removal of Forward SRNS Context Acknowledge message	23.060	405	F	4.5.0	TEI4	26
S2-022421	Removal of Forward SRNS Context Acknowledge message	23.060	406r1	A	5.2.0	TEI5	26
S2-022567	Setting of PDP Context Identifier after inter-SGSN RAU from GTPv0-only SGSN	23.060	410	F	3.12.0	TEI	26
S2-022568	Setting of PDP Context Identifier after inter-SGSN RAU from GTPv0-only SGSN	23.060	411	A	4.5.0	TEI4	26
S2-022569	Setting of PDP Context Identifier after inter-SGSN RAU from GTPv0-only SGSN	23.060	412	A	5.2.0	TEI5	26

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CHANGE REQUEST

⌘ **03.60** CR **216** ⌘ **rev** ⌘ Current version: **7.8.0** ⌘

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

Proposed change affects: UICC apps⌘ ☐ ME **X** Radio Access Network ☐ Core Network **X**

Title: ⌘	No MT calls after resumption of GPRS in Network Operation Mode I
Source: ⌘	Vodafone Ltd,Nokia
Work item code: ⌘	TEI	**Date:** ⌘	21/08/2002
Category: ⌘ **A**	**Release:** ⌘ R98

Use <u>one</u> of the following categories:
F (correction)
A (corresponds to a correction in an earlier release)
B (addition of feature),
C (functional modification of feature)
D (editorial modification)
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use <u>one</u> of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)

Reason for change: ⌘	The current description in sub clause 16.2.1 "Suspension of GPRS Services" describing of how MS may resume GPRS services by sending a ROUTEING AREA UPDATE REQUEST message to SGSN, is contradicting with text in 6.3.1 "Administration of the SGSN –MSC/VLR Association".

6.3.1 clearly specifies that MS always perform combined procedures when camped on a cell in network operation mode I unless the MS is CS connected, while 16.2.1 can be interpreted to mean that to resume GPRS service only Routeing Area Update procedure is used.

As the network operation mode is only known and configured in BSS/RAN the SGSN establishes/releases the Gs association based on the request type used in ROUTEING AREA UPDATE REQUEST message. Therefore the noncombined RA Update releases the association as specified in 6.3.1 for MS in class-B mode of operation. |
Summary of change: ⌘	It is clarifed when MS resume GPRS services by sending a ROUTEING AREA UPDATE REQUEST message, the Update Type depends on the mode of operation of the network in use e.g. in mode I Combined RA/LA Update is made and in mode II or III Routeing Area Update is made.
Consequences if not approved: ⌘	If specifications are interpreted in different ways by MS and Network implementations, the administration of the SGSN-MSC/VLR association will not work. This can lead all subsequent MT calls (and CS domain SMSes) being lost until MS updates it's location using correct procedures.
Clauses affected: ⌘	6.9.1.3; 16.2.1

		Y	N			
Other specs affected:	⌘	X		Other core specifications	⌘	04.08
				Test specifications		
				O&M Specifications		
Other comments:	⌘					

6.9.1.3 Combined RA / LA Update Procedure

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, or when the MS indicates changed access capabilities to the network, or when a suspended MS is not resumed by the BSS (see subclause "Suspension of GPRS Services"). 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 GSM 03.22), as no combined RA / LA updates are performed during a CS connection.

*************NEXT MODIFICATION **************

16.2 Circuit-switched Services

The ability for a GPRS user to access circuit-switched services depends on the subscription held, the network capabilities, and the MS capabilities. Interaction between GPRS and circuit-switched services is described in subclause "Interactions Between SGSN and MSC/VLR".

16.2.1 Suspension of GPRS Services

When a GPRS-attached MS enters dedicated mode, and when the MS limitations make it unable to communicate on GPRS channels, the MS shall request the network for suspension of GPRS services. The Suspend and Resume procedure is illustrated in **Error! Reference source not found.**. Each step is explained in the following list.
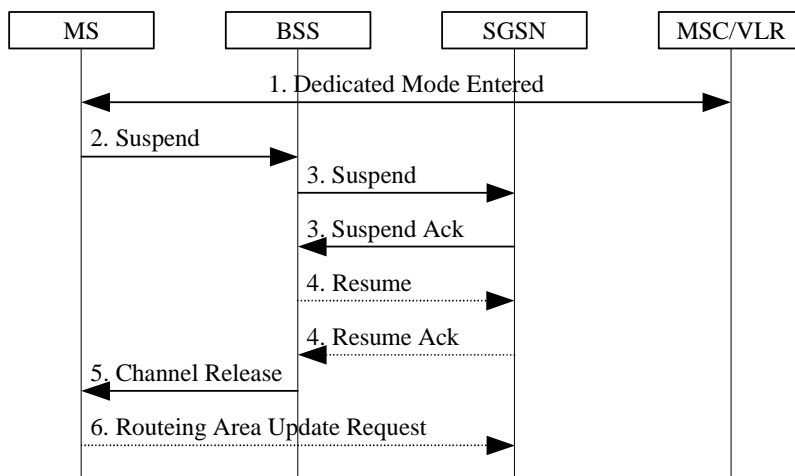
Figure 1: Suspend and Resume Procedure

1) The MS enters dedicated mode.

2) The MS sends an RR Suspend (TLLI, RAI) message to the BSS. The BSS may terminate any ongoing GPRS traffic for this TLLI.

3) The BSS sends a Suspend (TLLI, RAI) message to the SGSN, and the SGSN acknowledges by returning Suspend Ack. The BSS shall store TLLI and RAI in order to be able to request the SGSN to resume GPRS services when the MS leaves dedicated mode.

4) Eventually, the BSS determines that the circuit-switched radio channel shall be released. If the BSS is able to request the SGSN to resume GPRS services, the BSS shall send a Resume (TLLI, RAI) message to the SGSN. The SGSN acknowledges the successful outcome of the resume by returning Resume Ack.

5) The BSS sends an RR Channel Release (Resume) message to the MS. Resume indicates whether the BSS has successfully requested the SGSN to resume GPRS services for the MS, i.e., whether Resume Ack was received in the BSS before the RR Channel Release message was transmitted. The MS leaves dedicated mode.

6)	If the BSS did not successfully request the SGSN to resume GPRS services, or if the RR Channel Release message was not received before the MS left dedicated mode, then the MS shall resume GPRS services by sending a Routeing Area Update Request message to the SGSN. The Update Type depends on the mode of operation of the network in use e.g. in mode I Combined RA/LA Update is made and in mode II or III Routeing Area Update is made., as described in subclause "Routeing Area Update Procedure".

The full handling of suspended MSs in the BSS and the SGSN is implementation dependent. Typically, the SGSN should not page suspended MSs.

If the MS performs an inter-BSC handover while suspended, then TLLI and RAI should be transferred as BSC-to-BSC information in the Handover Required and Handover Request messages, see GSM 08.08. This allows the new BSC to initiate the Resume request procedure to the SGSN. In the case where the BSC-to-BSC information was not transferred or not understood, then the MS doesn't receive an indication that resumption has been successful, and the MS shall resume GPRS services by initiating a Routeing Area Update or Combined RA/LA Updating Request procedure as described in step 6.

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CHANGE REQUEST

| ⌘ | **23.060** CR | **407** ⌘rev | **1** ⌘ | Current version: | **3.12.0** ⌘ |

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

Proposed change affects: UICC apps⌘ ☐   ME **X** Radio Access Network ☐   Core Network **X**

Title: ⌘	No MT calls after resumption of GPRS in Network Operation Mode I	
Source: ⌘	Vodafone Ltd,Nokia	
Work item code: ⌘	TEI	**Date:** ⌘ 22/08/2002
Category: ⌘ **A**		**Release:** ⌘ R99

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

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)

Reason for change: ⌘	The current description in sub clause 16.2.1 "Suspension of GPRS Services" describing of how MS may resume GPRS services by sending a ROUTEING AREA UPDATE REQUEST message to SGSN, is contradicting with text in 6.3.1 "Administration of the SGSN –MSC/VLR Association".
	6.3.1 clearly specifies that MS always perform combined procedures when camped on a cell in network operation mode I unless the MS is CS connected, while 16.2.1 can be interpreted to mean that to resume GPRS service only Routeing Area Update procedure is used.
	As the network operation mode is only known and configured in BSS/RAN the SGSN establishes/releases the Gs association based on the request type used in ROUTEING AREA UPDATE REQUEST message. Therefore the noncombined RA Update releases the association as specified in 6.3.1 for MS in class-B mode of operation.
Summary of change: ⌘	It is clarifed when MS resume GPRS services by sending a ROUTEING AREA UPDATE REQUEST message, the Update Type depends on the mode of operation of the network in use e.g. in mode I Combined RA/LA Update is made and in mode II or III Routeing Area Update is made.
Consequences if not approved: ⌘	If specifications are interpreted in different ways by MS and Network implementations, the administration of the SGSN-MSC/VLR association will not work. This can lead all subsequent MT calls (and CS domain SMSes) being lost until MS updates it's location using correct procedures.
Clauses affected: ⌘	6.9.1.3; 16.2.1

		Y	N			
Other specs affected:	⌘	X		Other core specifications	⌘	24.008
				Test specifications		
				O&M Specifications		
Other comments:	⌘					

6.9.1.3 Combined RA / LA Update Procedure

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 an IMSI attach, or when the MS has to indicate new access capabilities to the network, or when a suspended MS is not resumed by the BSS (see subclause "Suspension of GPRS Services"). 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 GSM 03.22), as no combined RA / LA updates are performed during a CS connection.

**************NEXT MODIFICATION ***************

16.2 Circuit-switched Services (GSM only)

The ability for a GPRS user to access circuit-switched services depends on the subscription held, the network capabilities, and the MS capabilities. Interaction between GPRS and circuit-switched services is described in subclause "Interactions Between SGSN and MSC/VLR".

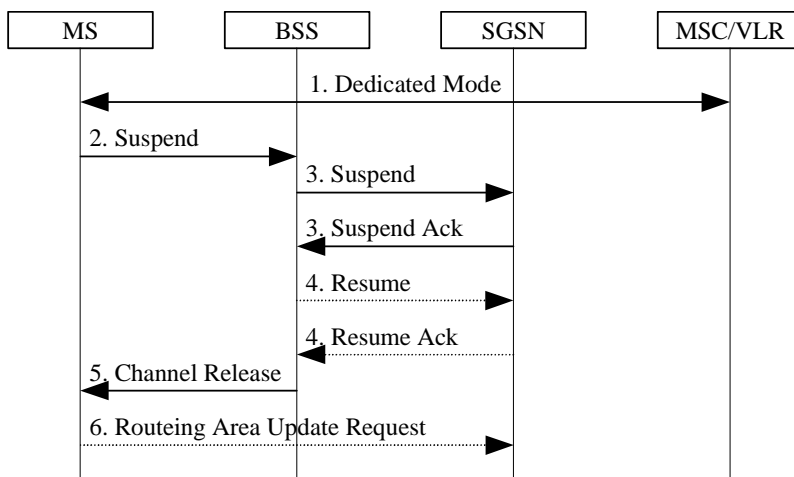## 16.2.1 Suspension of GPRS Services

The MS shall request the network for suspension of GPRS services when the MS or the network limitations make it unable to communicate on GPRS channels in one or more of the following scenarios:

1 When a GPRS-attached MS enters dedicated mode and the support of Class A mode of operation is not posssible (e.g. the MS only supports DTM (see GSM 03.64) and the network only supports independent CS and PS).

2 During CS connection, the MS performs handover from UMTS to GSM, and the MS or the network limitations make it unable to support CS/PS mode of operation, e.g. an MS in CS/PS mode of operation in Iu mode during a CS connection reverts to class-B mode of operation in A/Gb mode.

3 When an MS in class A mode of operation is handed over to a cell where the support of Class A mode of operation is not possible (e.g. a DTM mobile station entering a cell not supporting DTM).

16.2.1.1 Intra GSM (GSM only) Suspend and Resume procedure

16.2.1.1.1 Intra-SGSN Suspend and Resume procedure

The Suspend and Resume procedure for intra-SGSN is illustrated in Figure 1.

Figure 1: Suspend and Resume Procedure for intra SGSN

1) The MS enters dedicated mode and the MS or the network limitations make it unable to support Class A mode of operation, or during CS connection, a DTM MS performs handover from a cell supporting DTM to a cell not supporting DTM.

2) The MS sends an RR Suspend (TLLI, RAI) message to the BSS. The BSS may terminate any ongoing GPRS traffic for this TLLI.

3) The BSS sends a Suspend (TLLI, RAI) message to the SGSN, and the SGSN acknowledges by returning Suspend Ack. The BSS shall store TLLI and RAI in order to be able to request the SGSN to resume GPRS services when the MS leaves dedicated mode.

4) Eventually, the BSS may determine that theconditions for the GPRS suspension have disappeared. If the BSS is able to request the SGSN to resume GPRS services, the BSS shall send a Resume (TLLI, RAI) message to the SGSN. The SGSN acknowledges the successful outcome of the resume by returning Resume Ack.

5) If the circuit switched radio channel is to be released, the BSS sends an RR Channel Release (Resume) message to the MS. The Resume message indicates whether the BSS has successfully requested the SGSN to resume GPRS services for the MS, i.e., whether Resume Ack was received in the BSS before the RR Channel Release message was transmitted. The MS leaves dedicated mode.

6) The MS shall resume GPRS services by sending a Routeing Area Update Request message to the SGSN, as described in subclause "Routeing Area Update Procedure":

    - if the BSS did not successfully request the SGSN to resume GPRS services,

    - if the RR Channel Release message was not received before the MS left dedicated mode,

    - if the MS locally determines that the conditions for the GPRS suspension have disappeared.

    The Update Type depends on the mode of operation of the network in use e.g. in mode I Combined RA/LA Update is made and in mode II or III Routeing Area Update is made.
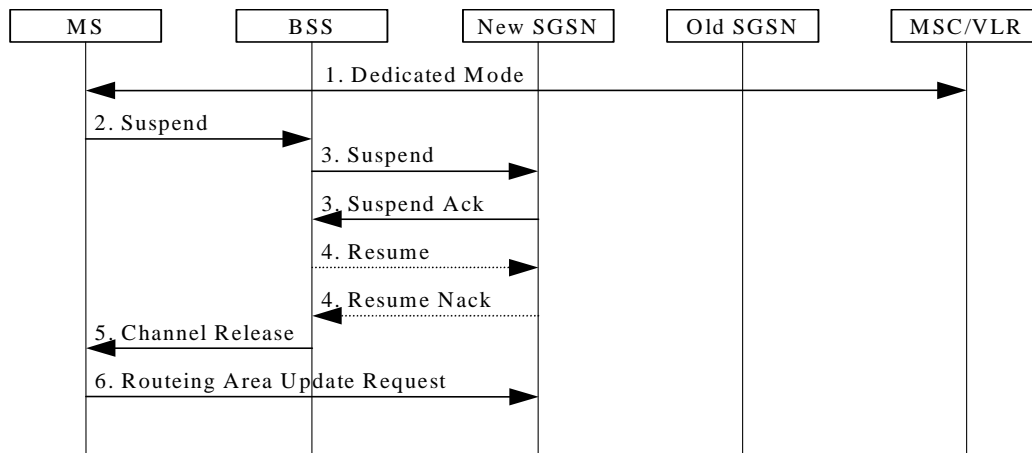
    The full handling of suspended MSs in the BSS and the SGSN is implementation dependent. Typically, the SGSN should not page suspended MSs.

If the MS performs an inter-BSC handover while suspended, the TLLI and RAI should be transferred as BSC-to-BSC information in the Handover Required and Handover Request messages, see GSM 08.08. This allows the new BSC to initiate the Resume request procedure to the SGSN. In the case where the BSC-to-BSC information was not transferred or not understood, the MS doesn't receive an indication that resumption has been successful, and the MS shall resume GPRS services by initiating a Routeing Area Update or Combined RA/LA Updating Request procedure as described in step 6.

16.2.1.1.2   Inter-SGSN Suspend and Resume procedure

The Suspend and Resume procedure for inter-SGSN is illustrated in Figure 2.

This describes the scenario where the old cell and the new cell are handled by different SGSN's, i.e. suspend message is received in an SGSN that is different from the SGSN currently handling the packet data transmission. Note: this procedure does not specify SGSN to SGSN signalling for the Suspend, and therefore traffic on the old SGSN is not suspended.

MS | BSS | New SGSN | Old SGSN | MSC/VLR

1. Dedicated Mode

2. Suspend

3. Suspend

3. Suspend Ack

4. Resume

4. Resume Nack

5. Channel Release

6. Routeing Area Update Request

Figure 2: Suspend and Resume Procedure for inter-SGSN

1) During CS connection, a DTM MS performs handover from a cell supporting DTM to a cell not supporting DTM.

2) The MS sends an RR Suspend (TLLI, RAI) message to the BSS.

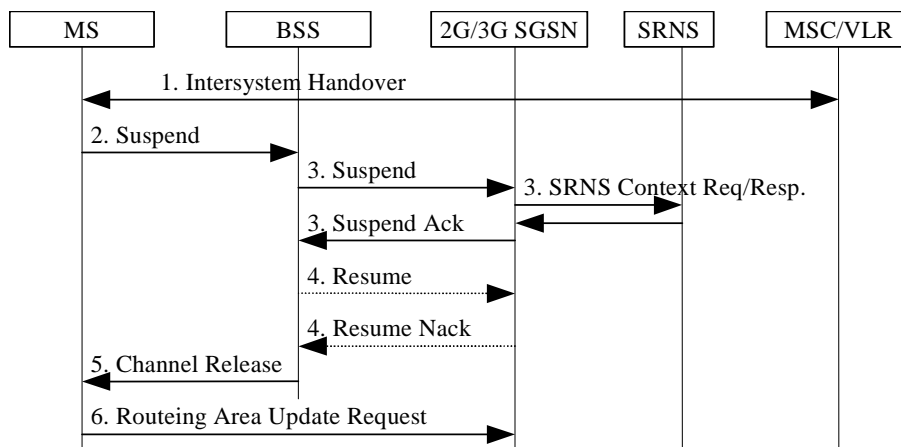3) The BSS sends a Suspend (TLLI, RAI) message to the SGSN.

The new SGSN then returns Suspend Ack to the BSS.

4) After CS connection is terminated, the BSS may send a Resume (TLLI, RAI) message to the new SGSN, but since resume is not needed against the old SGSN, the new SGSN acknowledges the resume by Resume Nack. (Resume is not needed against the old SGSN since the MS in this case always will perform an RA Update for updating of GPRS services when the CS connection is terminated and the MM context will be moved from the old to the new SGSN.)

5) The BSS sends an RR Channel Release message to the MS, indicating that the BSS has not successfully requested the SGSN to resume GPRS services for the MS. The MS leaves dedicated mode.

6) The MS shall resume GPRS services by sending a Routeing Area Update Request message to the SGSN~~,~~. The Update Type depends on the mode of operation of the network in use e.g. in mode I Combined RA/LA Update is made and in mode II or III Routeing Area Update is made. ~~as described in subclause "Routeing Area Update Procedure".~~

16.2.1.2 Inter-System (UMTS-GSM) Suspend and Resume procedure

16.2.1.2.1 Intra-SGSN Suspend and Resume procedure

The Suspend and Resume procedure for intra SGSN is illustrated in Figure 3.

MS	BSS	2G/3G SGSN	SRNS	MSC/VLR

1. Intersystem Handover

2. Suspend

3. Suspend

3. SRNS Context Req/Resp.

3. Suspend Ack

4. Resume

4. Resume Nack

5. Channel Release

6. Routeing Area Update Request
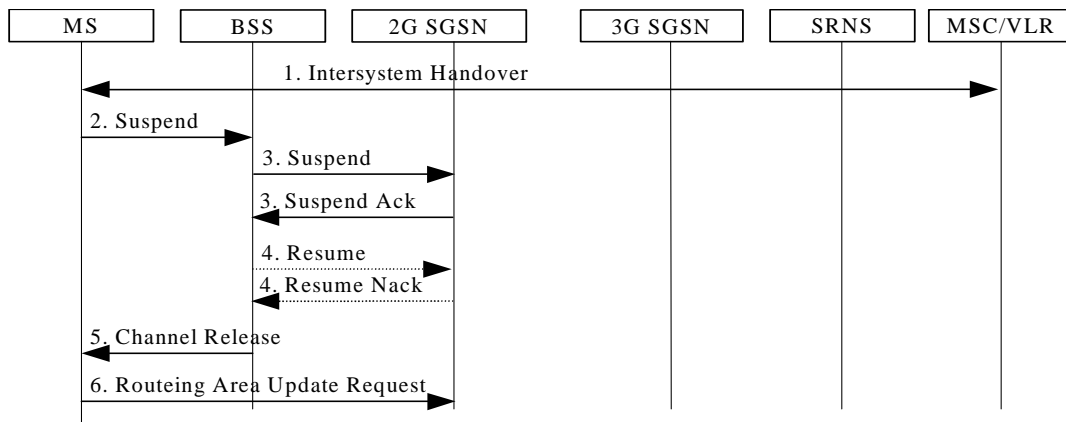
Figure 3: Suspend and Resume Procedure for intra-SGSN

1) During CS connection, the MS performs handover from UMTS to GSM and the MS or the network limitations are unable to support CS/PS mode of operation.

2) The MS sends an RR Suspend (TLLI, RAI) message to the BSS.

3) The BSS sends a Suspend (TLLI, RAI) message to the SGSN.
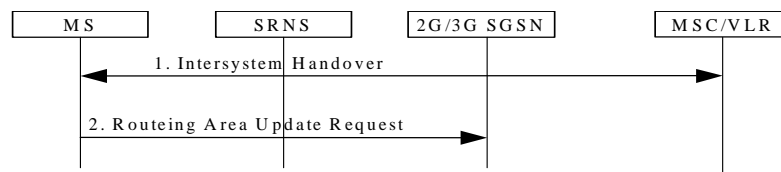
- The SGSN will then request the SRNS to stop sending downlink PDU's by the SRNS Context Request message. The SRNS then starts buffering the downlink PDUs.

- The SRNS responds with an SRNS Context Response message.

- The SGSN then returns Suspend Ack to the BSS.

4) After CS connection is terminated, the BSS may send a Resume (TLLI, RAI) message to the SGSN, but resume is not possible since the MS has changed the radio system, so the SGSN acknowledges the resume by Resume Nack.

5) The BSS sends an RR Channel Release message to the MS, indicating that the BSS has not successfully requested the SGSN to resume GPRS services for the MS.

6) The MS shall resume GPRS services by sending a Routeing Area Update Request message to the SGSN., The Update Type depends on the mode of operation of the network in use e.g. in mode I Combined RA/LA Update is made and in mode II or III Routeing Area Update is made. as described in subclause "Inter System Change Procedure".

16.2.1.2.2　　Inter-SGSN Suspend and Resume procedure

The Suspend and Resume procedure for inter SGSN is illustrated in Figure 4.

This describes the scenario when the suspend message is received in an SGSN that is different from the SGSN currently handling the packet data transmission and would be valid for at least the following cases:

- MS performs inter-system handover from UMTS to GSM during CS connection and the SGSN handling the GSM cell is different from the SGSN handling the UMTS cell, i.e. the 2G and 3G SGSNs are separated.

```
MS        BSS      2G SGSN    3G SGSN     SRNS      MSC/VLR

            1. Intersystem Handover

2. Suspend
            3. Suspend
            3. Suspend Ack
            4. Resume
            4. Resume Nack
5. Channel Release
6. Routeing Area Update Request
```

Figure 4: Suspend and Resume Procedure for inter-SGSN

1) During CS connection, the MS performs handover from UMTS to GSM, and the MS or the network limitations make it unable to support CS/PS mode of operation.

2) The MS sends an RR Suspend (TLLI, RAI) message to the BSS.

3) The BSS sends a Suspend (TLLI, RAI) message to the SGSN.

The 2G SGSN then returns Suspend Ack to the BSS.

4) After CS connection is terminated, the BSS may send a Resume (TLLI, RAI) message to the 2G SGSN, but since resume is not needed against the 3G SGSN the 2G SGSN acknowledges the resume by Resume Nack. (Resume is not needed in this case since the MS always will perform an RA Update for updating of GPRS services when the CS connection is terminated and the MM context will be moved from 3G to 2G SGSN.)

5) The BSS sends an RR Channel Release message to the MS, indicating that the BSS has not successfully requested the SGSN to resume GPRS services for the MS.

6) The MS shall resume GPRS services by sending a Routeing Area Update Request message to the SGSN. The Update Type depends on the mode of operation of the network in use e.g. in mode I Combined RA/LA Update is made and in mode II or III Routeing Area Update is made. as described in subclause " Inter System Change Procedure".

16.2.1.3　　Inter System (GSM-UMTS) Resume Procedure

The resume procedure is only applicable in case of A/Gb mode to Iu mode handover.

16.2.1.1.1 16.2.1.3.1 Intra-SGSN Resume Procedure

The procedure for resume of GPRS traffic at intra SGSN case is illustrated in Figure 5.

```
MS          SRNS       2G/3G SGSN      MSC/VLR

      1. Intersystem Handover

      2. Routeing Area Update Request
```
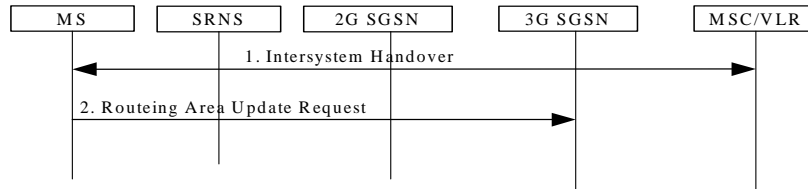
Figure 5: Resume of GPRS traffic at intra SGSN

1) The MS in A/Gb mode class-B mode of operation during CS connection performs handover to CS/PS mode of operation in Iu mode;
or the MS in class-A mode of operation capable of DTM performs handover during CS connection from a GSM cell not supporting DTM to a UMTS cell.

2) The MS shall resume GPRS services, directly after the CS handover is completed, by sending a Routeing Area Update Request message to the SGSN. The Update Type depends on the mode of operation of the network in

use e.g. in mode I Combined RA/LA Update is made and in mode II Routeing Area Update is made.as described in subclause " Inter System Change Procedure".

16.2.1.3.2   Inter-SGSN Resume Procedure

The procedure for resuming GPRS traffic at inter-SGSN case is illustrated in Figure 6.

Figure 6: Resume of GPRS traffic at inter SGSN

1) The MS in A/Gb mode class-B mode of operation during CS connection performs a handover to CS/PS mode of operation in Iu mode;
   or the MS in class-A mode of operation capable of DTM performs a handover during CS connection from a GSM cell not supporting DTM to a UMTS cell.

2) The MS shall resume GPRS services, directly after the CS handover is completed, by sending a Routeing Area Update Request message to the SGSN., The Update Type depends on the mode of operation of the network in use e.g. in mode I Combined RA/LA Update is made and in mode II Routeing Area Update is made. as described in subclause " Inter System Change Procedure":

3GPP TSG-SA WG2 Meeting #26
Toronto, Canada, 19ᵗʰ – 23ʳᵈ Aug 2002

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CHANGE REQUEST

⌘   **23.060 CR**   **408** ⌘**rev**   ⌘ Current version: **4.5.0** ⌘

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

Proposed change affects: UICC apps⌘ ☐   ME **X** Radio Access Network ☐ Core Network **X**

Title: ⌘	No MT calls after resumption of GPRS in Network Operation Mode I
Source: ⌘	Vodafone Ltd,Nokia
Work item code:⌘	TEI4 *Date:* ⌘ 22/08/2002
Category: ⌘ **A**	*Release:* ⌘ Rel-4

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

Use one of the following releases:
  2   *(GSM Phase 2)*
  R96 *(Release 1996)*
  R97 *(Release 1997)*
  R98 *(Release 1998)*
  R99 *(Release 1999)*
  Rel-4 *(Release 4)*
  Rel-5 *(Release 5)*
  Rel-6 *(Release 6)*

Reason for change: ⌘	The current description in sub clause 16.2.1 "Suspension of GPRS Services" describing of how MS may resume GPRS services by sending a ROUTEING AREA UPDATE REQUEST message to SGSN, is contradicting with text in 6.3.1 "Administration of the SGSN –MSC/VLR Association". 6.3.1 clearly specifies that MS always perform combined procedures when camped on a cell in network operation mode I unless the MS is CS connected, while 16.2.1 can be interpreted to mean that to resume GPRS service only Routeing Area Update procedure is used. As the network operation mode is only known and configured in BSS/RAN the SGSN establishes/releases the Gs association based on the request type used in ROUTEING AREA UPDATE REQUEST message. Therefore the noncombined RA Update releases the association as specified in 6.3.1 for MS in class-B mode of operation.
Summary of change:⌘	It is clarifed when MS resume GPRS services by sending a ROUTEING AREA UPDATE REQUEST message, the Update Type depends on the mode of operation of the network in use e.g. in mode I Combined RA/LA Update is made and in mode II or III Routeing Area Update is made.
Consequences if not approved: ⌘	If specifications are interpreted in different ways by MS and Network implementations, the administration of the SGSN-MSC/VLR association will not work. This can lead all subsequent MT calls (and CS domain SMSes) being lost until MS updates it's location using correct procedures.
Clauses affected: ⌘	6.9.1.3; 16.2.1

CR page 1

		Y	N			
Other specs affected:	⌘	X		Other core specifications	⌘	24.008
				Test specifications		
				O&M Specifications		
Other comments:	⌘					

6.9.1.3   Combined RA / LA Update Procedure

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 an IMSI attach, or when the MS has to indicate new access capabilities to the network, or when a suspended MS is not resumed by the BSS (see subclause "Suspension of GPRS Services"). 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 GSM 03.22), as no combined RA / LA updates are performed during a CS connection.

*************NEXT MODIFICATION **************

16.2   Circuit-switched Services (GSM only)

The ability for a GPRS user to access circuit-switched services depends on the subscription held, the network capabilities, and the MS capabilities. Interaction between GPRS and circuit-switched services is described in clause "Interactions Between SGSN and MSC/VLR".

16.2.1   Suspension of GPRS Services

The MS shall request the network for suspension of GPRS services when the MS or the network limitations make it unable to communicate on GPRS channels in one or more of the following scenarios:

1   When a GPRS-attached MS enters dedicated mode and the support of Class A mode of operation is not posssible (e.g. the MS only supports DTM (see GSM 03.64) and the network only supports independent CS and PS).

2   During CS connection, the MS performs handover from UMTS to GSM, and the MS or the network limitations make it unable to support CS/PS mode of operation, e.g. an MS in CS/PS mode of operation in Iu mode during a CS connection reverts to class-B mode of operation in A/Gb mode.

3   When an MS in class A mode of operation is handed over to a cell where the support of Class A mode of operation is not possible (e.g. a DTM mobile station entering a cell not supporting DTM).

16.2.1.1   Intra GSM (GSM only) Suspend and Resume procedure

16.2.1.1.1   Intra-SGSN Suspend and Resume procedure

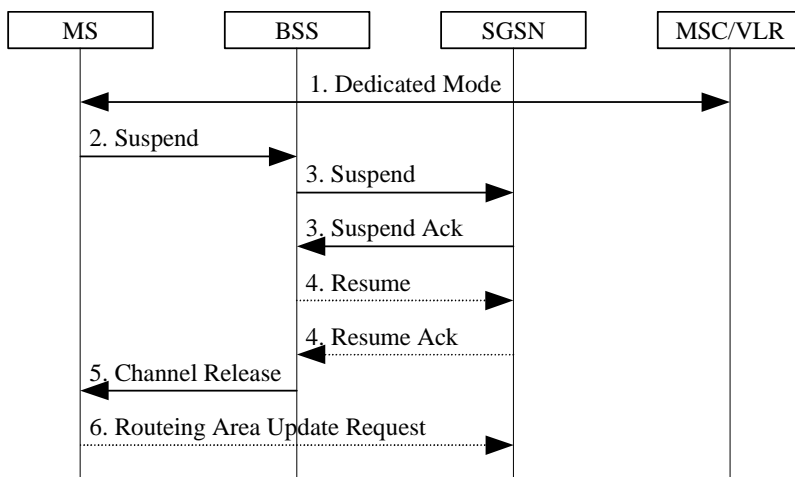The Suspend and Resume procedure for intra-SGSN is illustrated in Figure 99.

Figure 99: Suspend and Resume Procedure for intra SGSN

1) The MS enters dedicated mode and the MS or the network limitations make it unable to support Class A mode of operation, or during CS connection, a DTM MS performs handover from a cell supporting DTM to a cell not supporting DTM.

2) The MS sends an RR Suspend (TLLI, RAI) message to the BSS. The BSS may terminate any ongoing GPRS traffic for this TLLI.

3) The BSS sends a Suspend (TLLI, RAI) message to the SGSN, and the SGSN acknowledges by returning Suspend Ack. The BSS shall store TLLI and RAI in order to be able to request the SGSN to resume GPRS services when the MS leaves dedicated mode.

4) Eventually, the BSS may determine that theconditions for the GPRS suspension have disappeared. If the BSS is able to request the SGSN to resume GPRS services, the BSS shall send a Resume (TLLI, RAI) message to the SGSN. The SGSN acknowledges the successful outcome of the resume by returning Resume Ack.

5) If the circuit switched radio channel is to be released, the BSS sends an RR Channel Release (Resume) message to the MS. The Resume message indicates whether the BSS has successfully requested the SGSN to resume GPRS services for the MS, i.e., whether Resume Ack was received in the BSS before the RR Channel Release message was transmitted. The MS leaves dedicated mode.

6) The MS shall resume GPRS services by sending a Routeing Area Update Request message to the SGSN, ~~as described in subclause "Routeing Area Update Procedure"~~:

   - if the BSS did not successfully request the SGSN to resume GPRS services,

   - if the RR Channel Release message was not received before the MS left dedicated mode,

   - if the MS locally determines that the conditions for the GPRS suspension have disappeared.

   The Update Type depends on the mode of operation of the network in use e.g. in mode I Combined RA/LA Update is made and in mode II or III Routeing Area Update is made.
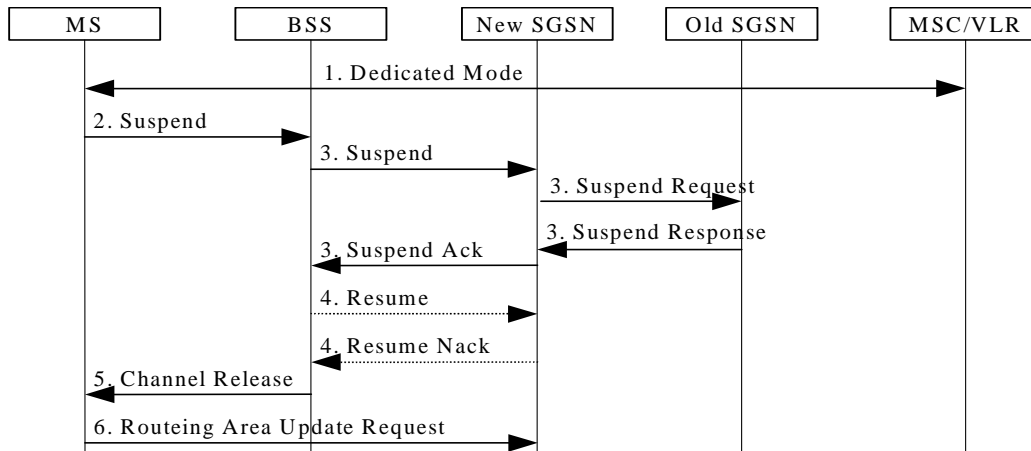
   The full handling of suspended MSs in the BSS and the SGSN is implementation dependent. Typically, the SGSN should not page suspended MSs.

If the MS performs an inter-BSC handover while suspended, the TLLI and RAI should be transferred as BSC-to-BSC information in the Handover Required and Handover Request messages, see GSM 08.08. This allows the new BSC to initiate the Resume request procedure to the SGSN. In the case where the BSC-to-BSC information was not transferred or not understood, the MS doesn't receive an indication that resumption has been successful, and the MS shall resume GPRS services by initiating a Routeing Area Update or Combined RA/LA Updating ~~Request~~ procedure as described in step 6.

16.2.1.1.2   Inter-SGSN Suspend and Resume procedure

The Suspend and Resume procedure for inter-SGSN is illustrated in Figure 100.

This describes the scenario where the old cell and the new cell are handled by different SGSN's, i.e. suspend message is received in an SGSN that is different from the SGSN currently handling the packet data transmission.
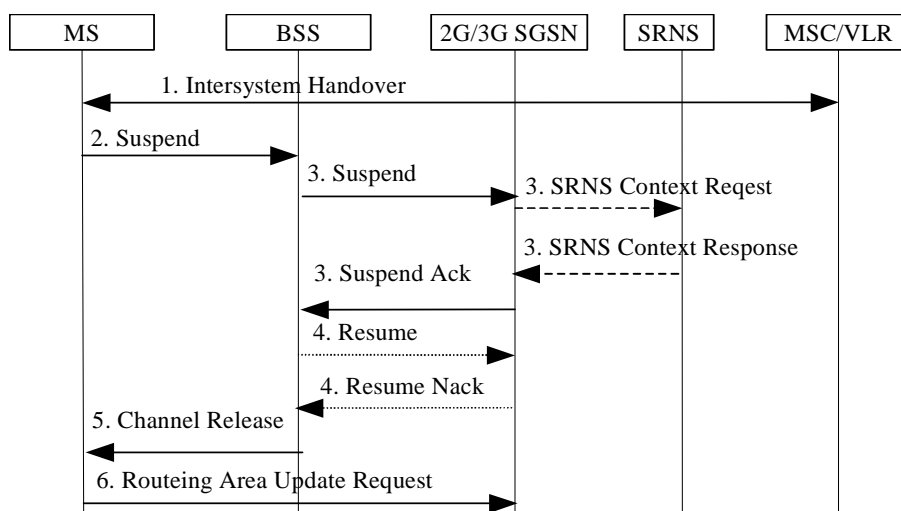
Figure 100: Suspend and Resume Procedure for inter-SGSN

1) During CS connection, a DTM MS performs handover from a cell supporting DTM to a cell not supporting DTM.

2) The MS sends an RR Suspend (TLLI, RAI) message to the BSS.

3) The BSS sends a Suspend (TLLI, RAI) message to the SGSN.

   - Since the SGSN that receives the Suspend message is not the one currently handling the packet data transmission, an indication to perform suspend will be sent to the old SGSN by means of a SUSPEND REQUEST message on the Gn interface. The address of the old SGSN is derived by "old RAI" received in Suspend message.

   - The Old SGSN returns a SUSPEND RESPONSE.

   - The new SGSN then returns Suspend Ack to the BSS.

4) After CS connection is terminated, the BSS may send a Resume (TLLI, RAI) message to the new SGSN, but since resume is not needed against the old SGSN, the new SGSN acknowledges the resume by Resume Nack. (Resume is not needed against the old SGSN since the MS in this case always will perform an RA Update for updating of GPRS services when the CS connection is terminated and the MM context will be moved from the old to the new SGSN.)

5) The BSS sends an RR Channel Release message to the MS, indicating that the BSS has not successfully requested the SGSN to resume GPRS services for the MS. The MS leaves dedicated mode.

6) The MS shall resume GPRS services by sending a Routeing Area Update Request message to the SGSN. The Update Type depends on the mode of operation of the network in use e.g. in mode I Combined RA/LA Update is made and in mode II or III Routeing Area Update is made. as described in subclause "Routeing Area Update Procedure".

16.2.1.2 Inter-System (UMTS-GSM) Suspend and Resume procedure

16.2.1.2.1 Intra-SGSN Suspend and Resume procedure

The Suspend and Resume procedure for intra SGSN is illustrated in Figure 101.

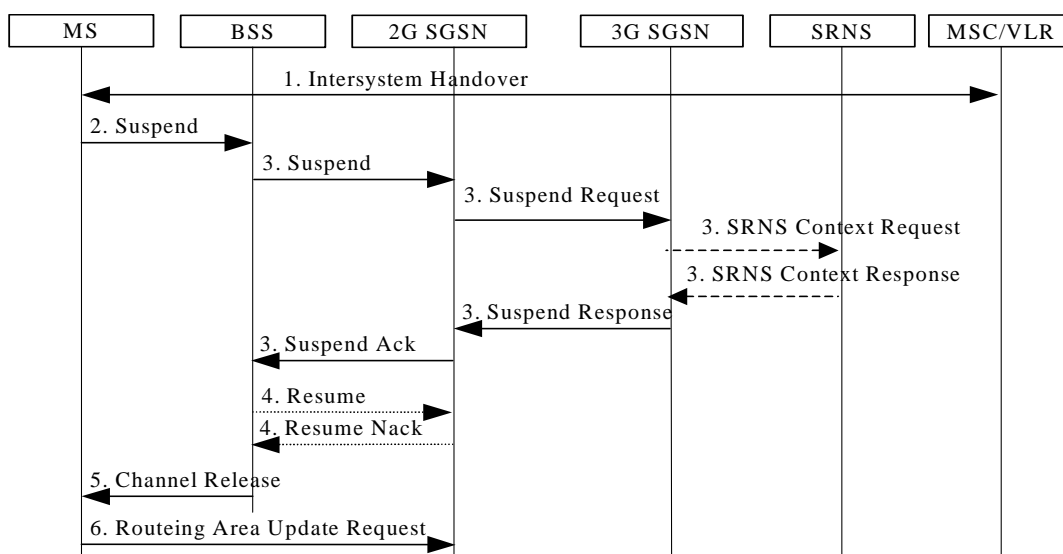**Figure 101: Suspend and Resume Procedure for intra-SGSN**

1) During CS connection, the MS performs handover from UMTS to GSM and the MS or the network limitations are unable to support CS/PS mode of operation.

2) The MS sends an RR Suspend (TLLI, RAI) message to the BSS.

3) The BSS sends a Suspend (TLLI, RAI) message to the SGSN and:

   - The SGSN may request the SRNS to stop sending downlink PDU's by the SRNS Context Request message. The SRNS then starts buffering the downlink PDUs.

   - The SRNS responds with an SRNS Context Response message.

   - The SGSN then returns Suspend Ack to the BSS.

4) After CS connection is terminated, the BSS may send a Resume (TLLI, RAI) message to the SGSN, but resume is not possible since the MS has changed the radio system, so the SGSN acknowledges the resume by Resume Nack.

5) The BSS sends an RR Channel Release message to the MS, indicating that the BSS has not successfully requested the SGSN to resume GPRS services for the MS.

6) The MS shall resume GPRS services by sending a Routeing Area Update Request message to the SGSN~~,~~. The Update Type depends on the mode of operation of the network in use e.g. in mode I Combined RA/LA Update is made and in mode II or III Routeing Area Update is made. ~~as described in subclause "Inter System Change Procedure".~~

16.2.1.2.2   Inter-SGSN Suspend and Resume procedure

The Suspend and Resume procedure for inter SGSN is illustrated in Figure 102.

This describes the scenario when the suspend message is received in an SGSN that is different from the SGSN currently handling the packet data transmission and would be valid for at least the following cases:

   - MS performs inter-system handover from UMTS to GSM during CS connection and the SGSN handling the GSM cell is different from the SGSN handling the UMTS cell, i.e. the 2G and 3GPP SGSNs are separated.

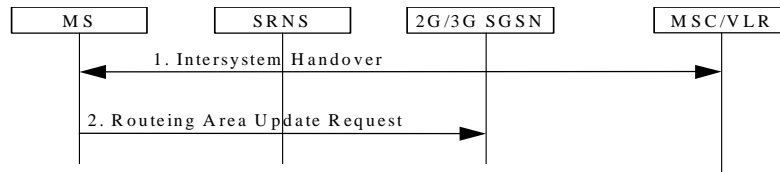**Figure 102: Suspend and Resume Procedure for inter-SGSN**

1) During CS connection, the MS performs handover from UMTS to GSM, and the MS or the network limitations make it unable to support CS/PS mode of operation.

2) The MS sends an RR Suspend (TLLI, RAI) message to the BSS.

3) The BSS sends a Suspend (TLLI, RAI) message to the SGSN.

   - Since the SGSN that receives the Suspend message is not the one currently handling the packet data transmission, an indication to perform suspend will be sent to the 3G SGSN by means of a SUSPEND REQUEST message on the Gn interface. The address of the old SGSN is derived by "old RAI" received in the Suspend message.

   - The 3G SGSN may request the SRNS to stop sending downlink PDU's by the SRNS Context Request message. Upon reception of the SRNS Context Request message, the SRNS starts buffering the downlink PDUs.

   - The SRNS responds with an SRNS Context Response message.

   - The 3G SGSN return a SUSPEND RESPONSE.

   - The 2G SGSN then returns Suspend Ack to the BSS.

4) After CS connection is terminated, the BSS may send a Resume (TLLI, RAI) message to the 2G SGSN, but since resume is not needed against the 3G SGSN the 2G SGSN acknowledges the resume by Resume Nack. (Resume is not needed in this case since the MS always will perform an RA Update for updating of GPRS services when the CS connection is terminated and the MM context will be moved from 3G to 2G SGSN.)

5) The BSS sends an RR Channel Release message to the MS, indicating that the BSS has not successfully requested the SGSN to resume GPRS services for the MS.

6) The MS shall resume GPRS services by sending a Routeing Area Update Request message to the SGSN,. The Update Type depends on the mode of operation of the network in use e.g. in mode I Combined RA/LA Update is made and in mode II or III Routeing Area Update is made. as described in subclause " Inter System Change Procedure".

16.2.1.3 Inter System (GSM-UMTS) Resume procedure

The resume procedure is only applicable in case of A/Gb mode to Iu mode handover.

16.2.1.3.1 Intra-SGSN Resume procedure

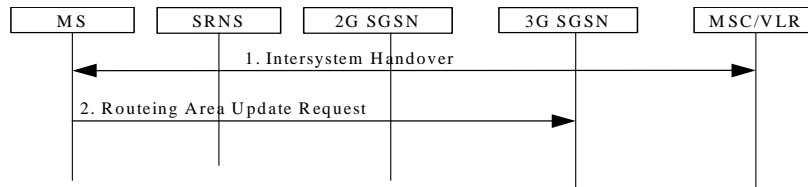The procedure for resume of GPRS traffic at intra SGSN case is illustrated in Figure 103.

Figure 103: Resume of GPRS traffic at intra SGSN

1) The MS in A/Gb mode class-B mode of operation during CS connection performs handover to CS/PS mode of operation in Iu mode;
   or the MS in class-A mode of operation capable of DTM performs handover during CS connection from a GSM cell not supporting DTM to a UMTS cell.

2) The MS shall resume GPRS services, directly after the CS handover is completed, by sending a Routeing Area Update Request message to the SGSN.~~,~~ The Update Type depends on the mode of operation of the network in use e.g. in mode I Combined RA/LA Update is made and in mode II Routeing Area Update is made.~~as described in subclause " Inter System Change Procedure".~~

16.2.1.3.2   Inter-SGSN Resume procedure

The procedure for resuming GPRS traffic at inter-SGSN case is illustrated in Figure 104.

Figure 104: Resume of GPRS traffic at inter SGSN

1) The MS in A/Gb mode class-B mode of operation during CS connection performs a handover to CS/PS mode of operation in Iu mode;
   or the MS in class-A mode of operation capable of DTM performs a handover during CS connection from a GSM cell not supporting DTM to a UMTS cell.

2) The MS shall resume GPRS services, directly after the CS handover is completed, by sending a Routeing Area Update Request message to the SGSN. The Update Type depends on the mode of operation of the network in use e.g. in mode I Combined RA/LA Update is made and in mode II Routeing Area Update is made.~~, as described in clause " Inter System Change Procedure".~~

CR-Form-v7

CHANGE REQUEST

| ⌘ | **23.060 CR** | **409** | ⌘ **rev** | **1** | ⌘ | Current version: | **5.2.0** | ⌘ |

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

Proposed change affects: UICC apps⌘ ☐   ME **X** Radio Access Network ☐ Core Network **X**

Title: ⌘	No MT calls after resumption of GPRS in Network Operation Mode I	
Source: ⌘	Vodafone Ltd,Nokia	
Work item code: ⌘	TEI5	**Date:** ⌘ 22/08/2002
Category: ⌘ **A**		**Release:** ⌘ Rel-5

Use <u>one</u> of the following categories:
   F (correction)
   A (corresponds to a correction in an earlier release)
   B (addition of feature),
   C (functional modification of feature)
   D (editorial modification)
Detailed explanations of the above categories can
be found in 3GPP TR 21.900.

Use <u>one</u> of the following releases:
   2   (GSM Phase 2)
   R96   (Release 1996)
   R97   (Release 1997)
   R98   (Release 1998)
   R99   (Release 1999)
   Rel-4 (Release 4)
   Rel-5 (Release 5)
   Rel-6 (Release 6)

Reason for change: ⌘	The current description in sub clause 16.2.1 "Suspension of GPRS Services" describing of how MS may resume GPRS services by sending a ROUTEING AREA UPDATE REQUEST message to SGSN, is contradicting with text in 6.3.1 "Administration of the SGSN –MSC/VLR Association". 6.3.1 clearly specifies that MS always perform combined procedures when camped on a cell in network operation mode I unless the MS is CS connected, while 16.2.1 can be interpreted to mean that to resume GPRS service only Routeing Area Update procedure is used. As the network operation mode is only known and configured in BSS/RAN the SGSN establishes/releases the Gs association based on the request type used in ROUTEING AREA UPDATE REQUEST message. Therefore the noncombined RA Update releases the association as specified in 6.3.1 for MS in class-B mode of operation.
Summary of change: ⌘	It is clarifed when MS resume GPRS services by sending a ROUTEING AREA UPDATE REQUEST message, the Update Type depends on the mode of operation of the network in use e.g. in mode I Combined RA/LA Update is made and in mode II or III Routeing Area Update is made.
Consequences if not approved: ⌘	If specifications are interpreted in different ways by MS and Network implementations, the administration of the SGSN-MSC/VLR association will not work. This can lead all subsequent MT calls (and CS domain SMSes) being lost until MS updates it's location using correct procedures.
Clauses affected: ⌘	6.9.1.3; 16.2.1

	Y	N			
Other specs affected:	⌘	X		Other core specifications	⌘	24.008
				Test specifications		
				O&M Specifications		
Other comments:	⌘					

6.9.1.3 Combined RA / LA Update Procedure

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 an IMSI attach, or when the MS has to indicate new access capabilities to the network, or when a suspended MS is not resumed by the BSS (see subclause "Suspension of GPRS Services"). 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 GSM 03.22), as no combined RA / LA updates are performed during a CS connection.

<p align="center">*************NEXT MODIFICATION **************</p>

16.2 Circuit-switched Services (A/Gb mode)

The ability for a GPRS user to access circuit-switched services depends on the subscription held, the network capabilities, and the MS capabilities. Interaction between GPRS and circuit-switched services is described in clause "Interactions Between SGSN and MSC/VLR".

16.2.1 Suspension of GPRS Services

The MS shall request the network for suspension of GPRS services when the MS or the network limitations make it unable to communicate on GPRS channels in one or more of the following scenarios:

1　When a GPRS-attached MS enters dedicated mode and the support of Class A mode of operation is not possible (e.g. the MS only supports DTM (see GSM 03.64) and the network only supports independent CS and PS).

2　During CS connection, the MS performs handover from Iu mode to A/Gb mode, and the MS or the network limitations make it unable to support CS/PS mode of operation, e.g. an MS in CS/PS mode of operation in Iu mode during a CS connection reverts to class-B mode of operation in A/Gb mode.

3　When an MS in class A mode of operation is handed over to a cell where the support of Class A mode of operation is not possible (e.g. a DTM mobile station entering a cell not supporting DTM).

16.2.1.1 Suspend and Resume procedure (A/Gb mode)

16.2.1.1.1 Intra-SGSN Suspend and Resume procedure

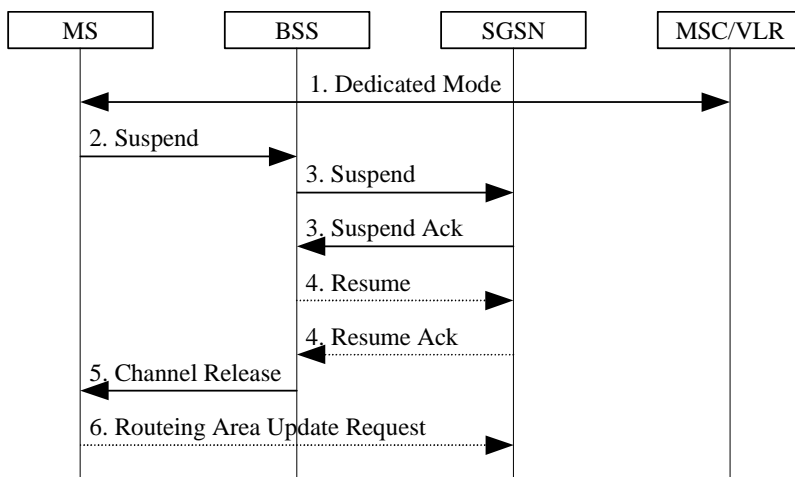The Suspend and Resume procedure for intra-SGSN is illustrated in Figure 99.

Figure 99: Suspend and Resume Procedure for intra SGSN

1) The MS enters dedicated mode and the MS or the network limitations make it unable to support Class A mode of operation, or during CS connection, a DTM MS performs handover from a cell supporting DTM to a cell not supporting DTM.

2) The MS sends an RR Suspend (TLLI, RAI) message to the BSS. The BSS may terminate any ongoing GPRS traffic for this TLLI.

3) The BSS sends a Suspend (TLLI, RAI) message to the SGSN, and the SGSN acknowledges by returning Suspend Ack. The BSS shall store TLLI and RAI in order to be able to request the SGSN to resume GPRS services when the MS leaves dedicated mode.

4) Eventually, the BSS may determine that the conditions for the GPRS suspension have disappeared. If the BSS is able to request the SGSN to resume GPRS services, the BSS shall send a Resume (TLLI, RAI) message to the SGSN. The SGSN acknowledges the successful outcome of the resume by returning Resume Ack.

5) If the circuit switched radio channel is to be released, the BSS sends an RR Channel Release (Resume) message to the MS. The Resume message indicates whether the BSS has successfully requested the SGSN to resume GPRS services for the MS, i.e., whether Resume Ack was received in the BSS before the RR Channel Release message was transmitted. The MS leaves dedicated mode.

6) The MS shall resume GPRS services by sending a Routeing Area Update Request message to the SGSN, as described in subclause "Routeing Area Update Procedure":

   - if the BSS did not successfully request the SGSN to resume GPRS services,

   - if the RR Channel Release message was not received before the MS left dedicated mode,

   - if the MS locally determines that the conditions for the GPRS suspension have disappeared

   The Update Type depends on the mode of operation of the network in use e.g. in mode I Combined RA/LA Update is made and in mode II or III Routeing Area Update is made.
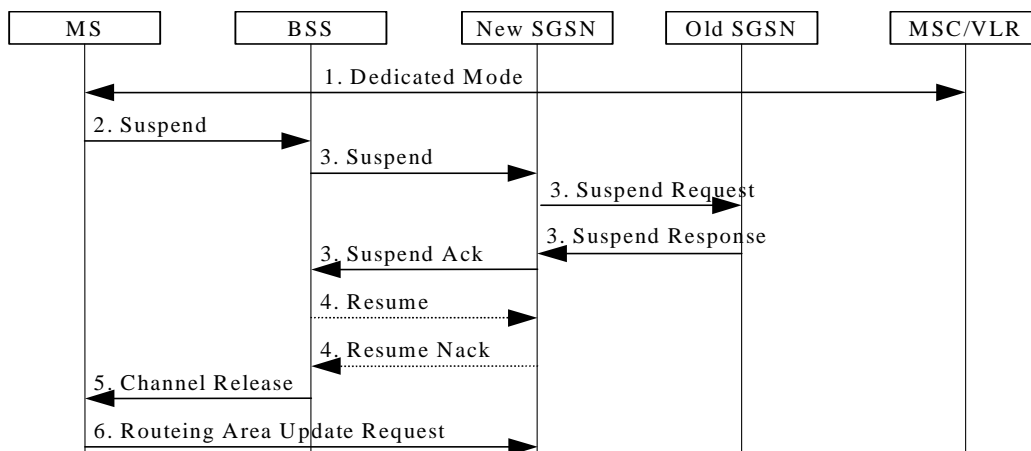
   The full handling of suspended MSs in the BSS and the SGSN is implementation dependent. Typically, the SGSN should not page suspended MSs.

If the MS performs an inter-BSC handover while suspended, the TLLI and RAI should be transferred as BSC-to-BSC information in the Handover Required and Handover Request messages, see GSM 08.08. This allows the new BSC to initiate the Resume request procedure to the SGSN. In the case where the BSC-to-BSC information was not transferred or not understood, the MS doesn't receive an indication that resumption has been successful, and the MS shall resume GPRS services by initiating a Routeing Area Update or Combined RA/LA Updating Request procedure as described in step 6.

16.2.1.1.2   Inter-SGSN Suspend and Resume procedure

The Suspend and Resume procedure for inter-SGSN is illustrated in Figure 100.

This describes the scenario where the old cell and the new cell are handled by different SGSN's, i.e. suspend message is received in an SGSN that is different from the SGSN currently handling the packet data transmission.
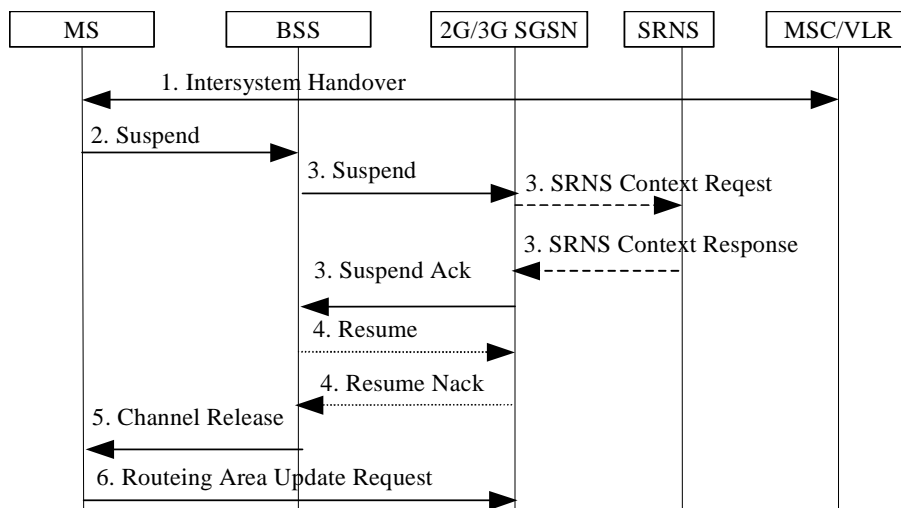
Figure 100: Suspend and Resume Procedure for inter-SGSN

1) During CS connection, a DTM MS performs handover from a cell supporting DTM to a cell not supporting DTM.

2) The MS sends an RR Suspend (TLLI, RAI) message to the BSS.

3) The BSS sends a Suspend (TLLI, RAI) message to the SGSN.

   - Since the SGSN that receives the Suspend message is not the one currently handling the packet data transmission, an indication to perform suspend will be sent to the old SGSN by means of a SUSPEND REQUEST message on the Gn interface. The address of the old SGSN is derived by "old RAI" received in Suspend message. If the SGSN that receives the Suspend message provides functionality for Intra Domain Connection of RAN Nodes to Multiple CN Nodes, the SGSN that receives the Suspend message from the BSS may derive the old SGSN from the old RAI and the old TLLI and send the Suspend Request message to this old SGSN. Otherwise, the SGSN that receives the Suspend message from the BSS derives the old SGSN from the old RAI. In any case the SGSN that receives the Suspend message from the BSS will derive an SGSN that it believes is the old SGSN. This derived SGSN is itself the old SGSN, or it is associated with the same pool area as the actual old SGSN and it will determine the correct old SGSN from the TLLI and relay the Suspend Request message to that actual old SGSN.

   - The Old SGSN returns a SUSPEND RESPONSE.

   - The new SGSN then returns Suspend Ack to the BSS.

4) After CS connection is terminated, the BSS may send a Resume (TLLI, RAI) message to the new SGSN, but since resume is not needed against the old SGSN, the new SGSN acknowledges the resume by Resume Nack. (Resume is not needed against the old SGSN since the MS in this case always will perform an RA Update for updating of GPRS services when the CS connection is terminated and the MM context will be moved from the old to the new SGSN.)

5) The BSS sends an RR Channel Release message to the MS, indicating that the BSS has not successfully requested the SGSN to resume GPRS services for the MS. The MS leaves dedicated mode.

6) The MS shall resume GPRS services by sending a Routeing Area Update Request message to the SGSN,. The Update Type depends on the mode of operation of the network in use e.g. in mode I Combined RA/LA Update is made and in mode II or III Routeing Area Update is made. as described in subclause "Routeing Area Update Procedure".

16.2.1.2 Inter-System Suspend and Resume procedure

16.2.1.2.1 Intra-SGSN Suspend and Resume procedure

The Suspend and Resume procedure for intra SGSN is illustrated in Figure 101.

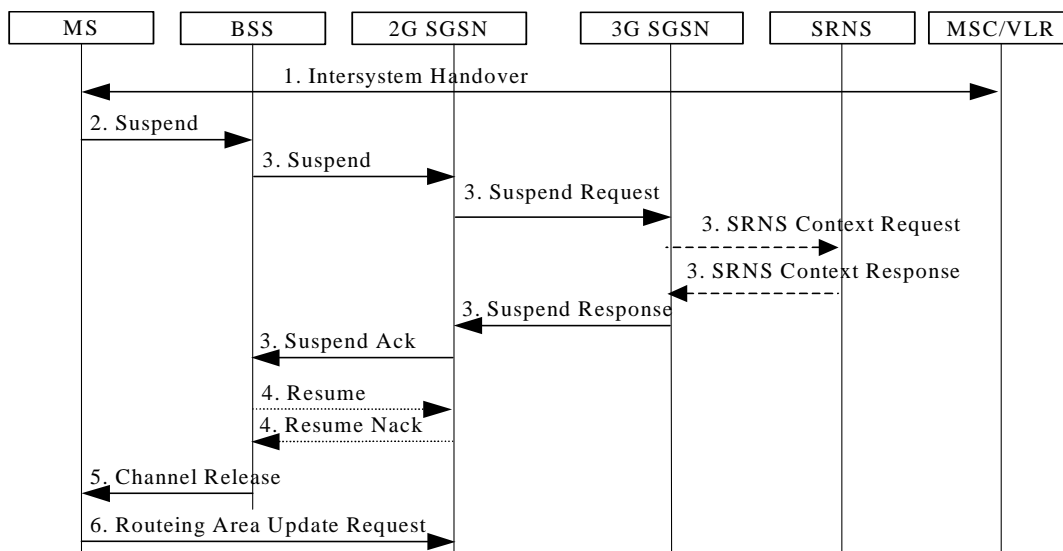**Figure 101: Suspend and Resume Procedure for intra-SGSN**

1) During CS connection, the MS performs handover from Iu mode to A/Gb mode and the MS or the network limitations are unable to support CS/PS mode of operation.

2) The MS sends an RR Suspend (TLLI, RAI) message to the BSS.

3) The BSS sends a Suspend (TLLI, RAI) message to the SGSN and:

   - The SGSN may request the SRNS to stop sending downlink PDU's by the SRNS Context Request message. The SRNS then starts buffering the downlink PDUs.

   - The SRNS responds with an SRNS Context Response message.

   - The SGSN then returns Suspend Ack to the BSS.

4) After CS connection is terminated, the BSS may send a Resume (TLLI, RAI) message to the SGSN, but resume is not possible since the MS has changed the radio system, so the SGSN acknowledges the resume by Resume Nack.

5) The BSS sends an RR Channel Release message to the MS, indicating that the BSS has not successfully requested the SGSN to resume GPRS services for the MS.

6) The MS shall resume GPRS services by sending a Routeing Area Update Request message to the SGSN. The Update Type depends on the mode of operation of the network in use e.g. in mode I Combined RA/LA Update is made and in mode II or III Routeing Area Update is made. as described in subclause "Inter System Change Procedure".

16.2.1.2.2   Inter-SGSN Suspend and Resume procedure

The Suspend and Resume procedure for inter SGSN is illustrated in Figure 102.

This describes the scenario when the suspend message is received in an SGSN that is different from the SGSN currently handling the packet data transmission and would be valid for at least the following cases:

   - MS performs inter-system handover from Iu mode to A/Gb mode during CS connection and the SGSN handling the A/Gb mode cell is different from the SGSN handling the Iu mode cell, i.e. the 2G and 3G SGSNs are separated.

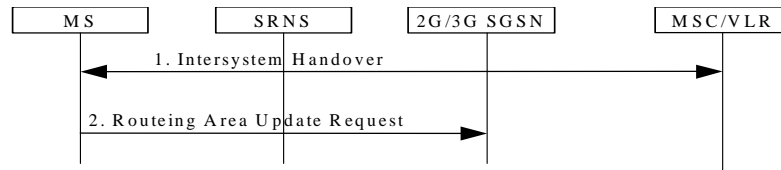**Figure 102: Suspend and Resume Procedure for inter-SGSN**

1) During CS connection, the MS performs handover from Iu mode to A/Gb mode, and the MS or the network limitations make it unable to support CS/PS mode of operation.

2) The MS sends an RR Suspend (TLLI, RAI) message to the BSS.

3) The BSS sends a Suspend (TLLI, RAI) message to the SGSN.

   - Since the SGSN that receives the Suspend message is not the one currently handling the packet data transmission, an indication to perform suspend will be sent to the 3G SGSN by means of a SUSPEND REQUEST message on the Gn interface. The address of the old SGSN is derived by "old RAI" received in the Suspend message. If the SGSN that receives the Suspend message provides functionality for Intra Domain Connection of RAN Nodes to Multiple CN Nodes, the SGSN that receives the Suspend message from the BSS may derive the old SGSN from the old RAI and the old TLLI and send the Suspend Request message to this old SGSN. Otherwise, the SGSN that receives the Suspend message from the BSS derives the old SGSN from the old RAI. In any case the SGSN that receives the Suspend message from the BSS will derive an SGSN that it believes is the old SGSN. This derived SGSN is itself the old SGSN, or it is associated with the same pool area as the actual old SGSN and it will determine the correct old SGSN from the TLLI and relay the Suspend Request message to that actual old SGSN.

   - The 3G SGSN may request the SRNS to stop sending downlink PDU's by the SRNS Context Request message. Upon reception of the SRNS Context Request message, the SRNS starts buffering the downlink PDUs.

   - The SRNS responds with an SRNS Context Response message.

   - The 3G SGSN return a SUSPEND RESPONSE.

   - The 2G SGSN then returns Suspend Ack to the BSS.

4) After CS connection is terminated, the BSS may send a Resume (TLLI, RAI) message to the 2G SGSN, but since resume is not needed against the 3G SGSN the 2G SGSN acknowledges the resume by Resume Nack. (Resume is not needed in this case since the MS always will perform an RA Update for updating of GPRS services when the CS connection is terminated and the MM context will be moved from 3G to 2G SGSN.)

5) The BSS sends an RR Channel Release message to the MS, indicating that the BSS has not successfully requested the SGSN to resume GPRS services for the MS.

6) The MS shall resume GPRS services by sending a Routeing Area Update Request message to the SGSN. The Update Type depends on the mode of operation of the network in use e.g. in mode I Combined RA/LA Update is made and in mode II or III Routeing Area Update is made., as described in subclause " Inter System Change Procedure".

16.2.1.3 Inter System Resume procedure

The resume procedure is only applicable in case of A/Gb mode to Iu mode handover.

16.2.1.3.1 Intra-SGSN Resume procedure

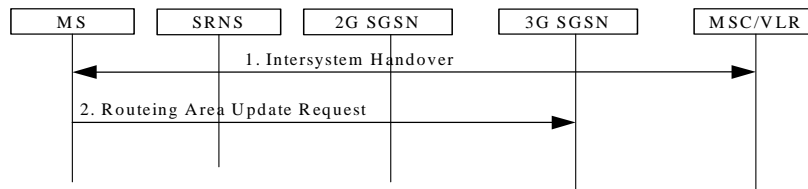The procedure for resume of GPRS traffic at intra SGSN case is illustrated in Figure 103.

```
  M S            S R N S          2G/3G SGSN          M SC/VLR
   |               |                  |                  |
   |<---------------------- 1. Intersystem Handover --------------------->|
   |               |                  |                  |
   |-------- 2. Routeing Area Update Request ----------->|                 |
   |               |                  |                  |
```

Figure 103: Resume of GPRS traffic at intra SGSN

1) The MS in A/Gb mode class-B mode of operation during CS connection performs handover to CS/PS mode of operation in Iu mode;
   or the MS in class-A mode of operation capable of DTM performs handover during CS connection from an A/Gb mode cell not supporting DTM to an Iu mode cell.

2) The MS shall resume GPRS services, directly after the CS handover is completed, by sending a Routeing Area Update Request message to the SGSN~~,~~. The Update Type depends on the mode of operation of the network in use e.g. in mode I Combined RA/LA Update is made and in mode II Routeing Area Update is made.~~as described in subclause " Inter System Change Procedure".~~

16.2.1.3.2 Inter-SGSN Resume procedure

The procedure for resuming GPRS traffic at inter-SGSN case is illustrated in Figure 104.

```
  M S         S R N S       2G SGSN       3G SGSN       M SC/VLR
   |            |              |             |             |
   |<------------------ 1. Intersystem Handover ----------------------->|
   |            |              |             |             |
   |---- 2. Routeing Area Update Request --->|             |
   |            |              |             |             |
```

Figure 104: Resume of GPRS traffic at inter SGSN

1) The MS in A/Gb mode class-B mode of operation during CS connection performs a handover to CS/PS mode of operation in Iu mode;
   or the MS in class-A mode of operation capable of DTM performs a handover during CS connection from an A/Gb mode cell not supporting DTM to an Iu mode cell.

2) The MS shall resume GPRS services, directly after the CS handover is completed, by sending a Routeing Area Update Request message to the SGSN. The Update Type depends on the mode of operation of the network in use e.g. in mode I Combined RA/LA Update is made and in mode II or Routeing Area Update is made.~~, as described in clause " Inter System Change Procedure".~~

CR-Form-v7

CHANGE REQUEST

| ⌘ | **23.060** CR **373** | ⌘ **rev** | **2** | ⌘ | Current version: | **3.12.0** | ⌘ |

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

Proposed change affects: UICC apps⌘ ☐   ME **X** Radio Access Network ☐ Core Network **X**

Title: ⌘	Clarification to preserved real-time PDP contexts RAB establishment	
Source: ⌘	Nokia	
Work item code: ⌘	TEI	**Date:** ⌘ 28/06/2002
Category: ⌘ **F**		**Release:** ⌘ R99

Use <u>one</u> of the following categories:
F (correction)
A (corresponds to a correction in an earlier release)
B (addition of feature),
C (functional modification of feature)
D (editorial modification)
Detailed explanations of the above categories can
be found in 3GPP TR 21.900.

Use <u>one</u> of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)

Reason for change: ⌘	In case of an Iu or RAB release the PDP contexts are preserved in the SGSN and GGSN. The associated RABs can be re-established at later stage. When PDP contexts using streaming or conversational traffic class are preserved in the core network, the maximum bit rate is dowgraded to 0 kbit/s (for uplink and downlink). Due to the fact that RANAP protocol does not allow to establish RABs with value of 0 kbit/s for the maximum bit rate (for both uplink and downlink), it needs to be clarified that to re-establish such RAB the MS shall start PDP Context Modification procedure (and upgrade max bit rate to correct value) or deactivate the PDP context.
Summary of change: ⌘	It is clarified: - that SGSN shall not establish RABs for PDP contexts with maximum bitrate for uplink and downlink of 0 kbit/s. - to re-establish such RAB the MS shall start PDP Context Modification procedure (and upgrade max bit rate to correct value) or deactivate the PDP context.
Consequences if not approved: ⌘	The current specification text does not describe how RABs can be re-established in the case of preserved PDP context with 0kbit/s for maximum bit rate (for uplink and downlink. This may result different implementations of ME and/or PS Core Network elements with incorrect and undesirable effects.

Clauses affected:	⌘	6.9.2.2.1-3; 6.12.1-2; 9.2.3.3-5; 9.2.4.1; 9.2.5.2; 12.7.4		

		Y	**N**			
Other specs affected:	⌘	X		Other core specifications	⌘	24.008
				Test specifications		
				O&M Specifications		

Other comments:	⌘		

6.9.2.2.1 SRNS Relocation Procedure

This procedure is only performed for an MS in PMM-CONNECTED state where the Iur interface carries both the control signalling and the user data.

The Serving SRNS Relocation procedure is used to move the UTRAN to CN connection point at the UTRAN side from the source SRNC to the target RNC, from a "standing still position". In the procedure, the Iu links are relocated. If the target RNC is connected to the same SGSN as the source SRNC, an Intra-SGSN SRNS Relocation procedure is performed. If the routeing area is changed, this procedure is followed by an Intra-SGSN Routeing Area Update procedure. 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 HLR about the new MS location.

Figure 1 shows SRNS relocation when source SRNC and target RNC are connected to different SGSNs. Figure 2 shows the situation after SRNS Relocation procedure and Routeing Area Update procedure have been completed. In the case described in Figure 1 and Figure 2, the MS is in state PMM-CONNECTED.
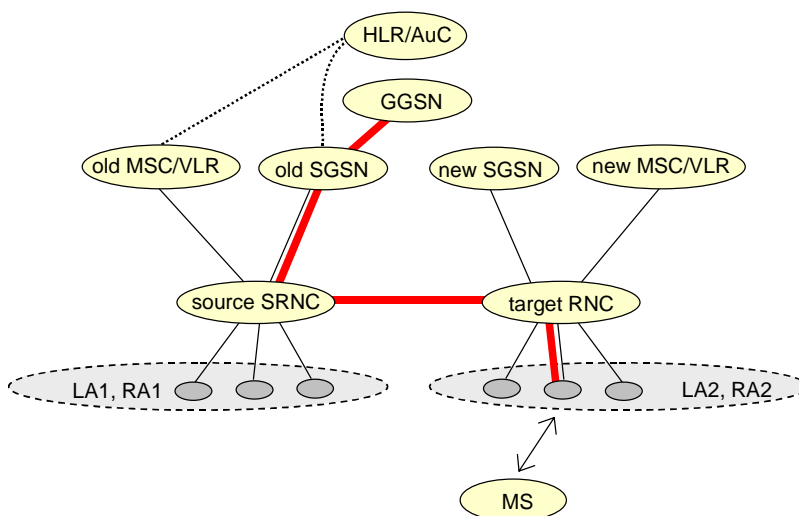
Figure 1: Before SRNS Relocation and Routeing Area Update

Before the Serving SRNS Relocation procedure and RA update, the MS is registered in the old SGSN. The source RNC is acting as a serving RNC (SRNC).
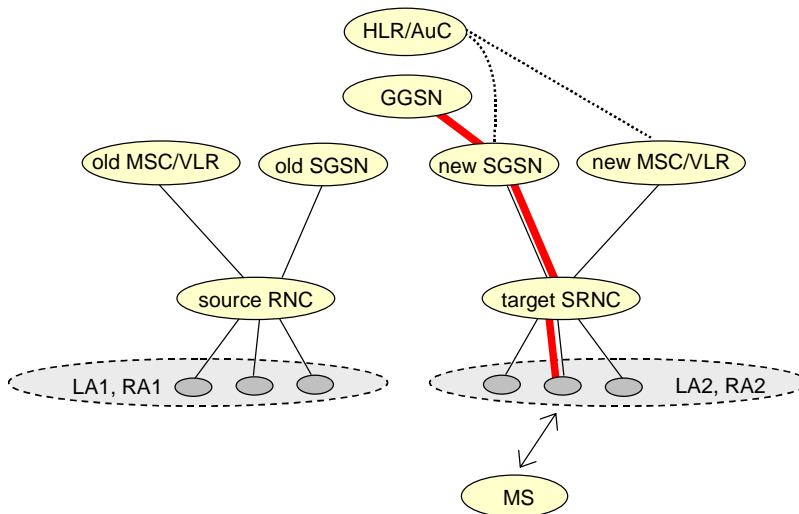
Figure 2: After SRNS Relocation and Routeing Area Update

After the Serving SRNS Relocation procedure and RA update, the MS is registered in the new SGSN The MS is in the state PMM-CONNECTED towards the new SGSN, and the target RNC is acting as the serving RNC.

The Serving SRNS Relocation procedure is illustrated in Figure 3. The sequence is valid for both intra-SGSN SRNS relocation and inter-SGSN SRNS relocation.
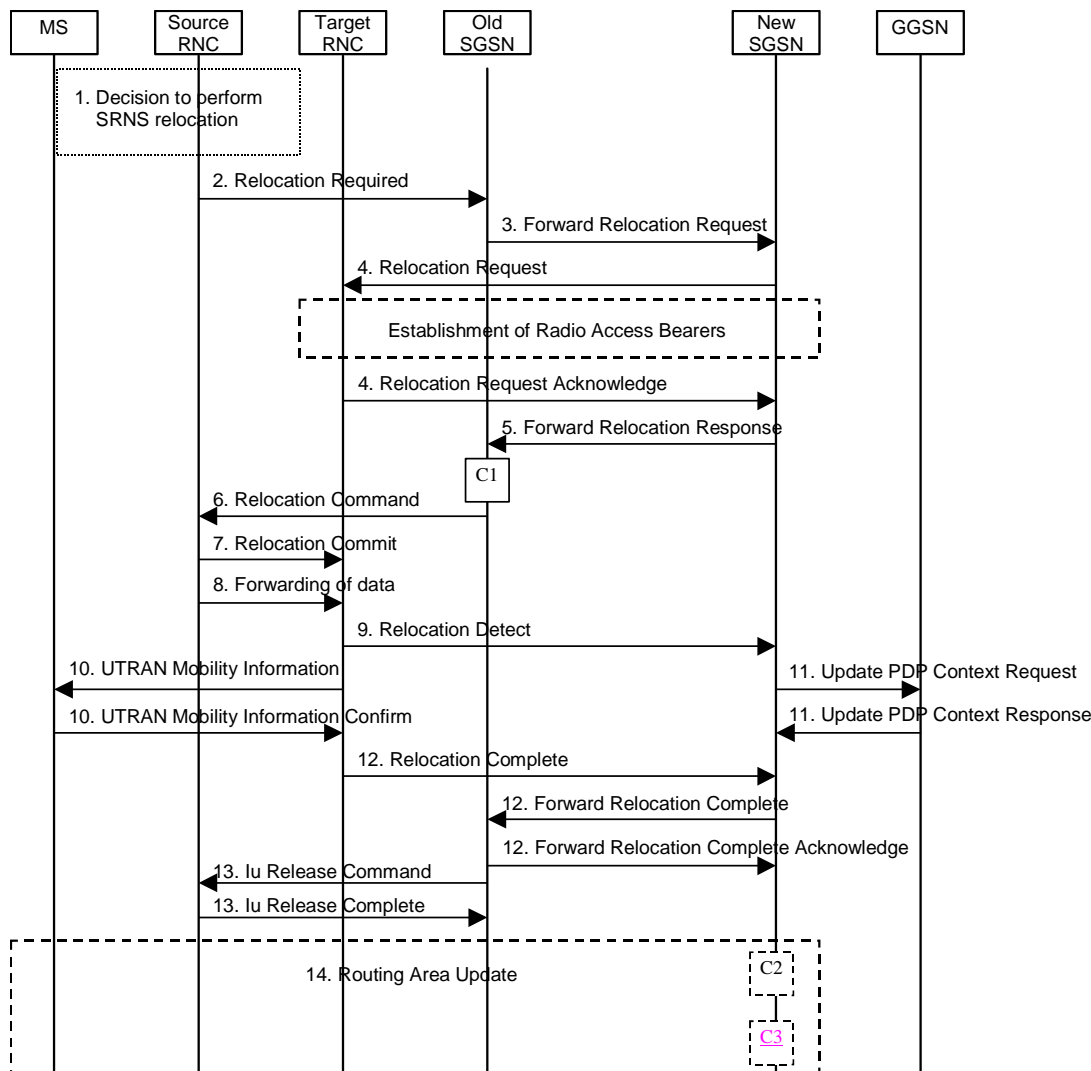

Figure 3: Serving SRNS Relocation Procedure

1) The source SRNC decides to perform/initiate SRNS relocation. At this point both uplink and downlink user data flows via the following tunnel(s): Radio Bearer between MS and source SRNC (data flows via the target RNC, which acts as a drift RNC); GTP-U tunnel(s) between source SRNC and old-SGSN; GTP-U tunnel(s) between old-SGSN and GGSN.

2) The source SRNC sends a Relocation Required message (Relocation Type, Cause, Source ID, Target ID, Source RNC to target RNC transparent container) to the old SGSN. The source SRNC shall set the Relocation Type to "UE not involved". The Source SRNC to Target RNC Transparent Container includes the necessary information for Relocation co-ordination, security functionality and RRC protocol context information (including MS Capabilities).

3) The old SGSN determines from the Target ID if the SRNS Relocation is intra-SGSN SRNS relocation or inter-SGSN SRNS relocation. In case of inter-SGSN SRNS relocation, the old SGSN initiates the relocation resource allocation procedure by sending a Forward Relocation Request message (IMSI, Tunnel Endpoint Identifier Signalling, MM Context, PDP Context, Target Identification, UTRAN transparent container, RANAP Cause) to the new SGSN. PDP context contains GGSN Address for User Plane and Uplink TEID for Data (to this GGSN

Address and Uplink TEID for Data, the old SGSN and the new SGSN send uplink packets). At the same time a timer is started on the MM and PDP contexts in the old SGSN (see the Routeing Area Update procedure in subclause "Location Management Procedures (UMTS only)"). The Forward Relocation Request message is applicable only in the case of inter-SGSN SRNS relocation.

4) The new SGSN sends a Relocation Request message (Permanent NAS UE Identity, Cause, CN Domain Indicator, Source RNC to target RNC transparent container, RABs to be setup) to the target RNC. Only the Iu Bearers of the RABs are setup between the target RNC and the new-SGSN as the existing Radio Bearers will be reallocated between the MS and the target RNC when the target RNC takes the role of the serving RNC. For each requested RAB, the RABs to be setup information elements shall contain information such as RAB ID, RAB parameters, Transport Layer Address, and Iu Transport Association. SGSN shall not establish RABs for PDP contexts with maximum bitrate for uplink and downlink of 0 kbit/s. The RAB ID information element contains the NSAPI value, and the RAB parameters information element gives the QoS profile. The Transport Layer Address is the SGSN Address for user data, and the Iu Transport Association corresponds to the uplink Tunnel Endpoint Identifier Data. After all necessary resources for accepted RABs including the Iu user plane are successfully allocated; the target RNC shall send the Relocation Request Acknowledge message (RABs setup, RABs failed to setup) to the new SGSN. Each RAB to be setup is defined by a Transport Layer Address, which is the target RNC Address for user data, and an Iu Transport Association, which corresponds to the downlink Tunnel Endpoint Identifier for user data. For each RAB to be set up, the target RNC may receivesimultaneously downlink user packets both from the source SRNC and from the new SGSN.

After the new SGSN receives the Relocation Request Acknowledge message, the GTP-U tunnels are established between the target RNC and the new-SGSN.

****NEXT MODIFIED SECTION *******

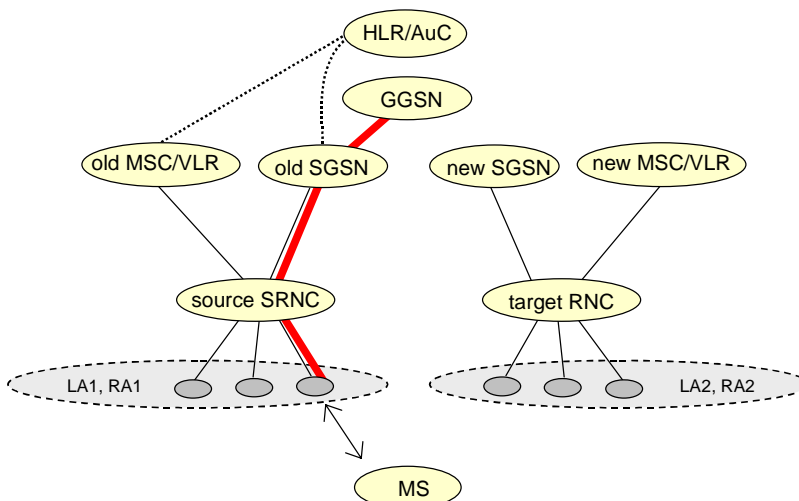### 6.9.2.2.2   Combined Hard Handover and SRNS Relocation Procedure

This procedure is only performed for an MS in PMM-CONNECTED state in case the Iur interface is not available.

The Combined Hard Handover and SRNS Relocation procedure is used to move the UTRAN to CN connection point at the UTRAN side from the source SRNC to the target RNC, while performing a hard handover decided by the UTRAN. In the procedure, the Iu links are relocated. If the target RNC is connected to the same SGSN as the source SRNC, an Intra-SGSN SRNS Relocation procedure is performed. If the routeing area is changed, this procedure is followed by an Intra-SGSN Routeing Area Update procedure. 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 HLR about the new MS location.

If the target RNC is connected to a different SGSN than the source SRNC, an Inter-SGSN SRNS Relocation procedure is performed. This procedure is followed by an Inter-SGSN Routeing Area Update procedure.

Figure 4shows the situation before a Combined Hard Handover and SRNS Relocation procedure when source and target RNC are connected to different SGSNs. Figure 5shows the situation after the Combined Hard Handover and SRNS Relocation procedure and RA update procedure have been completed. In the case described in Figure 4 and Figure 5 the MS is in PMM-CONNECTED state.

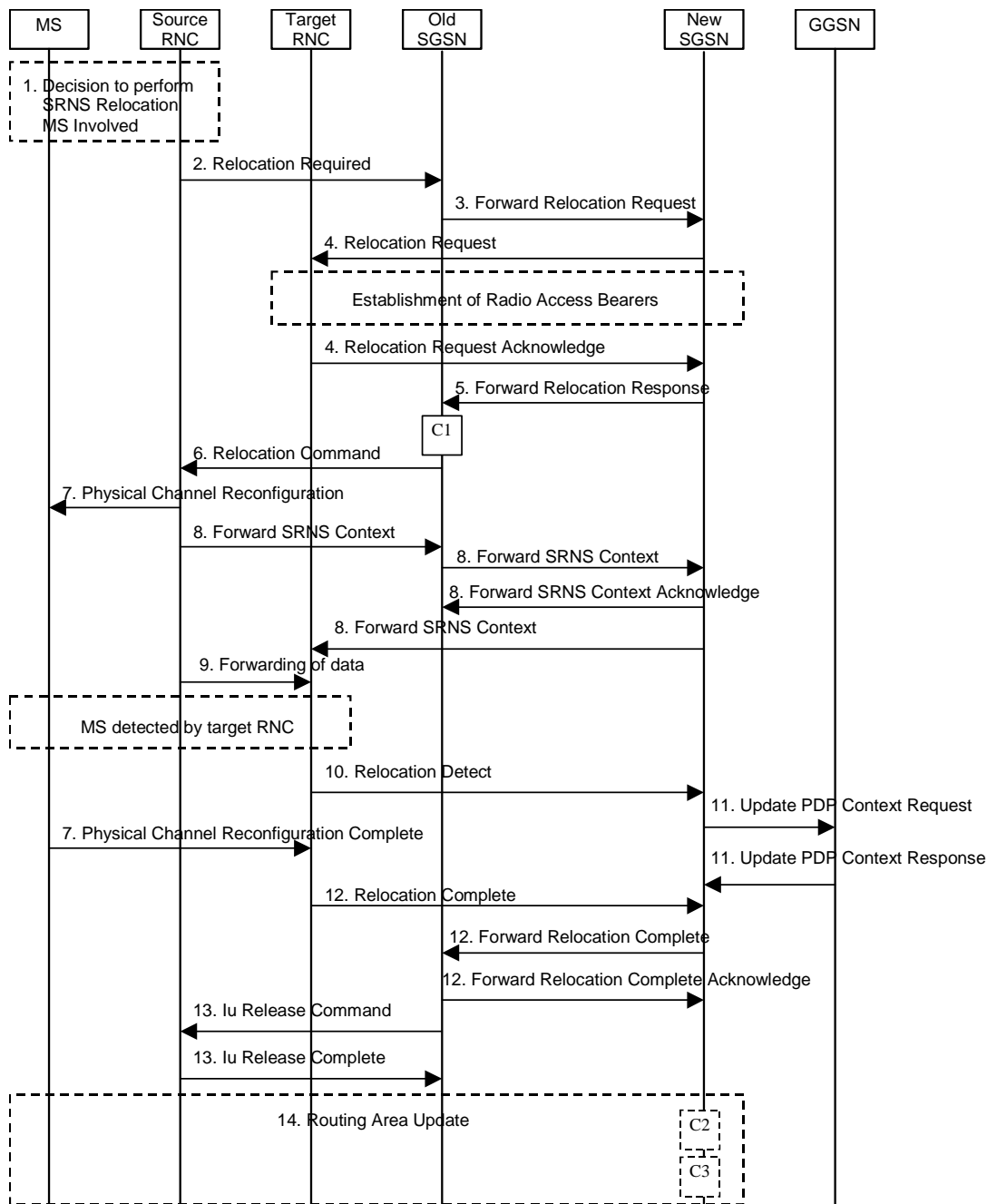**Figure 4: Before Combined Hard Handover and SRNS Relocation and Routeing Area Update**

Before the SRNS Relocation and Routeing Area Update the MS is registered in the old SGSN and in the old MSC/VLR. The source RNC is acting as serving RNC.
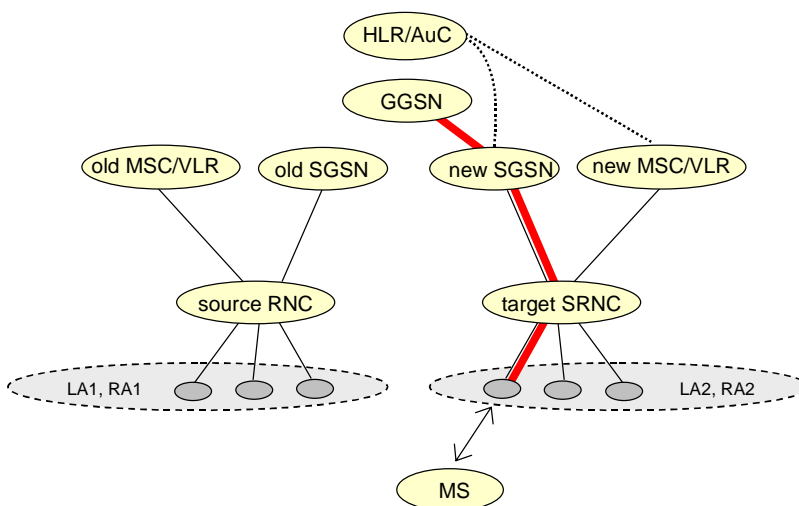
Figure 5: After Combined Hard Handover and SRNS Relocation and Routeing Area Update

After the SRNS relocation and RA update, the MS is registered in the new SGSN and in the new MSC/VLR. The MS is in state PMM-CONNECTED towards the new SGSN and in MM IDLE state towards the new MSC/VLR. The target RNC is acting as serving RNC.

The Combined Hard Handover and SRNS Relocation procedure for the PS domain is illustrated in Figure 6. The sequence is valid for both intra-SGSN SRNS relocation and inter-SGSN SRNS relocation.

Figure 6: Combined Hard Handover and SRNS Relocation Procedure

1) Based on measurement results and knowledge of the UTRAN topology, the source SRNC decides to initiate a combined hard handover and SRNS relocation. At this point both uplink and downlink user data flows via the following tunnel(s): Radio Bearer between the MS and the source SRNC (no drift RNC available); GTP-U tunnel(s) between the source SRNC and the old SGSN; GTP-U tunnel(s) between the old SGSN and the GGSN.

2) The source SRNC sends a Relocation Required message (Relocation Type, Cause, Source ID, Target ID, Source RNC To Target RNC Transparent Container) to the old SGSN. The source SRNC shall set Relocation Type to "UE Involved". Source RNC To Target RNC Transparent Container includes the necessary information for relocation co-ordination, security functionality and RRC protocol context information (including MS Capabilities).

3) The old SGSN determines from the Target ID if the SRNS relocation is intra-SGSN SRNS relocation or inter-SGSN SRNS relocation. In case of inter-SGSN SRNS relocation the old SGSN initiates the relocation resource allocation procedure by sending a Forward Relocation Request message (IMSI, Tunnel Endpoint Identifier Signalling, MM Context, PDP Context, Target Identification, UTRAN Transparent Container, RANAP Cause) to the new SGSN. PDP context contains GGSN Address for User Plane and Uplink TEID for Data (to this GGSN Address and Uplink TEID for Data, the old SGSN and the new SGSN send uplink packets). At the same time a timer is started on the MM and PDP contexts in the old SGSN (see Routeing Area Update procedure in subclause "Location Management Procedures (UMTS only)"). The Forward Relocation Request message is applicable only in case of inter-SGSN SRNS relocation

4) The new SGSN sends a Relocation Request message (Permanent NAS UE Identity, Cause, CN Domain Indicator, Source RNC To Target RNC Transparent Container, RABs To Be Setup) to the target RNC. For each requested RAB, RABs To Be Setup shall contain information such as RAB ID, RAB parameters, Transport Layer Address, and Iu Transport Association. SGSN shall not establish RABs for PDP contexts with maximum bitrate for uplink and downlink of 0 kbit/s. The RAB ID information element contains the NSAPI value, and the RAB parameters information element gives the QoS profile. The Transport Layer Address is the SGSN Address for user data, and the Iu Transport Association corresponds to the uplink Tunnel Endpoint Identifier Data.

After all the necessary resources for accepted RABs including the Iu user plane are successfully allocated, the target RNC shall send the Relocation Request Acknowledge message (Target RNC To Source RNC Transparent Container, RABs Setup, RABs Failed To Setup) to the new SGSN. Each RAB to be setup is defined by a Transport Layer Address, which is the target RNC Address for user data, and the Iu Transport Association, which corresponds to the down-link Tunnel Endpoint Identifier for user data. The transparent container contains all radio-related information that the MS needs for the handover, i.e., a complete RRC message (e.g., Physical Channel Reconfiguration) to be sent transparently via CN and source SRNC to the MS. For each RAB to be set up, the target RNC may receive simultaneously downlink user packets both from the source SRNC and from the new SGSN.

After the new SGSN receives the Relocation Request Acknowledge message, the GTP-U tunnel(s) are established between the target RNC and the new SGSN. However at this point, the target RNC has not yet established the Radio Bearer(s) with the MS yet.

****NEXT MODIFIED SECTION ******

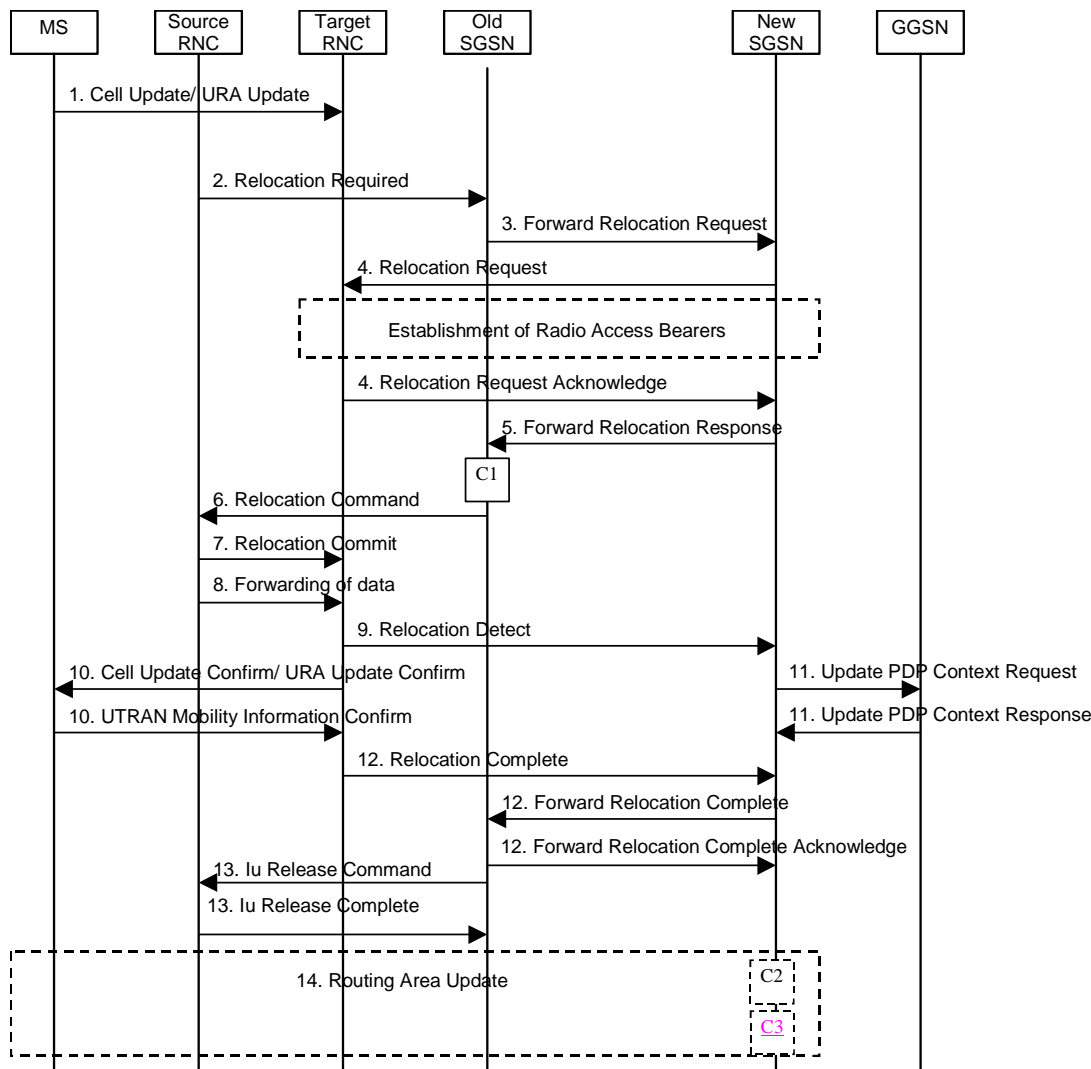## 6.9.2.2.3 Combined Cell / URA Update and SRNS Relocation Procedure

This procedure is only performed for an MS in PMM-CONNECTED state, where the Iur interface carries control signalling but no user data.

The Combined Cell / URA Update and SRNS Relocation procedure is used to move the UTRAN to CN connection point at the UTRAN side from the source SRNC to the target RNC, while performing a cell re-selection in the UTRAN. In the procedure, the Iu links are relocated. If the target RNC is connected to the same SGSN as the source SRNC, an Intra-SGSN SRNS Relocation procedure is performed. If the routeing area is changed, this procedure is followed by an Intra-SGSN Routeing Area Update procedure. 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 HLR about the new MS location.

Before the Combined Cell / URA Update and SRNS Relocation and the Routeing Area Update, the MS is registered in the old SGSN. The source RNC is acting as serving RNC.

After the Combined Cell / URA Update and SRNS Relocation and the Routeing Area Update, the MS is registered in the new SGSN. The MS is in state PMM-CONNECTED towards the new SGSN, and the target RNC is acting as serving RNC.

The Combined Cell / URA Update and SRNS Relocation procedure for the PS domain is illustrated in Figure 7. The sequence is valid for both intra-SGSN SRNS relocation and inter-SGSN SRNS relocation.

Figure 7: Combined Cell / URA Update and SRNS Relocation Procedure

1) The MS sends a Cell Update / URA Update message to the source SRNC (if the cell is located under another RNC the message is routed via the DRNC to SRNC over the Iur). The source SRNC decides whether or not to perform a combined cell / URA update and SRNS relocation towards the target RNC. The rest of this subclause describes the case where a combined cell / URA update and SRNS relocation applies. In this case no radio bearer is established between the source SRNC and the UE. Nonetheless the following tunnel(s) are established: GTP-U tunnel(s) between source SRNC and old-SGSN; GTP-U tunnel(s) between old-SGSN and GGSN.

2) The source SRNC sends a Relocation Required message (Relocation Type, Cause, Source ID, Target ID, Source RNC to Target RNC Transparent Container) to the old SGSN. The source SRNC shall set Relocation Type to "UE not involved". Source RNC to Target RNC Transparent Container includes the necessary information for Relocation co-ordination, security functionality, and RRC protocol context information (including MS Capabilities).

3) The old SGSN determines from the Target ID if the SRNS Relocation is intra-SGSN SRNS relocation or inter-SGSN SRNS relocation. In the case of inter-SGSN SRNS relocation the old SGSN initiates the relocation resource allocation procedure by sending a Forward Relocation Request (IMSI, Tunnel Endpoint Identifier Signalling, MM Context, PDP Context, Target Identification, UTRAN Transparent Container, RANAP Cause) message to the new SGSN. PDP context contains GGSN Address for User Plane and Uplink TEID for Data (to this GGSN Address and Uplink TEID for Data, the old SGSN and the new SGSN send uplink packets). At the

same time a timer is started on the MM and PDP contexts in the old SGSN, see Routeing Area Update procedure in subclause "Location Management Procedures (UMTS only)". The Forward Relocation Request message is applicable only in case of inter-SGSN SRNS relocation.

4) The new SGSN sends a Relocation Request message (Permanent NAS UE Identity, Cause, CN Domain Indicator, Source RNC to Target RNC Transparent Container, RABs To Be Setup) to the target RNC. For each requested RAB, RABs To Be Setup shall contain information such as RAB ID, RAB parameters, Transport Layer Address, and Iu Transport Association. SGSN shall not establish RABs for PDP contexts with maximum bitrate for uplink and downlink of 0 kbit/s. The RAB ID information element contains the NSAPI value, and the RAB parameters information element gives the QoS profile. The Transport Layer Address is the SGSN Address for user data, and the Iu Transport Association corresponds to the uplink Tunnel Endpoint Identifier Data.
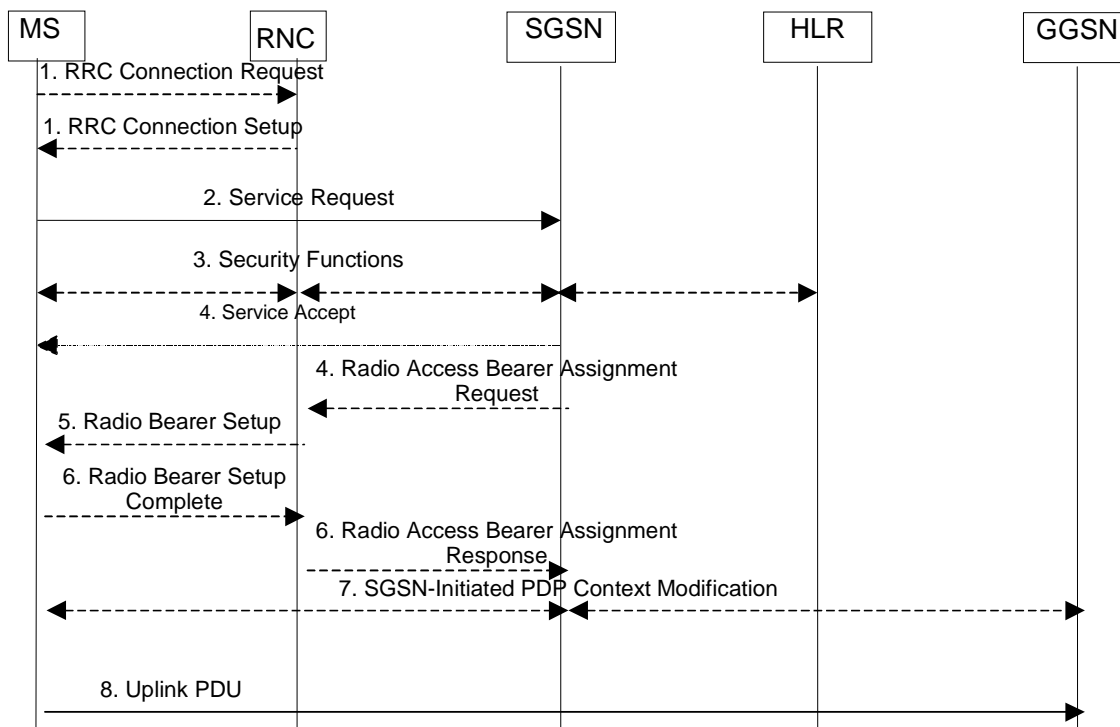
After successful allocation of all necessary resources for accepted RABs including the Iu user plane, the target RNC shall send the Relocation Request Acknowledge message (RABs setup, RABs failed to setup) to the new SGSN. Each RAB to be setup is defined by a Transport Layer Address, which is the target RNC Address for user data, and an Iu Transport Association, which corresponds to the downlink Tunnel Endpoint Identifier for user data. For each RAB to be set up, the target-RNC may receive simultaneously downlink user packets both from the source SRNC and from the new SGSN.

After the new SGSN receives the Relocation Request Acknowledge message, the GTP-U tunnels are established between the target RNC and the new-SGSN.

<div align="center">****NEXT MODIFIED SECTION *******</div>

6.12.1   MS Initiated Service Request Procedure

The MS in PMM-IDLE state sends the Service Request message to the 3G-SGSN in order to establish the PS signalling connection for the upper layer signalling or for the resource reservation for active PDP context(s). After receiving the Service Request message, the 3G-SGSN may perform authentication, and it shall perform the security mode procedure. After the establishment of the secure PS signalling connection to a 3G-SGSN, the MS may send signalling messages, e.g., Activate PDP Context Request, to the 3G-SGSN, or the 3G-SGSN may start the resource reservation for the active PDP contexts depending on the requested service in the Service Request message. An MS in PMM-CONNECTED state also requests the resource reservation for the active PDP contexts through this procedure.
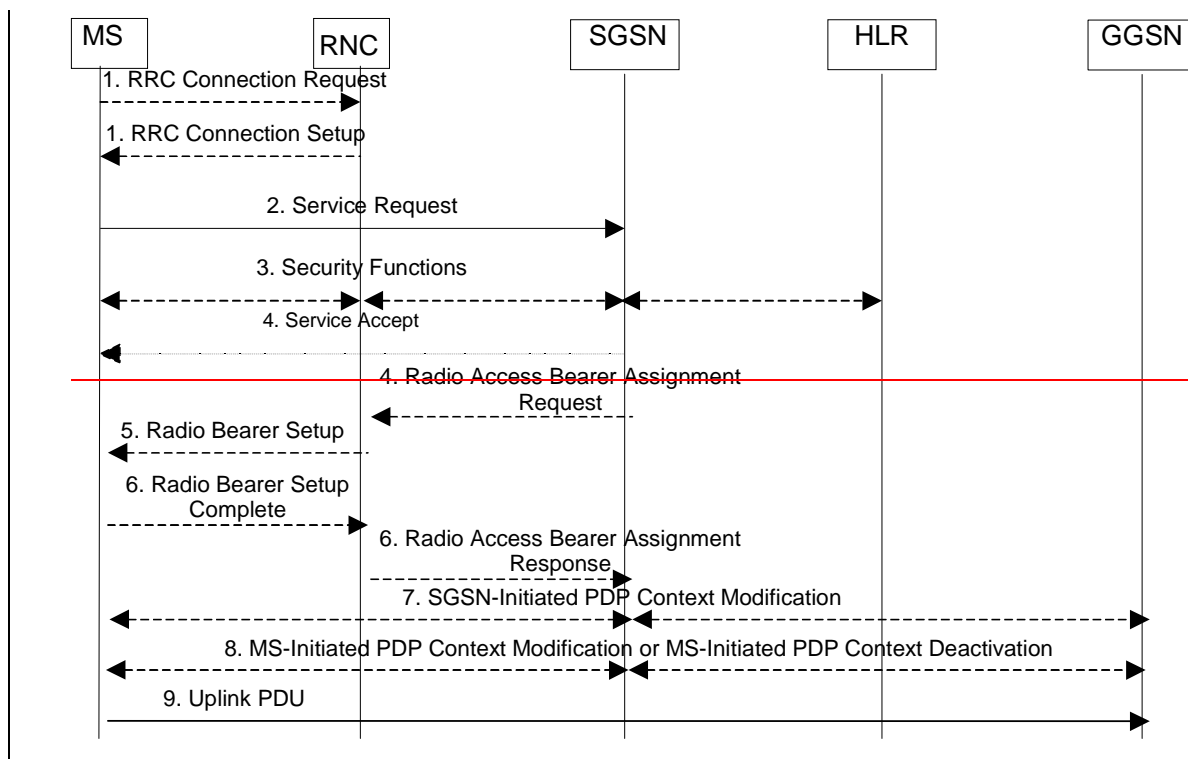
Figure 8: MS Initiated Service Request Procedure

1) The MS establishes an RRC connection, if none exists for CS traffic.

2) The MS sends 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. At this point, the SGSN may perform the authentication procedure.

   If Service Type indicates Data, a signalling connection is established between the MS and the SGSN, and resources for active PDP context(s) are allocated, i.e., RAB establishment for the activated PDP context(s).

   If Service Type indicates Signalling, the signalling connection is established between the MS and the SGSN for sending upper-layer signalling messages, e.g., Activate PDP Context Request. The resources for active PDP context(s) are not allocated.

3) The SGSN shall perform the security functions if the MS in PMM-IDLE state initiated the service request.

4) If the network is in PMM-CONNECTED state and the Service Type indicates Data, the SGSN shall respond with a Service Accept message towards the MS, in case the service request can be accepted. In case Service Type indicates Data, the SGSN sends a Radio Access Bearer Assignment Request (NSAPIRAB ID(s), TEID(s), QoS Profile(s), SGSN IP Address(es)) message to re-establish radio access bearer for every activated PDP context, except the ones having maximum bit rates for uplink and downlink of 0 kbit/s.

5) The RNC indicates to the MS the new Radio Bearer Identity established and the corresponding RAB ID with the RRC radio bearer setup procedure.

6) SRNC responds with the Radio Access Bearer Assignment Response (RAB ID(s), TEID(s), QoS Profile(s), RNC IP Address(es)) message. The GTP tunnel(s) are established on the Iu interface. If the RNC returns a Radio Access Bearer Assignment Response message with a cause indicating that the requested QoS profile(s) can not be provided, e.g., "Requested Maximum Bit Rate not Available", the SGSN may send a new Radio Access Bearer Assignment Request message with different QoS profile(s). The number of re-attempts, if any, as well as how the new QoS profile(s) values are determined is implementation dependent.

7) For each RAB re-established with a modified QoS profile, the SGSN initiates a PDP Context Modification procedure to inform the MS and the GGSN of the new negotiated QoS profile for the corresponding PDP context.

8) For each RAB using streaming or conversational traffic class with maximum bit rate of 0 kbit/s (e.g. after 'RNC-Initiated PDP Context Modification Procedure'), the MS starts the MS-Initiated PDP Context Modification procedure or the MS-Initiated PDP Context Deactivation procedure to inform the CN whether to re-activate or to delete the PDP contexts.

89) The MS sends the uplink packet.

For Service Type = Signalling, the MS knows that the Service Request message was successfully received in the SGSN when the MS receives the RRC Security Mode Control Command message.

For Service Type = Data, in PMM-IDLE, the MS knows that the Service Request was successfully received when the MS receives the RRC Security Mode Control Command message from the RNC; in PMM-CONNECTED state, the MS knows that the Service Request was successfully received when the MS receives the Service Accept message.

NOTE: The reception of the Service Accept message does not imply the successful re-establishment of the RAB(s).
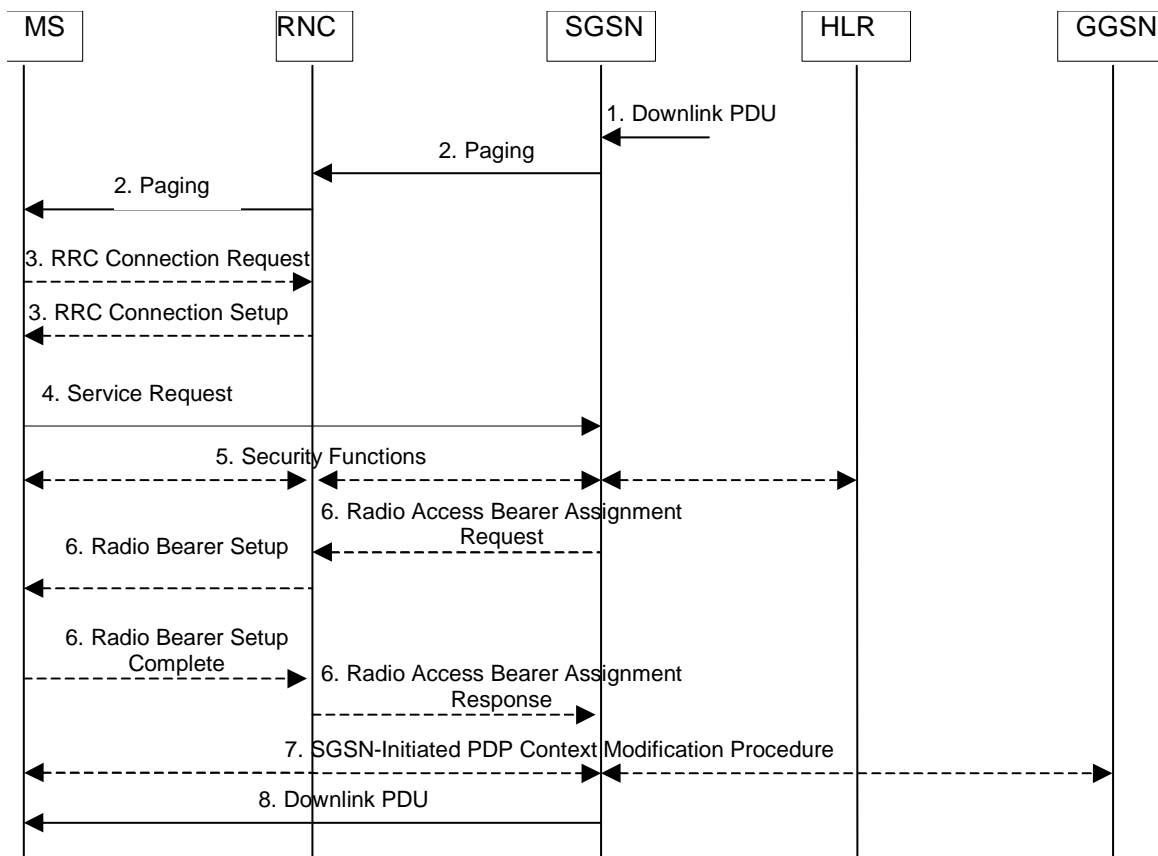
For any Service Type, in case the service request cannot be accepted, the network returns a Service Reject message to the MS with an appropriate cause value.

For Service Type = Data, in case the SGSN fails to re-establish RAB(s) for the PDP context(s), the SGSN determines if an SM procedure, such as SGSN-Initiated PDP Context Modification or PDP Context Deactivation, should be initiated. The appropriate action depends on the QoS profile of the PDP context and is an operator choice.

For each PDP context using streaming or conversational traffic class with maximum bit rate for uplink and downlink of 0 kbit/s the MS starts the MS-Initiated PDP Context Modification procedure or the MS-Initiated PDP Context Deactivation procedure to inform the SGSN whether to re-activate or to delete the PDP contexts. If the PDP context has been deactivated locally in the MS, the MS shall not perform the PDP context deactivation procedure for this PDP context because the list of active and inactive PDP contexts is included in the Service Request Message sent prior to the network.

6.12.2   Network Initiated Service Request Procedure

When the 3G-SGSN receives a downlink packet (e.g., Request PDP Context Activation, MT SMS, user data) for an MS in PMM-IDLE state, the 3G-SGSN sends a paging request to UTRAN. The paging request triggers the Service Request procedure in the MS.

Figure 9: Network Initiated Service Request Procedure

1) The SGSN receives a downlink PDP PDU for an MS in PMM-IDLE state.

2) The SGSN sends a Paging message to the RNC. The RNC pages the MS by sending a Paging message to the MS. See subclause "PS Paging Initiated by 3G-SGSN without RRC Connection for CS" for details.

3) The MS establishes an RRC connection if none exists for CS traffic.

4) The MS sends a Service Request (P-TMSI, RAI, CKSN, Service Type) message to the SGSN. Service Type specifies Paging Response. The Service Request is carried over the radio in an RRC Direct Transfer message and over the Iu interface in the RANAP Initial MS message. At this point, the SGSN may perform the authentication procedure. The SGSN knows whether the downlink packet requires RAB establishment (e.g., downlink PDU) or not (e.g., Request PDP Context Activation or MT SMS).

5) The SGSN shall perform the security mode procedure.

6) If resources for the PDP contexts are re-established, the SGSN sends a Radio Access Bearer Assignment Request (RAB ID(s), TEID(s), QoS Profile(s), SGSN IP Address(es)) message to the RNC. The RNC sends a Radio Bearer Setup (RAB ID(s)) to the MS. The MS responds by returning a Radio Bearer Setup Complete message to the RNC. The RNC sends a Radio Access Bearer Assignment Response (RAB ID(s), TEID(s), RNC IP Address(es)) message to the SGSN in order to indicate that GTP tunnels are established on the Iu interface and radio access bearers are established between the RNC and the MS. If the RNC returns a Radio Access Bearer Assignment Response message with a cause indicating that the requested QoS profile(s) can not be provided, e.g., "Requested Maximum Bit Rate not Available", the SGSN may send a new Radio Access Bearer Assignment Request message with different QoS profile(s). The number of re-attempts, if any, as well as how the new QoS profile(s) values are determined is implementation dependent.

7) For each RAB re-established with a modified QoS profile, the SGSN initiates a PDP Context Modification procedure to inform the MS and the GGSN of the new negotiated QoS profile for the corresponding PDP context.
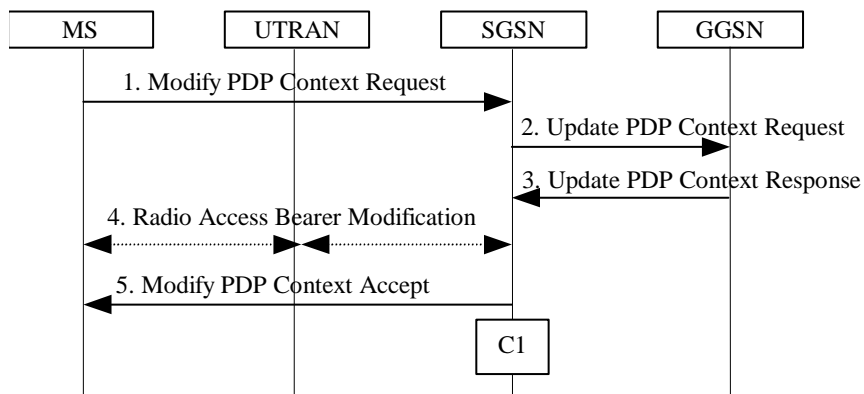
8) The SGSN sends the downlink packet.

For Service Type = Page Response, the MS knows that the Service Request message was successfully received in the SGSN when the MS receives the RRC Security Mode Control Command message.

In the case the SGSN fails to re-establish RAB(s) for the PDP context(s), the SGSN determines if an SM procedure, such as SGSN-Initiated PDP Context Modification or PDP Context Deactivation, should be initiated. The appropriate action depends on the QoS profile of the PDP context and is an operator choice.

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*****NEXT MODIFIED SECTION *******
</div>

9.2.3.3 MS-Initiated PDP Context Modification Procedure

The MS-Initiated PDP Context Modification procedure is illustrated in Figure 10.

Figure 10: MS-Initiated PDP Context Modification Procedure

1) The MS sends a Modify PDP Context Request (TI, QoS Requested, TFT) message to the SGSN. Either QoS Requested or TFT or both may be included. QoS Requested indicates the desired QoS profile, while TFT indicates the TFT that is to be added or modified or deleted from the PDP context.

2) The SGSN may restrict the desired QoS profile given its capabilities, the current load, and the subscribed QoS profile. The SGSN sends an Update PDP Context Request (TEID, NSAPI, QoS Negotiated, TFT) message to the GGSN. If QoS Negotiated and/or TFT received from the SGSN is incompatible with the PDP context being modified (e.g., TFT contains inconsistent packet filters), the GGSN rejects the Update PDP Context Request. The GGSN operator configures the compatible QoS profile.

3) The GGSN may further restrict QoS Negotiated given its capabilities and the current load. The GGSN stores QoS Negotiated, stores, modifies, or deletes TFT of that PDP context as indicated in TFT, and returns an Update PDP Context Response (TEID, QoS Negotiated) message.

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

5) The SGSN selects Radio Priority and Packet Flow Id based on QoS Negotiated, and returns a Modify PDP Context Accept (TI, QoS Negotiated, Radio Priority, Packet Flow Id) message to the MS.

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

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

C1) CAMEL_GPRS_Change_Of_QoS.

The procedure returns as result "Continue".

9.2.3.4 RNC-Initiated PDP Context Modification Procedure

The RNC can request the release of the Iu connection (see subclause "Iu Release Procedure") e.g., due to a break of the radio connection or due to user inactivity. After Iu Release the PDP contexts are modified as follows:

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

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

The following procedures shall be performed in the MS when radio coverage is lost:

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

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

9.2.3.5 RAB Release-Initiated Local PDP Context Modification Procedure

The RNC can request a RAB to be released through the RAB Release procedure ~~on the streaming or conversational traffic class bearers~~ without releasing the Iu connection ~~when there is a break in the radio connection~~. After the RAB(s) release the SGSN shall modify the PDP context as follows.

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

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

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

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

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

At this point or at a later stage, the MS may start a PDP Context Deactivation procedure or PDP Context Modification procedure. ~~After coverage is regained the MS should~~ The MS shall use the PDP Context Modification procedure to re-activate the PDP context and re-establish the RAB ~~(refer to section "Re-establishment of RABs")~~.

~~The radio access bearer shall be released by the RNC only when RRC re-establishment is not any longer possible. Therefore the change happens simultaneously in the MS and in the SGSN.~~

****NEXT MODIFIED SECTION *******

9.2.4.1 MS Initiated PDP Context Deactivation Procedure

The MS Initiated PDP Context Deactivation procedures for GSM and UMTS are illustrated in Figure 11 and Figure 12, respectively.
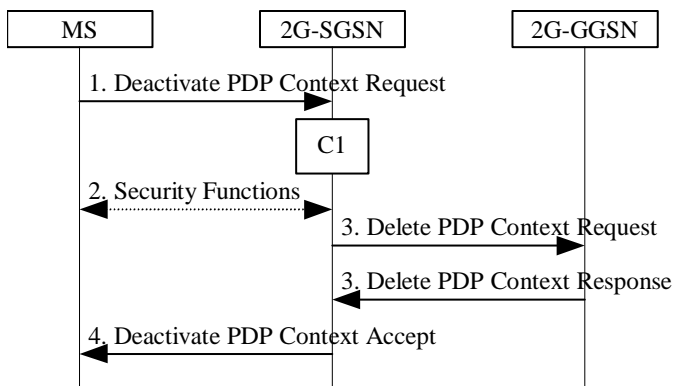
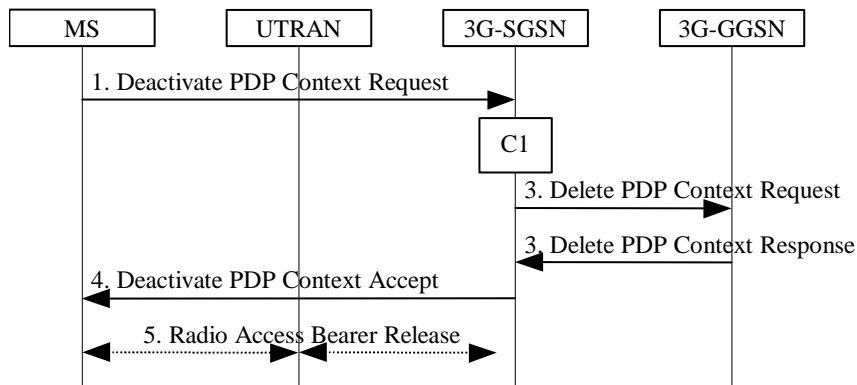**Figure 11: MS Initiated PDP Context Deactivation Procedure for GSM**

Figure 12: MS Initiated PDP Context Deactivation Procedure for UMTS

1) The MS sends a Deactivate PDP Context Request (TI, Teardown Ind) message to the SGSN.

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

3) The SGSN sends a Delete PDP Context Request (TEID, NSAPI, Teardown Ind) message to the GGSN. If the MS in the Deactivate PDP Context Request message included Teardown Ind, then the SGSN deactivates all PDP contexts associated with this PDP address by including Teardown Ind in the Delete PDP Context Request message. The GGSN removes the PDP context(s) and returns a Delete PDP Context Response (TEID) message to the SGSN. If the MS was using a dynamic PDP address allocated by the GGSN, and if the context being deactivated is the last PDP context associated with this PDP address, then the GGSN releases this PDP address and makes it available for subsequent activation by other MSs. The Delete PDP Context messages are sent over the backbone network.

4) The SGSN returns a Deactivate PDP Context Accept (TI) message to the MS.

5) In Iu mode, radio access bearer release is done by the RAB Assignment procedure, if a RAB exists for this PDP context.

At GPRS detach, all PDP contexts for the MS are implicitly deactivated.

If the SGSN receives a Deactivate PDP Context Request (TI) message for a PDP context that is currently being activated, the SGSN shall stop the PDP Context Activation procedure without responding to the MS, and continue with the MS Initiated PDP Context Deactivation procedure.

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

   C1)   CAMEL_GPRS_PDP_Context_Disconnection.

The procedure returns as result "Continue".

****NEXT MODIFIED SECTION ******

9.2.5.2   Re-establishment of RABs

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

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

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

****NEXT MODIFIED SECTION ******

12.7.4   RAB Assignment Procedure

The purpose of the RAB Assignment procedure is to enable establishment of new RABs for a given MS and/or modification and/or release of already established RABs. When this procedure is executed and if there is any PDP context without radio access bearer assigned, all the radio access bearer are re-established, except the ones having maximum bit rates of 0 kbit/s for uplink and downlink. The same messages are used for the three mentioned actions and it is only the content carried by the messages that is different. The RAB Assignment procedure, which is shown below, is specified in 3G TS 25.413. The RRC protocol is specified in 3G TS 25.331.
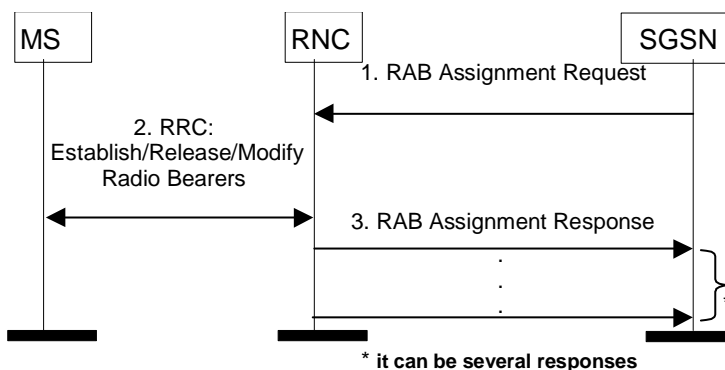
Figure 13: RAB Assignment Procedure

1) The SGSN sends a RAB Assignment Request message to the RNC to establish, modify, or release one or several RABs. For each RAB requested to be established or modified, if the RAB is allowed for queuing and the resource situation requires it, the RNC may place the RAB in the establishment queue.

2) The RNC establishes, modifies, or releases the appropriate radio bearers.

3) The RNC returns a RAB Assignment Response message to the SGSN. If the request to establish or modify one or several RABs has been queued, the RNC will report the outcome of the establishment or modification in subsequent RAB Assignment Response messages. If the SGSN receives a RAB Assignment Response message with a cause indicating that the requested QoS profile(s) can not be provided (e.g., "Requested Maximum Bit Rate not Available"), then the SGSN may send a new RAB Assignment Request message with different QoS profile(s). The number of re-attempts, if any, as well as how the new QoS profile(s) values are determined is implementation dependent.

CR-Form-v7

CHANGE REQUEST

⌘	**23.060** CR	**374**	⌘ **rev**		⌘	Current version:	**4.5.0**	⌘

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

Proposed change affects:　UICC apps⌘ ☐　　ME **X** Radio Access Network ☐　Core Network **X**

Title:	⌘	Clarification to preserved real-time PDP contexts RAB establishment
Source:	⌘	Nokia

Work item code:	⌘	TEI4		**Date:** ⌘	28/06/2002

Category:	⌘	**A**	**Release:** ⌘	Rel-4

Use <u>one</u> of the following categories:
F (correction)
A (corresponds to a correction in an earlier release)
B (addition of feature),
C (functional modification of feature)
D (editorial modification)
Detailed explanations of the above categories can
be found in 3GPP TR 21.900.

Use <u>one</u> of the following releases:
2　　(GSM Phase 2)
R96　(Release 1996)
R97　(Release 1997)
R98　(Release 1998)
R99　(Release 1999)
Rel-4　(Release 4)
Rel-5　(Release 5)
Rel-6　(Release 6)

Reason for change:	⌘	In case of an Iu or RAB release the PDP contexts are preserved in the SGSN and GGSN. The associated RABs can be re-established at later stage.
		When PDP contexts using streaming or conversational traffic class are preserved in the core network, the maximum bit rate is dowgraded to 0 kbit/s (for uplink and downlink).
		Due to the fact that RANAP protocol does not allow to establish RABs with value of 0 kbit/s for the maximum bit rate (for both uplink and downlink), it needs to be clarified that to re-establish such RAB the MS shall start PDP Context Modification procedure (and upgrade max bit rate to correct value) or deactivate the PDP context.

Summary of change:	⌘	It is clarified:
		- that SGSN shall not establish RABs for PDP contexts with maximum bitrate for uplink and downlink of 0 kbit/s.
		- to re-establish such RAB the MS shall start PDP Context Modification procedure (and upgrade max bit rate to correct value) or deactivate the PDP context.

Consequences if not approved:	⌘	The current specification text does not describe how RABs can be re-established in the case of preserved PDP context with 0kbit/s for maximum bit rate (for uplink and downlink.
		This may result different implementations of ME and/or PS Core Network elements with incorrect and undesirable effects.

Clauses affected:	⌘	6.9.2.2.1-3; 6.12.1-2; 9.2.3.3-5; 9.2.4.1; 9.2.5.2; 12.7.4			

		Y	**N**		
Other specs	⌘	X		Other core specifications	⌘ 24.008
affected:				Test specifications	
				O&M Specifications	

Other comments:	⌘	

6.9.2.2.1 Serving RNS Relocation Procedure

This procedure is only performed for an MS in PMM-CONNECTED state where the Iur interface carries both the control signalling and the user data.

The Serving SRNS Relocation procedure is used to move the UTRAN to CN connection point at the UTRAN side from the source SRNC to the target RNC, from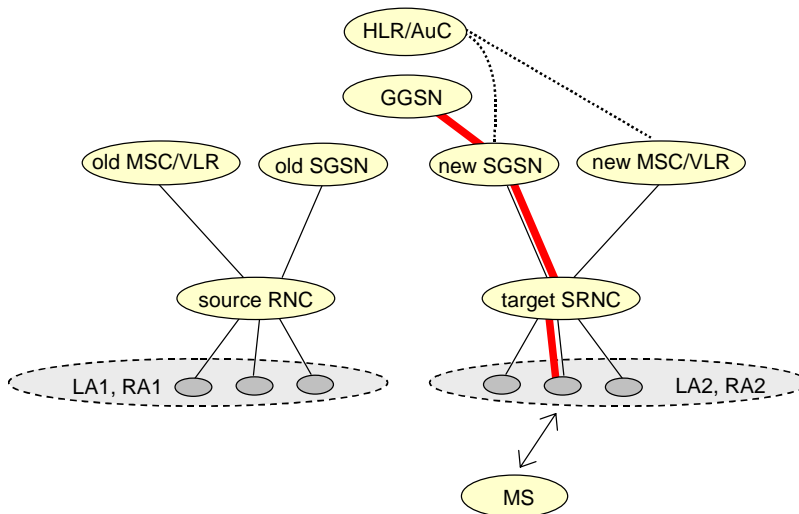 a "standing still position". In the procedure, the Iu links are relocated. If the target RNC is connected to the same SGSN as the source SRNC, an Intra-SGSN SRNS Relocation procedure is performed. If the routeing area is changed, this procedure is followed by an Intra-SGSN Routeing Area Update procedure. The SGSN detects 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 HLR about new location of the MS.

Figure 37 shows user data routing before SRNS relocation when source SRNC and target RNC are connected to different SGSNs. Figure 38 shows the user data routing after SRNS Relocation procedure and Routeing Area Update procedure is completed. In case depicted in Figure 37 and Figure 38, the MS is in state PMM-CONNECTED.

Figure 37: Before SRNS Relocation and Routeing Area Update

Before the SRNS Relocation procedure and RA update, the MS is registered in the old SGSN. The source RNC is acting as a serving RNC (SRNC).

Figure 38: After SRNS Relocation and Routeing Area Update

After the SRNS Relocation procedure and RA update, the MS is registered in the new SGSN. The MS is in the state PMM-CONNECTED towards the new SGSN, and the target RNC is acting as the serving RNC.

The Serving SRNS Relocation procedure is illustrated in Figure 39. The sequence is valid for both intra-SGSN SRNS relocation and inter-SGSN SRNS relocation.
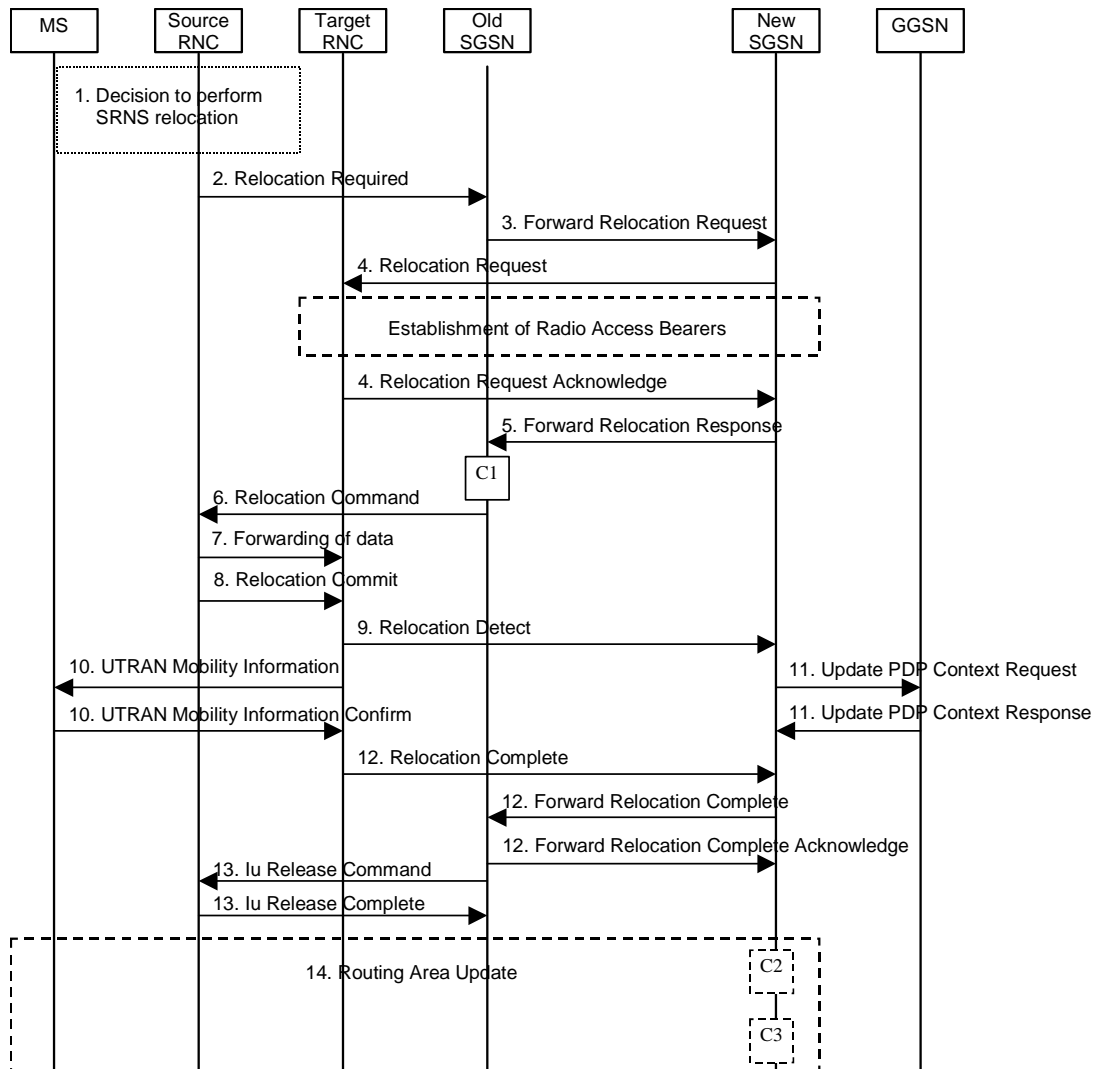

Figure 39: SRNS Relocation Procedure

1) The source SRNC decides to perform/initiate SRNS relocation. At this point both uplink and downlink user data flows via the following tunnel(s): Radio Bearer between MS and source SRNC (data flows via the target RNC, which acts as a drift RNC); GTP-U tunnel(s) between source SRNC and old-SGSN; GTP-U tunnel(s) between old-SGSN and GGSN.

2) The source SRNC sends a Relocation Required message (Relocation Type, Cause, Source ID, Target ID, Source RNC to target RNC transparent container) to the old SGSN. The source SRNC shall set the Relocation Type to "UE not involved". The Source SRNC to Target RNC Transparent Container includes the necessary information for Relocation co-ordination, security functionality and RRC protocol context information (including MS Capabilities).

3) The old SGSN determines from the Target ID if the SRNS Relocation is intra-SGSN SRNS relocation or inter-SGSN SRNS relocation. In case of inter-SGSN SRNS relocation, the old SGSN initiates the relocation resource allocation procedure by sending a Forward Relocation Request message (IMSI, Tunnel Endpoint Identifier Signalling, MM Context, PDP Context, Target Identification, UTRAN transparent container, RANAP Cause) to the new SGSN. The PDP context contains GGSN Address for User Plane and Uplink TEID for Data (to this

GGSN Address and Uplink TEID for Data the old SGSN and the new SGSN send uplink packets). At the same time a timer is started on the MM and PDP contexts in the old SGSN (see the Routeing Area Update procedure in subclause "Location Management Procedures (UMTS only)"). The Forward Relocation Request message is applicable only in the case of inter-SGSN SRNS relocation.

4) The new SGSN sends a Relocation Request message (Permanent NAS UE Identity, Cause, CN Domain Indicator, Source-RNC to target RNC transparent container, RABs to be setup) to the target RNC. Only the Iu Bearers of the RABs are setup between the target RNC and the new-SGSN as the existing Radio Bearers will be reallocated between the MS and the target RNC when the target RNC takes the role of the serving RNC. For each requested RAB, the RABs to be setup information elements shall contain information such as RAB ID, RAB parameters, Transport Layer Address, and Iu Transport Association. SGSN shall not establish RABs for PDP contexts with maximum bitrate for uplink and downlink of 0 kbit/s. The RAB ID information element contains the NSAPI value, and the RAB parameters information element gives the QoS profile. The Transport Layer Address is the SGSN Address for user data, and the Iu Transport Association corresponds to the uplink Tunnel Endpoint Identifier Data. After all necessary resources for accepted RABs including the Iu user plane are successfully allocated; the target RNC shall send the Relocation Request Acknowledge message (RABs setup, RABs failed to setup) to the new SGSN. Each RAB to be setup is defined by a Transport Layer Address, which is the target RNC Address for user data, and an Iu Transport Association, which corresponds to the downlink Tunnel Endpoint Identifier for user data. For each RAB to be set up, the target RNC may receive simultaneously downlink user packets both from the source SRNC and from the new SGSN.

5) When resources for the transmission of user data between the target RNC and the new SGSN have been allocated and the new SGSN is ready for relocation of SRNS, the Forward Relocation Response message (Cause, RANAP Cause, and RAB Setup Information) is sent from the new SGSN to old SGSN. This message indicates that the target RNC is ready to receive from source SRNC the forwarded downlink PDUs, i.e. the relocation resource allocation procedure is terminated successfully. RANAP Cause is information from the target RNC to be forwarded to the source SRNC. The RAB Setup Information, one information element for each RAB, contains the RNC Tunnel Endpoint Identifier and the RNC IP address for data forwarding from the source SRNC to the target RNC. If the target RNC or the new SGSN failed to allocate resources, the RAB Setup Information element contains only NSAPI indicating that the source SRNC shall release the resources associated with the NSAPI. The Forward Relocation Response message is applicable only in case of inter-SGSN SRNS relocation.

6) The old SGSN continues the relocation of SRNS by sending a Relocation Command message (RABs to be released, and RABs subject to data forwarding) to the source SRNC. The old SGSN decides the RABs to be subject for data forwarding based on QoS, and those RABs shall be contained in RABs subject to data forwarding. For each RAB subject to data forwarding, the information element shall contain RAB ID, Transport Layer Address, and Iu Transport Association. These are the same Transport Layer Address and Iu Transport Association that the target RNC had sent to new SGSN in Relocation Request Acknowledge message, and these are used for forwarding of downlink N-PDU from source SRNC to target RNC. The source SRNC is now ready to forward downlink user data directly to the target RNC over the Iu interface. This forwarding is performed for downlink user data only.

7) The source SRNC may, according to the QoS profile, begin the forwarding of data for the RABs to be subject for data forwarding. The data forwarding at SRNS relocation shall be carried out through the Iu interface, meaning that the data exchanged between the source SRNC and the target RNC are duplicated in the source SRNC and routed at IP layer towards the target RNC. For each radio bearer which uses lossless PDCP the GTP-PDUs related to transmitted but not yet acknowledged PDCP-PDUs are duplicated and routed at IP layer towards the target RNC together with their related downlink PDCP sequence numbers. The source RNC continues transmitting duplicates of downlink data and receiving uplink data. Before the serving RNC role is not yet taken over by target RNC and when downlink user plane data starts to arrive to target RNC, the target RNC may buffer or discard arriving downlink GTP-PDUs according to the related QoS profile.

Note: The order of steps, starting from step 7 onwards, does not necessarily reflect the order of events. For instance, source RNC may start data forwarding (step 7) and send Relocation Commit message (step 8) almost simultaneously except in the delivery order required case where step 7 triggers step 8. Target RNC may send Relocation Detect message (step 9) and UTRAN Mobility Information message (step 10) at the same time. Hence, target RNC may receive UTRAN Mobility Information Confirm message (step 10) while data forwarding (step 7) is still underway, and before the new SGSN receives Update PDP Context Response message (step 11).

8) Before sending the Relocation Commit the uplink and downlink data transfer in the source, SRNC shall be suspended for RABs, which require delivery order. The source RNC shall start the data-forwarding timer. When the source SRNC is ready, the source SRNC shall trigger the execution of relocation of SRNS by sending a Relocation Commit message (SRNS Contexts) to the target RNC over the Iur interface. The purpose of this

procedure is to transfer SRNS contexts from the source RNC to the target RNC, and to move the SRNS role from the source RNC to the target RNC. SRNS contexts are sent for each concerned RAB and contain the sequence numbers of the GTP PDUs next to be transmitted in the uplink and downlink directions and the next PDCP sequence numbers that would have been used to send and receive data from the MS. For PDP context(s) using delivery order not required (QoS profile), the sequence numbers of the GTP-PDUs next to be transmitted are not used by the target RNC. PDCP sequence numbers are only sent by the source RNC for radio bearers, which used lossless PDCP [57]. The use of lossless PDCP is selected by the RNC when the radio bearer is set up or reconfigured.

If delivery order is required (QoS profile), consecutive GTP-PDU sequence numbering shall be maintained throughout the lifetime of the PDP context(s). Therefore, during the entire SRNS relocation procedure for the PDP context(s) using delivery order required (QoS profile), the responsible GTP-U entities (RNCs and GGSN) shall assign consecutive GTP-PDU sequence numbers to user packets belonging to the same PDP context for uplink and downlink, respectively.

9) The target RNC shall send a Relocation Detect message to the new SGSN when the relocation execution trigger is received. For SRNS relocation type "UE not involved", the relocation execution trigger is the reception of the Relocation Commit message from the Iur interface. When the Relocation Detect message is sent, the target RNC shall start SRNC operation.

10) The target SRNC sends a UTRAN Mobility Information message. This message contains UE information elements and CN information elements. The UE information elements include among others new SRNC identity and S-RNTI. The CN information elements contain among others Location Area Identification and Routeing Area Identification. The procedure shall be co-ordinated in all Iu signalling connections existing for the MS.

The target SRNC establishes and/or restarts the RLC, and exchanges the PDCP sequence numbers (PDCP-SNU, PDCP-SND) between the target SRNC and the MS. PDCP-SND is the PDCP sequence number for the next expected in-sequence downlink packet to be received in the MS per radio bearer, which used lossless PDCP in the source RNC. PDCP-SND confirms all mobile-terminated packets successfully transferred before the SRNC relocation. If PDCP-SND confirms reception of packets that were forwarded from the source SRNC, the target SRNC shall discard these packets. PDCP-SNU is the PDCP sequence number for the next expected in-sequence uplink packet to be received in the RNC per radio bearer, which used lossless PDCP in the source RNC. PDCP-SNU confirms all mobile originated packets successfully transferred before the SRNC relocation. If PDCP-SNU confirms reception of packets that were received in the source SRNC, the MS shall discard these packets.

Upon reception of the UTRAN Mobility Information message the MS may start sending uplink user data to the target SRNC. When the MS has reconfigured itself, it sends the UTRAN Mobility Information Confirm message to the target SRNC. This indicates that the MS is also ready to receive downlink data from the target SRNC.

If new the SGSN has already received the Update PDP Context Response message from the GGSN, it shall forward the uplink user data to GGSN over this new GTP-U tunnel. Otherwise, the new SGSN shall forward the uplink user data to that GGSN IP address and TEID(s), which the new SGSN had received earlier by the Forward Relocation Request message.

For all RABs, the target RNC should:

start uplink reception of data and start transmission of uplink GTP-PDUs towards the new SGSN;

start processing the already buffered and the arriving downlink GTP-PDUs and start downlink transmission towards the MS.

11) Upon receipt of the Relocation Detect message, the CN may switch the user plane from source RNC to target SRNC. If the SRNS Relocation is an inter SGSN SRNS relocation, the new SGSN sends Update PDP Context Request messages (new SGSN Address, SGSN Tunnel Endpoint Identifier, QoS Negotiated) to the GGSNs concerned. The GGSNs update their PDP context fields and return an Update PDP Context Response (GGSN Tunnel Endpoint Identifier).

12) When the target SRNC receives the UTRAN Mobility Information Confirm message, i.e. the new SRNC—ID + S-RNTI are successfully exchanged with the MS by the radio protocols, the target SRNC shall initiate the Relocation Complete procedure by sending the Relocation Complete message to the new SGSN. The purpose of the Relocation Complete procedure is to indicate by the target SRNC the completion of the relocation of the SRNS to the CN. If the user plane has not been switched at Relocation Detect and upon reception of Relocation Complete, the CN shall switch the user plane from source RNC to target SRNC. If the SRNS Relocation is

an inter-SGSN SRNS relocation, the new SGSN shall signal to the old SGSN the completion of the SRNS relocation procedure by sending a Forward Relocation Complete message.

13) Upon receiving the Relocation Complete message or if it is an inter-SGSN SRNS relocation; the Forward Relocation Complete message, the old SGSN sends an Iu Release Command message to the source RNC. When the RNC data-forwarding timer has expired the source RNC responds with an Iu Release Complete.

14) After the MS has finished the RNTI reallocation procedure and if the new Routeing Area Identification is different from the old one, the MS initiates the Routeing Area Update procedure. See subclause "Location Management Procedures (UMTS only)". Note that it is only a subset of the RA update procedure that is performed, since the MS is in PMM-CONNECTED mode.

If the SRNS Relocation is inter-SGSN, then the following CAMEL procedure calls shall be performed (see referenced procedures in 3GPP TS 23.078):

C1)   CAMEL_GPRS_PDP_Context_Disconnection and CAMEL_GPRS_Detach.

They are called in the following order:

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

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

If the SRNS Relocation is intra-SGSN, then the above mentioned CAMEL procedures calls shall not be performed.

If Routeing Area Update occurs, then the following CAMEL procedure calls shall be performed (see referenced procedures in 3GPP TS 23.078):

C2)   CAMEL_GPRS_Routeing_Area_Update_Session.

The procedure returns as result "Continue".

C3)   CAMEL_GPRS_Routeing_Area_Update_Context.

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

For C2 and C3: refer to Routing Area Update procedure description for detailed message flow.
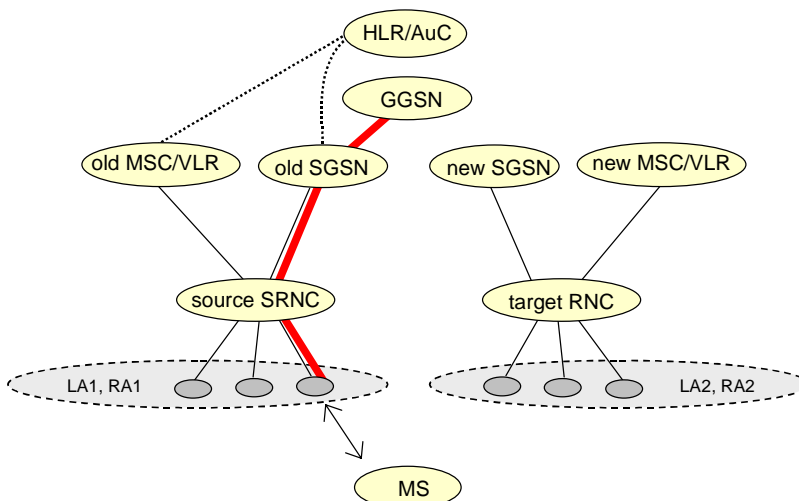
6.9.2.2.2   Combined Hard Handover and SRNS Relocation Procedure

This procedure is only performed for an MS in PMM-CONNECTED state in case the Iur interface is not available.

The Combined Hard Handover and SRNS Relocation procedure is used to move the UTRAN to CN connection point at the UTRAN side from the source SRNC to the target RNC, while performing a hard handover decided by the UTRAN. In the procedure, the Iu links are relocated. If the target RNC is connected to the same SGSN as the source SRNC, an Intra-SGSN SRNS Relocation procedure is performed. If the routeing area is changed, this procedure is followed by an Intra-SGSN Routeing Area Update procedure. 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 HLR about the new MS location.

If the target RNC is connected to a different SGSN than the source SRNC, an Inter-SGSN SRNS Relocation procedure is performed. This procedure is followed by an Inter-SGSN Routeing Area Update procedure.

Figure 40 shows the situation before a Combined Hard Handover and SRNS Relocation procedure when source and target RNC are connected to different SGSNs. Figure 41 shows the situation after the Combined Hard Handover and SRNS Relocation procedure and RA update procedure have been completed. In the case described in Figure 40 and Figure 41 the MS is in PMM-CONNECTED state.

Figure 40: Before Combined Hard Handover and SRNS Relocation and Routeing Area Update

Before the SRNS Relocation and Routeing Area Update the MS is registered in the old SGSN and in the old MSC/VLR. The source RNC is acting as serving RNC.
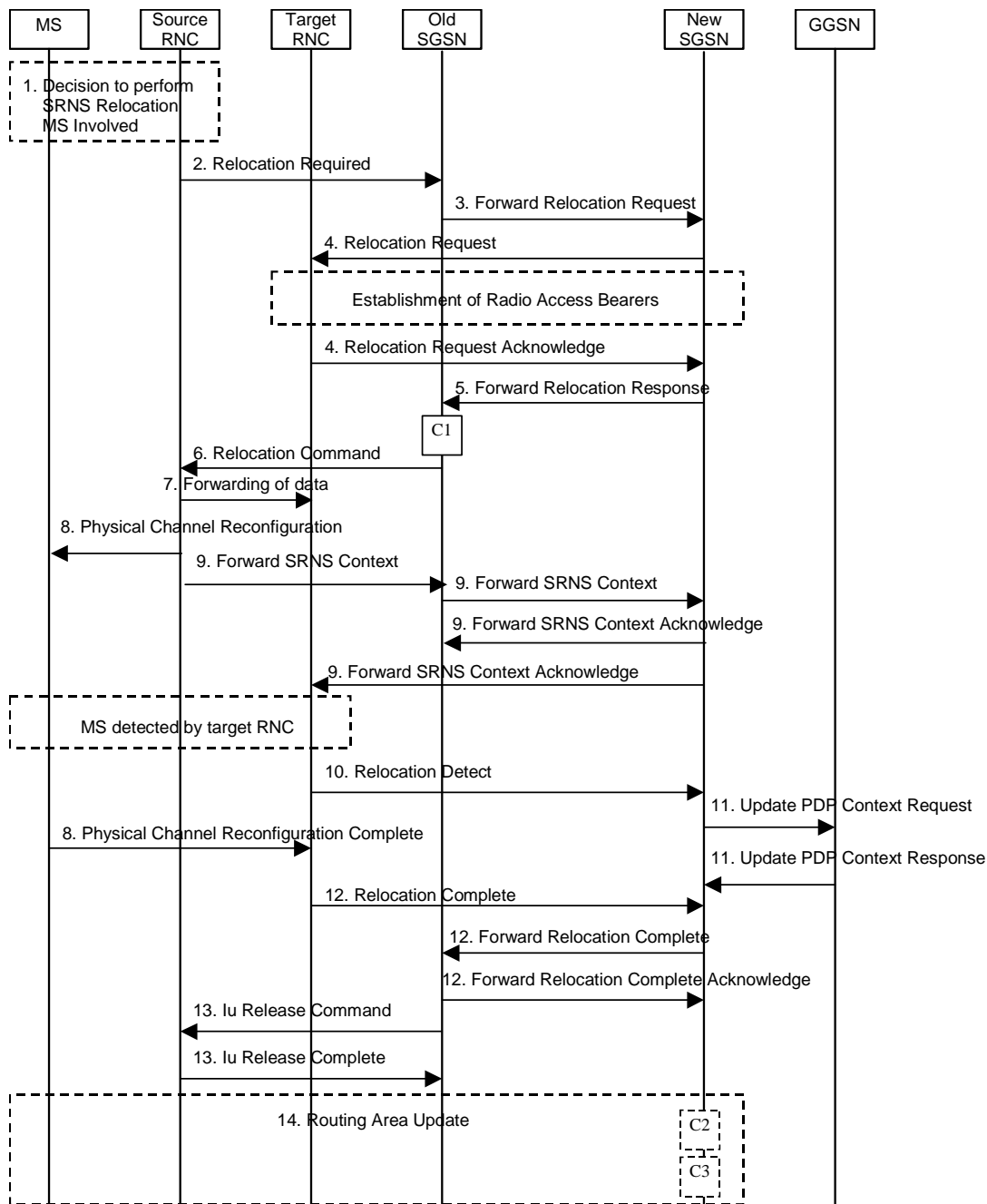

Figure 41: After Combined Hard Handover and SRNS Relocation and Routeing Area Update

After the SRNS relocation and RA update, the MS is registered in the new SGSN and in the new MSC/VLR. The MS is in state PMM-CONNECTED towards the new SGSN and in MM IDLE state towards the new MSC/VLR. The target RNC is acting as serving RNC.

The Combined Hard Handover and SRNS Relocation procedure for the PS domain is illustrated in Figure 42. The sequence is valid for both intra-SGSN SRNS relocation and inter-SGSN SRNS relocation.

Figure 42: Combined Hard Handover and SRNS Relocation Procedure

1) Based on measurement results and knowledge of the UTRAN topology, the source SRNC decides to initiate a combined hard handover and SRNS relocation. At this point both uplink and downlink user data flows via the following tunnel(s): Radio Bearer between the MS and the source SRNC (no drift RNC available); GTP-U tunnel(s) between the source SRNC and the old SGSN; GTP-U tunnel(s) between the old SGSN and the GGSN.

2) The source SRNC sends a Relocation Required message (Relocation Type, Cause, Source ID, Target ID, Source RNC To Target RNC Transparent Container) to the old SGSN. The source SRNC shall set Relocation Type to "UE Involved". Source RNC To Target RNC Transparent Container includes the necessary information for relocation co-ordination, security functionality and RRC protocol context information (including MS Capabilities).

3) The old SGSN determines from the Target ID if the SRNS relocation is intra-SGSN SRNS relocation or inter-SGSN SRNS relocation. In case of inter-SGSN SRNS relocation the old SGSN initiates the relocation resource allocation procedure by sending a Forward Relocation Request message (IMSI, Tunnel Endpoint Identifier Signalling, MM Context, PDP Context, Target Identification, UTRAN Transparent Container, RANAP Cause) to the new SGSN. PDP context contains GGSN Address for User Plane and Uplink TEID for Data (to this GGSN Address and Uplink TEID for Data, the old SGSN and the new SGSN send uplink packets). At the same time a timer is started on the MM and PDP contexts in the old SGSN (see Routeing Area Update procedure in subclause "Location Management Procedures (UMTS only)"). The Forward Relocation Request message is applicable only in case of inter-SGSN SRNS relocation.

4) The new SGSN sends a Relocation Request message (Permanent NAS UE Identity, Cause, CN Domain Indicator, Source RNC To Target RNC Transparent Container, RAB To Be Setup) to the target RNC. For each RAB requested to be established, RABs To Be Setup shall contain information such as RAB ID, RAB parameters, Transport Layer Address, and Iu Transport Association. SGSN shall not establish RABs for PDP contexts with maximum bitrate for uplink and downlink of 0 kbit/s. The RAB ID information element contains the NSAPI value, and the RAB parameters information element gives the QoS profile. The Transport Layer Address is the SGSN Address for user data, and the Iu Transport Association corresponds to the uplink Tunnel Endpoint Identifier Data.

After all the necessary resources for accepted RABs including the Iu user plane are successfully allocated, the target RNC shall send the Relocation Request Acknowledge message (Target RNC To Source RNC Transparent Container, RABs Setup, RABs Failed To Setup) to the new SGSN. Each RAB to be setup is defined by a Transport Layer Address, which is the target RNC Address for user data, and the Iu Transport Association, which corresponds to the downlink Tunnel Endpoint Identifier for user data. The transparent container contains all radio-related information that the MS needs for the handover, i.e., a complete RRC message (e.g., Physical Channel Reconfiguration) to be sent transparently via CN and source SRNC to the MS. For each RAB to be set up, the target RNC may receive simultaneously downlink user packets both from the source SRNC and from the new SGSN.

5) When resources for the transmission of user data between target RNC and new SGSN have been allocated and the new SGSN is ready for relocation of SRNS, the Forward Relocation Response (Cause, UTRAN Transparent Container, RANAP Cause, Target-RNC Information) message is sent from the new SGSN to the old SGSN. This message indicates that the target RNC is ready to receive from source SRNC the forwarded downlink PDUs, i.e., the relocation resource allocation procedure is terminated successfully. UTRAN transparent container and RANAP Cause are information from the target RNC to be forwarded to the source SRNC. The Target RNC Information, one information element for each RAB to be set up, contains the RNC Tunnel Endpoint Identifier and RNC IP address for data forwarding from the source SRNC to the target RNC. The Forward Relocation Response message is applicable only in case of inter-SGSN SRNS relocation.

6) The old SGSN continues the relocation of SRNS by sending a Relocation Command message (Target RNC To Source RNC Transparent Container, RABs To Be Released, RABs Subject To Data Forwarding) to the source SRNC. The old SGSN decides the RABs to be subject for data forwarding based on QoS, and those RABs shall be contained in RABs subject to data forwarding. For each RAB subject to data forwarding, the information element shall contain RAB ID, Transport Layer Address, and Iu Transport Association. These are the same Transport Layer Address and Iu Transport Association that the target RNC had sent to new SGSN in Relocation Request Acknowledge message, and these are used for forwarding of downlink N-PDU from the source SRNC to the target RNC. The source SRNC is now ready to forward downlink user data directly to the target RNC over the Iu interface. This forwarding is performed for downlink user data only.

7) The source SRNC may, according to the QoS profile, begins the forwarding of data for the RABs to be subject for data forwarding.

Note: The order of steps, starting from step 7 onwards, does not necessarily reflect the order of events. For instance, source RNC may start data forwarding (step 7), send Physical Channel Reconfiguration message to MS (step 8) and forward SRNS Context message to the old SGSN (step 8) almost simultaneously.

The data forwarding at SRNS relocation shall be carried out through the Iu interface, meaning that the GTP-PDUs exchanged between the source SRNC and the target RNC are duplicated in the source SRNC and routed at the IP layer towards the target RNC. For each radio bearer which uses lossless PDCP the GTP-PDUs related to transmitted but not yet acknowledged PDCP-PDUs are duplicated and routed at IP layer towards the target RNC together with their related downlink PDCP sequence numbers. The source RNC continues transmitting duplicates of downlink data and receiving uplink data.

Before the serving RNC role is not yet taken over by target RNC and when downlink user plane data starts to arrive to target RNC, the target RNC may buffer or discard arriving downlink GTP-PDUs according to the related QoS profile.

8) Before sending the Physical Channel Reconfiguration the uplink and downlink data transfer shall be suspended in the source SRNC for RABs, which require delivery order. When the source SRNC is ready, the source RNC shall trigger the execution of relocation of SRNS by sending to the MS the RRC message provided in the Target RNC to source RNC transparent container, e.g., a Physical Channel Reconfiguration (UE Information Elements, CN Information Elements) message. UE Information Elements include among others new SRNC identity and S-RNTI. CN Information Elements contain among others Location Area Identification and Routeing Area Identification.
Before the RRC message is sent (e,g, Physical Channel Reconfiguration) uplink and downlink data transfer in the source RNC shall be suspended for RABs which require to maintain the delivery order. .

When the MS has reconfigured itself, it sends e.g., a Physical Channel Reconfiguration Complete message to the target SRNC. If the Forward SRNS Context message with the sequence numbers is received, the exchange of packets with the MS may start. If this message is not yet received, the target RNC may start the packet transfer for all RABs, which do not require maintaining the delivery order.

9) The source SRNC continues the execution of relocation of SRNS by sending a Forward SRNS Context (RAB Contexts) message to the target RNC via the old and the new SGSN, which is acknowledged by a Forward SRNS Context Acknowledge message. The purpose of this procedure is to transfer SRNS contexts from the source RNC to the target RNC, and to move the SRNS role from the source RNC to the target RNC. SRNS contexts are sent for each concerned RAB and contain the sequence numbers of the GTP PDUs next to be transmitted in the uplink and downlink directions and the next PDCP sequence numbers that would have been used to send and receive data from the MS. PDCP sequence numbers are only sent by the source RNC for the radio bearers which used losslessPDCP [57]. The use of lossless PDCP is selected by the RNC when the radio bearer is set up or reconfigured. For PDP context(s) using delivery order not required (QoS profile), the sequence numbers of the GTP-PDUs next to be transmitted are not used by the target RNC.

If delivery order is required (QoS profile), consecutive GTP-PDU sequence numbering shall be maintained throughout the lifetime of the PDP context(s). Therefore, during the entire SRNS relocation procedure for the PDP context(s) using delivery order required (QoS profile), the responsible GTP-U entities (RNCs and GGSN) shall assign consecutive GTP-PDU sequence numbers to user packets belonging to the same PDP context uplink and downlink, respectively.

The target RNC establishes and/or restarts the RLC and exchanges the PDCP sequence numbers (PDCP-SNU, PDCP-SND) between the target RNC and the MS. PDCP-SND is the PDCP sequence number for the next expected in-sequence downlink packet to be received by the MS per radio bearer, which used lossless PDCP in the source RNC. PDCP-SND confirms all mobile terminated packets successfully transferred before the SRNC relocation. If PDCP-SND confirms reception of packets that were forwarded from the source SRNC, then the target SRNC shall discard these packets. PDCP-SNU is the PDCP sequence number for the next expected in-sequence uplink packet to be received in the RNC per radio bearer, which used lossless PDCP in the source RNC. PDCP-SNU confirms all mobile originated packets successfully transferred before the SRNC relocation. If PDCP-SNU confirms reception of packets that were received in the source SRNC, the MS shall discard these packets.

10) The target RNC shall send a Relocation Detect message to the new SGSN when the relocation execution trigger is received. For SRNS relocation type "UE Involved", the relocation execution trigger may be received from the Uu interface; i.e., when target RNC detects the MS on the lower layers. When the Relocation Detect message is sent, the target RNC shall start SRNC operation.

11) Upon reception of the Relocation Detect message, the CN may switch the user plane from the source RNC to the target SRNC. If the SRNS relocation is an inter-SGSN SRNS relocation, the new SGSN sends an Update PDP Context Request (New SGSN Address, SGSN Tunnel Endpoint Identifier, QoS Negotiated) message to the GGSNs concerned. The GGSNs update their PDP context fields and return an Update PDP Context Response (GGSN Tunnel Endpoint Identifier) message.

12) When the target SRNC receives the Physical Channel Reconfiguration Complete message or the Radio Bearer Release Complete message, i.e. the new SRNC-ID + S-RNTI are successfully exchanged with the MS by the radio protocols, the target SRNC shall initiate a Relocation Complete procedure by sending the Relocation Complete message to the new SGSN. The purpose of the Relocation Complete procedure is to indicate by the target SRNC the completion of the relocation of the SRNS to the CN. If the user plane has not been switched at

Relocation Detect, the CN shall upon reception of Relocation Complete switch the user plane from source RNC to target SRNC. If the SRNS Relocation is an inter-SGSN SRNS relocation, the new SGSN signals to the old SGSN the completion of the SRNS relocation procedure by sending a Forward Relocation Complete message.

13) Upon receiving the Relocation Complete message or, if it is an inter-SGSN SRNS relocation, the Forward Relocation Complete message, the old SGSN sends an Iu Release Command message to the source RNC. When the RNC data-forwarding timer has expired, the source RNC responds with an Iu Release Complete message.

14) After the MS has finished the reconfiguration procedure and if the new Routeing Area Identification is different from the old one, the MS initiates the Routeing Area Update procedure. See subclause "Location Management Procedures (UMTS only)". Note that it is only a subset of the RA update procedure that is performed, since the MS is in PMM-CONNECTED state.

If the SRNS Relocation is inter-SGSN, then the following CAMEL procedure calls shall be performed (see referenced procedures in 3GPP TS 23.078):

C1)   CAMEL_GPRS_PDP_Context_Disconnection and CAMEL_GPRS_Detach

They are called in the following order:

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

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

If the SRNS Relocation is intra-SGSN, then the above mentioned CAMEL procedures calls shall not be performed.

If Routeing Area Update occurs, then the following CAMEL procedure calls shall be performed (see referenced procedures in 3GPP TS 23.078):

C2)   CAMEL_GPRS_Routeing_Area_Update_Session.

In Figure 42, the procedure returns as result "Continue".

C3)   CAMEL_GPRS_Routeing_Area_Update_Context.

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

For C2 and C3: refer to Routing Area Update procedure description for detailed message flow.

6.9.2.2.3   Combined Cell / URA Update and SRNS Relocation Procedure

This procedure is only performed for an MS in PMM-CONNECTED state, where the Iur interface carries control signalling but no user data.

The Combined Cell / URA Update and SRNS Relocation procedure is used to move the UTRAN to CN connection point at the UTRAN side from the source SRNC to the target RNC, while performing a cell re-selection in the UTRAN. In the procedure, the Iu links are relocated. If the target RNC is connected to the same SGSN as the source SRNC, an Intra-SGSN SRNS Relocation procedure is performed. If the routeing area is changed, this procedure is followed by an Intra-SGSN Routeing Area Update procedure. 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 HLR about the new MS location.

Before the Combined Cell / URA Update and SRNS Relocation and the Routeing Area Update, the MS is registered in the old SGSN. The source RNC is acting as serving RNC.

After the Combined Cell / URA Update and SRNS Relocation and the Routeing Area Update, the MS is registered in the new SGSN. The MS is in state PMM-CONNECTED towards the new SGSN, and the target RNC is acting as serving RNC.

The Combined Cell / URA Update and SRNS Relocation procedure for the PS domain is illustrated in Figure 43. The sequence is valid for both intra-SGSN SRNS relocation and inter-SGSN SRNS relocation.
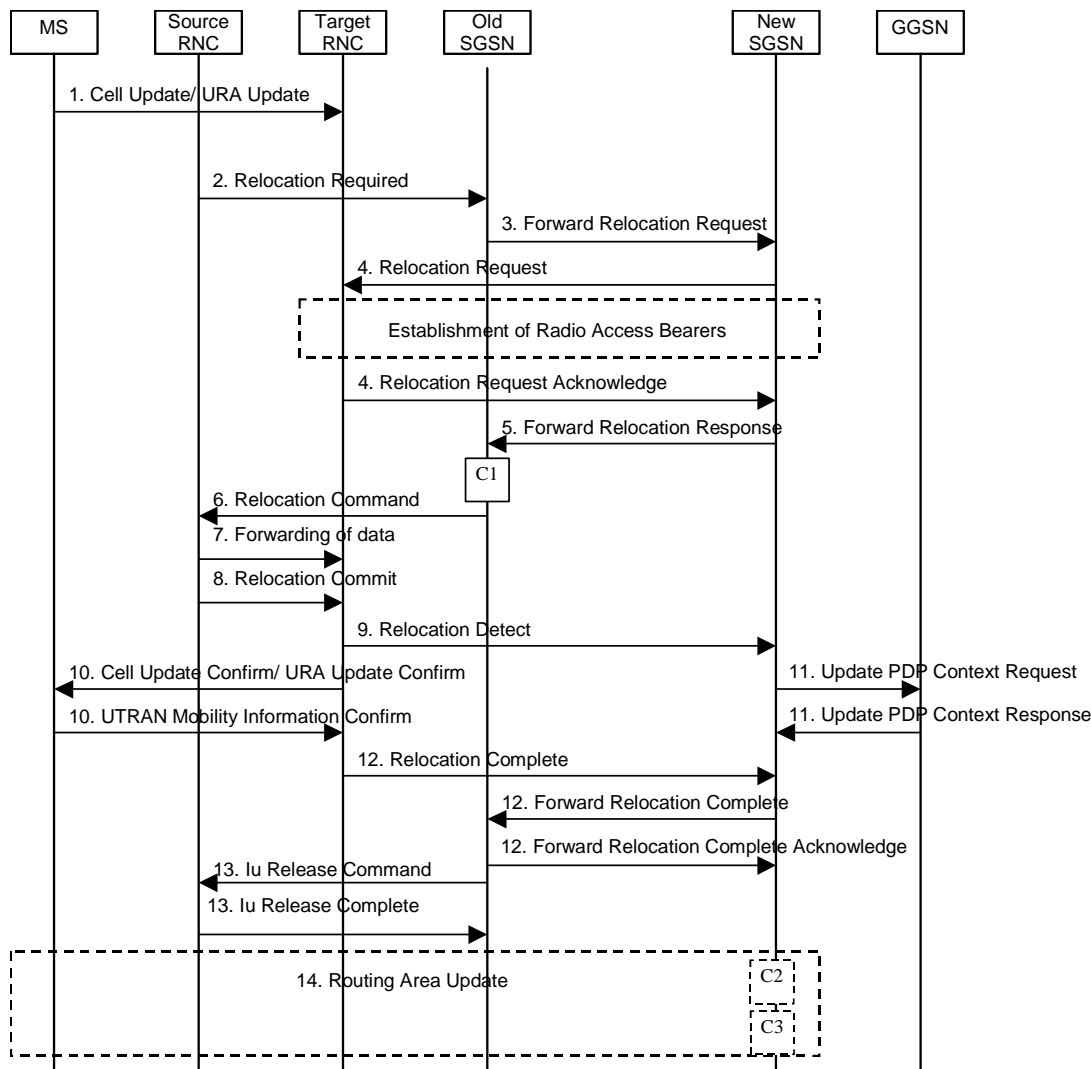

Figure 43: Combined Cell / URA Update and SRNS Relocation Procedure

1) The MS sends a Cell Update / URA Update message to the source SRNC (if the cell is located under another RNC the message is routed via the DRNC to SRNC over the Iur). The source SRNC decides whether or not to perform a combined cell / URA update and SRNS relocation towards the target RNC. The rest of this subclause describes the case where a combined cell / URA update and SRNS relocation applies. In this case no radio bearer is established between the source SRNC and the UE. Nonetheless the following tunnel(s) are established: GTP-U tunnel(s) between source SRNC and old-SGSN; GTP-U tunnel(s) between old-SGSN and GGSN.

2) The source SRNC sends a Relocation Required message (Relocation Type, Cause, Source ID, Target ID, Source RNC to Target RNC Transparent Container) to the old SGSN. The source SRNC shall set Relocation Type to "UE not involved". Source RNC to Target RNC Transparent Container includes the necessary information for Relocation co-ordination, security functionality, and RRC protocol context information (including MS Capabilities).

3) The old SGSN determines from the Target ID if the SRNS Relocation is intra-SGSN SRNS relocation or inter-SGSN SRNS relocation. In the case of inter-SGSN SRNS relocation the old SGSN initiates the relocation resource allocation procedure by sending a Forward Relocation Request (IMSI, Tunnel Endpoint Identifier Signalling, MM Context, PDP Context, Target Identification, UTRAN Transparent Container, RANAP Cause) message to the new SGSN. PDP context contains GGSN Address for User Plane and Uplink TEID for Data (to this GGSN Address and Uplink TEID for Data, the old SGSN and the new SGSN send uplink packets). At the

same time a timer is started on the MM and PDP contexts in the old SGSN, see Routeing Area Update procedure in subclause "Location Management Procedures (UMTS only)". The Forward Relocation Request message is applicable only in case of inter-SGSN SRNS relocation.

4) The new SGSN sends a Relocation Request message (Permanent NAS UE Identity, Cause, CN Domain Indicator, Source RNC to Target RNC Transparent Container, RABs To Be Setup) to the target RNC. For each requested RAB, RABs To Be Setup shall contain information such as RAB ID, RAB parameters, Transport Layer Address, and Iu Transport Association. SGSN shall not establish RABs for PDP contexts with maximum bitrate for uplink and downlink of 0 kbit/s. The RAB ID information element contains the NSAPI value, and the RAB parameters information element gives the QoS profile. The Transport Layer Address is the SGSN Address for user data, and the Iu Transport Association corresponds to the uplink Tunnel Endpoint Identifier Data.

After all necessary resources for accepted RABs including the Iu user plane are successfully allocated, the target RNC shall send the Relocation Request Acknowledge message (RABs setup, RABs failed to setup) to the new SGSN. Each RAB to be setup is defined by a Transport Layer Address, which is the target RNC Address for user data, and a Iu Transport Association which corresponds to the downlink Tunnel Endpoint Identifier for user data. The target-RNC may simultaneously receive for each RAB to be set up downlink user packets both from the source SRNC and from the new SGSN.

After the new SGSN receives the Relocation Request Acknowledge message, the GTP-U tunnels are established between the target RNC and the new-SGSN.

5) When resources for the transmission of user data between the target RNC and the new SGSN have been allocated and the new SGSN is ready for relocation of SRNS, the Forward Relocation Response message (Cause, RANAP Cause, and Target RNC Information) is sent from the new SGSN to the old SGSN. This message indicates that the target RNC is ready to receive from the source SRNC the forwarded downlink packets, i.e., the relocation resource allocation procedure is terminated successfully. RANAP Cause is information from the target RNC to be forwarded to the source SRNC. The RAB Setup Information, one information element for each RAB, contains the RNC Tunnel Endpoint Identifier and RNC IP address for data forwarding from the source SRNC to the target RNC. If the target RNC or the new SGSN failed to allocate resources, the RAB Setup Information element contains only NSAPI indicating that the source SRNC shall release the resources associated with the NSAPI. The Forward Relocation Response message is applicable only in case of inter-SGSN SRNS relocation.

6) The old SGSN continues the relocation of SRNS by sending a Relocation Command (RABs to be released, and RABs subject to data forwarding) message to the source SRNC. The old SGSN decides the RABs subject to data forwarding based on QoS, and those RABs shall be contained in RABs subject to data forwarding. For each RAB subject to data forwarding, the information element shall contain RAB ID, Transport Layer Address, and Iu Transport Association. These are the same Transport Layer Address and Iu Transport Association that the target RNC had sent to new SGSN in Relocation Request Acknowledge message, and these are used for forwarding of downlink N-PDU from the source SRNC to the target RNC. The source SRNC is now ready to forward downlink data directly to the target RNC over the Iu interface. This forwarding is performed for downlink user data only.

7) The source SRNC may, according to the QoS profile, begin the forwarding of data for the RABs subject to data forwarding and starts the data-forwarding timer. The data forwarding at SRNS relocation shall be carried out through the Iu interface, meaning that the data exchanged between the source SRNC and the target RNC are duplicated in the source SRNC and routed at the IP layer towards the target RNC. For each radio bearer which uses lossless PDCP the GTP-PDUs related to transmitted but not yet acknowledged PDCP-PDUs are duplicated and routed at IP layer towards the target RNC together with their related downlink PDCP sequence numbers. The source RNC continues transmitting duplicates of downlink data and receiving uplink data.

Note: The order of steps, starting from step 7 onwards, does not necessarily reflect the order of events. For instance, source RNC may send data forwarding (step 7) and start Relocation Commit message (step 8) almost simultaneously. Target RNC may send Relocation Detect message (step 9) and Cell Update Confirm/URA Update Confirm message (step 10) at the same time. Hence, target RNC may receive the UTRAN Mobility Information Confirm message from MS (step 10) while data forwarding (step 8) is still underway, and before the new SGSN receives Update PDP Context Response message (step 11).

Before the serving RNC role is not yet taken over by target RNC and when downlink user plane data starts to arrive to target RNC, the target RNC may buffer or discard arriving downlink GTP-PDUs according to the related QoS profile.

8) Before sending the Relocation Commit the uplink and downlink data transfer in the source, SRNC shall be suspended for RABs, which require delivery order.

When the source SRNC is ready, the source SRNC shall trigger the execution of relocation of SRNS by sending a Relocation Commit message (SRNS Contexts) to the target RNC over the Iur interface. The purpose of this procedure is to transfer SRNS contexts from the source RNC to the target RNC, and to move the SRNS role from the source RNC to the target RNC. SRNS contexts are sent for each concerned RAB and contain the sequence numbers of the GTP-PDUs next to be transmitted in the uplink and downlink directions and the next PDCP sequence numbers that would have been used to send and receive data from the MS. . PDCP sequence numbers are only sent by the source RNC for radio bearers, which used lossless PDCP [57]. The use of lossless PDCP is selected by the RNC when the radio bearer is set up or reconfigured. For PDP context(s) using delivery order not required (QoS profile), the sequence numbers of the GTP-PDUs next to be transmitted are not used by the target RNC.

If delivery order is required (QoS profile), consecutive GTP-PDU sequence numbering shall be maintained throughout the lifetime of the PDP context(s). Therefore, during the entire SRNS relocation procedure for the PDP context(s) using delivery order required (QoS profile), the responsible GTP-U entities (RNCs and GGSN) shall assign consecutive GTP-PDU sequence numbers to user packets belonging to the same PDP context for uplink and downlink respectively.

9) The target RNC shall send a Relocation Detect message to the new SGSN when the relocation execution trigger is received. For SRNS relocation type "UE not involved", the relocation execution trigger is the reception of the Relocation Commit message from the Iur interface. When the Relocation Detect message is sent, the target RNC shall start SRNC operation.

10) The target SRNC sends a Cell Update Confirm / URA Update Confirm message. This message contains UE information elements and CN information elements. The UE information elements include among others new SRNC identity and S-RNTI. The CN information elements contain among others Location Area Identification and Routeing Area Identification. The procedure shall be co-ordinated in all Iu signalling connections existing for the MS.

Upon reception of the Cell Update Confirm / URA Update Confirm message the MS may start sending uplink user data to the target SRNC. When the MS has reconfigured itself, it sends the UTRAN Mobility Information Confirm message to the target SRNC. This indicates that the MS is also ready to receive downlink data from the target SRNC.

If the new SGSN has already received the Update PDP Context Response message from the GGSN, it shall forward the uplink user data to the GGSN over this new GTP-U tunnel. Otherwise, the new SGSN shall forward the uplink user data to that GGSN IP address and TEID(s), which the new SGSN had received earlier by the Forward Relocation Request message.

The target SRNC and the MS exchange the PDCP sequence numbers; PDCP-SNU and PDCP-SND. PDCP-SND is the PDCP sequence number for the next expected in-sequence downlink packet to be received in the MS per radio bearer, which used lossless PDCP in the source RNC. PDCP-SND confirms all mobile terminated packets successfully transferred before the SRNC relocation procedure. . If PDCP-SND confirms the reception of packets that were forwarded from the source SRNC, the target SRNC shall discard these packets. PDCP-SNU is the PDCP sequence number for the next expected in-sequence uplink packet to be received in the RNC per radio bearer, which used lossless PDCP in the source RNC. PDCP-SNU confirms all mobile originated packets successfully transferred before the SRNC relocation. If PDCP-SNU confirms reception of packets that were received in the source SRNC, the target SRNC shall discard these packets.

11) Upon receipt of the Relocation Detect message, the CN may switch the user plane from the source RNC to the target SRNC. If the SRNS Relocation is an inter-SGSN SRNS relocation, the new SGSN sends Update PDP Context Request messages (new SGSN Address, SGSN Tunnel Endpoint Identifier, QoS Negotiated) to the GGSNs concerned. The GGSNs update their PDP context fields and return an Update PDP Context Response (GGSN Tunnel Endpoint Identifier) message.

12) When the target SRNC receives the UTRAN Mobility Information Confirm message, i.e. the new SRNC-ID + S-RNTI are successfully exchanged with the MS by the radio protocols, the target SRNC shall initiate the Relocation Complete procedure by sending the Relocation Complete message to the new SGSN. The purpose of the Relocation Complete procedure is to indicate by the target SRNC the completion of the relocation of the SRNS to the CN. If the user plane has not been switched at Relocation Detect, the CN shall upon reception of Relocation Complete switch the user plane from the source RNC to the target SRNC. If the SRNS Relocation is

an inter SGSN SRNS relocation, the new SGSN signals to the old SGSN the completion of the SRNS relocation procedure by sending a Forward Relocation Complete message.

13) Upon receiving the Relocation Complete message or if it is an inter-SGSN SRNS relocation, the Forward Relocation Complete message, the old SGSN sends an Iu Release Command message to the source RNC. When the RNC data-forwarding timer has expired the source RNC responds with an Iu Release Complete.

14) After the MS has finished the Cell / URA update and RNTI reallocation procedure and if the new Routeing Area Identification is different from the old one, the MS initiates the Routeing Area Update procedure. See subclause "Location Management Procedures (UMTS only)". Note that it is only a subset of the RA update procedure that is performed, since the MS is in PMM-CONNECTED state.

If the SRNS Relocation is inter-SGSN, then the following CAMEL procedure calls shall be performed (see referenced procedures in 3GPP TS 23.078):

C1)   CAMEL_GPRS_PDP_Context_Disconnection and CAMEL_GPRS_Detach

They are called in the following order:

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

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

If the SRNS Relocation is intra-SGSN, then the above mentioned CAMEL procedures calls shall not be performed.

If Routeing Area Update occurs, then the following CAMEL procedure calls shall be performed (see referenced procedures in 3GPP TS 23.078):

C2)   CAMEL GPRS Routeing Area Update-Session

The procedure returns as result "Continue".

C3)   CAMEL_GPRS_Routeing_Area_Update_Context.

This procedure is called several times: once per PDP context. It returns as result "Continue". For C2 and C3: refer to Routing Area Update procedure description for detailed message flow.

****NEXT MODIFIED SECTION ******

6.12.1   MS Initiated Service Request Procedure

The MS in PMM-IDLE state sends the Service Request message to the 3G-SGSN in order to establish the PS signalling connection for the upper layer signalling or for the resource reservation for active PDP context(s). After receiving the Service Request message, the 3G-SGSN may perform authentication, and it shall perform the security mode procedure. After the establishment of the secure PS signalling connection to a 3G-SGSN, the MS may send signalling messages, e.g. Activate PDP Context Request, to the 3G-SGSN, or the 3G-SGSN may start the resource reservation for the active PDP contexts depending on the requested service in the Service Request message. An MS in PMM-CONNECTED state also requests the resource reservation for the active PDP contexts through this procedure.
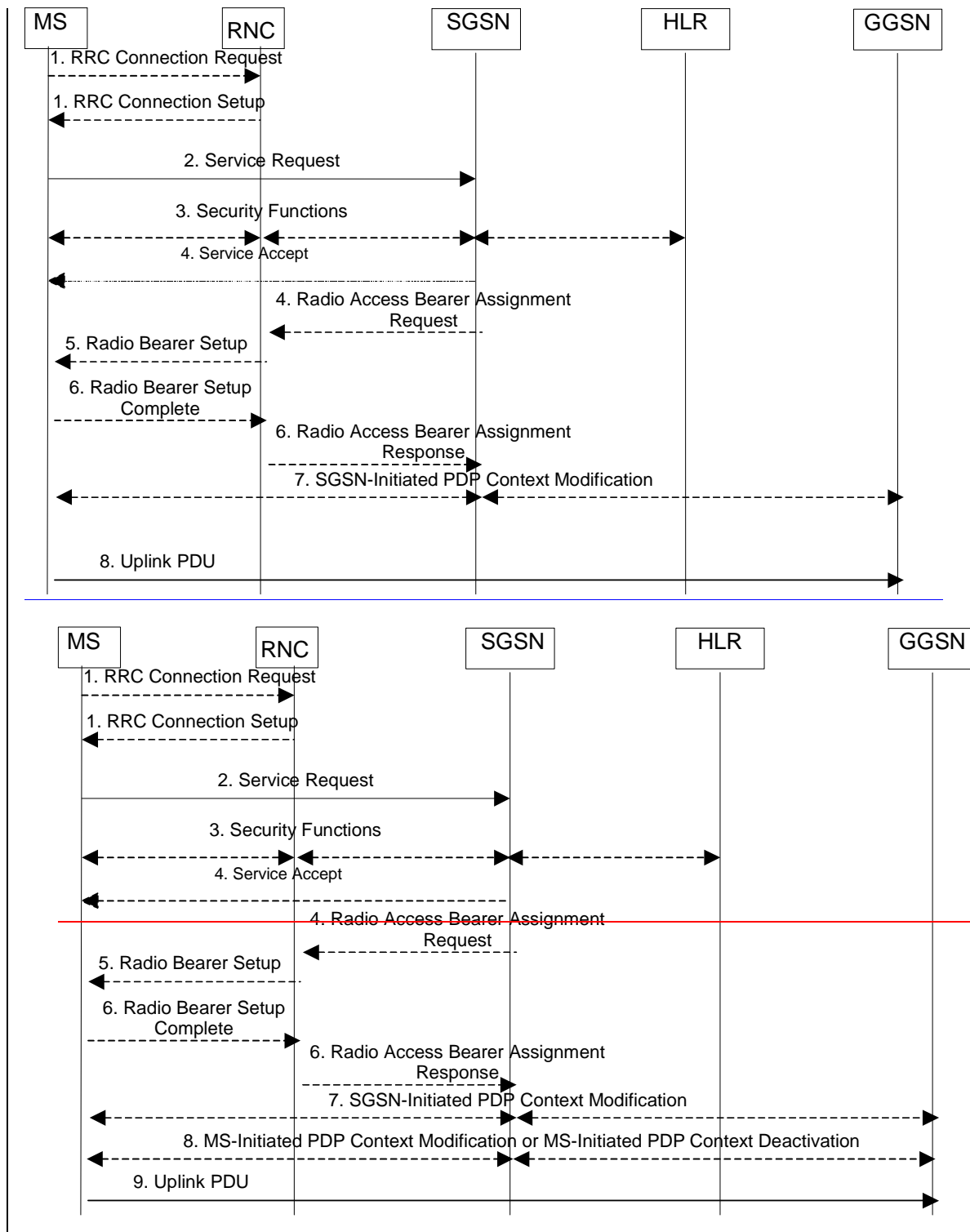
Figure 50: MS Initiated Service Request Procedure

1) The MS establishes an RRC connection, if none exists for CS traffic.

2) The MS sends 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. At this point, the SGSN may perform the authentication procedure.

   If Service Type indicates Data, a signalling connection is established between the MS and the SGSN, and resources for active PDP context(s) are allocated, i.e. RAB establishment for the activated PDP context(s).

If Service Type indicates Signalling, the signalling connection is established between the MS and the SGSN for sending upper-layer signalling messages, e.g. Activate PDP Context Request. The resources for active PDP context(s) are not allocated.

3) The SGSN shall perform the security functions if the MS in PMM-IDLE state initiated the service request.

4) If the network is in PMM-CONNECTED state and the Service Type indicates Data, the SGSN shall respond with a Service Accept message towards the MS, in case the service request can be accepted. In case Service Type indicates Data, the SGSN sends a Radio Access Bearer Assignment Request (NSAPIRAB ID(s), TEID(s), QoS Profile(s), SGSN IP Address(es)) message to re-establish radio access bearer for every activated PDP context, except the ones having maximum bit rates for uplink and downlink of 0 kbit/s.

5) The RNC indicates to the MS the new Radio Bearer Identity established and the corresponding RAB ID with the RRC radio bearer setup procedure.

6) SRNC responds with the Radio Access Bearer Assignment Response (RAB ID(s), TEID(s), QoS Profile(s), RNC IP Address(es)) message. The GTP tunnel(s) are established on the Iu interface. If the RNC returns a Radio Access Bearer Assignment Response message with a cause indicating that the requested QoS profile(s) can not be provided, e.g. "Requested Maximum Bit Rate not Available", the SGSN may send a new Radio Access Bearer Assignment Request message with different QoS profile(s). The number of re-attempts, if any, as well as how the new QoS profile(s) values are determined is implementation dependent.

7) For each RAB re-established with a modified QoS profile, the SGSN initiates a PDP Context Modification procedure to inform the MS and the GGSN of the new negotiated QoS profile for the corresponding PDP context.

8) ~~For each RAB using streaming or conversational traffic class with maximum bitrate of 0 kbit/s (e.g. after 'RNC-Initiated PDP Context Modification Procedure') the MS starts the MS-Initiated PDP Context Modification procedure or the PDP Context Deactivation Initiated by MS procedure to inform the CN whether to re-activate or to delete the PDP contexts.~~

89) The MS sends the uplink packet.

For Service Type = Signalling, the MS knows that the Service Request message was successfully received in the SGSN when the MS receives the RRC Security Mode Control Command message.

For Service Type = Data, in PMM-IDLE, the MS knows that the Service Request was successfully received when the MS receives the RRC Security Mode Control Command message from the RNC; in PMM-CONNECTED state, the MS knows that the Service Request was successfully received when the MS receives the Service Accept message.

NOTE: The reception of the Service Accept message does not imply the successful re-establishment of the RAB(s).
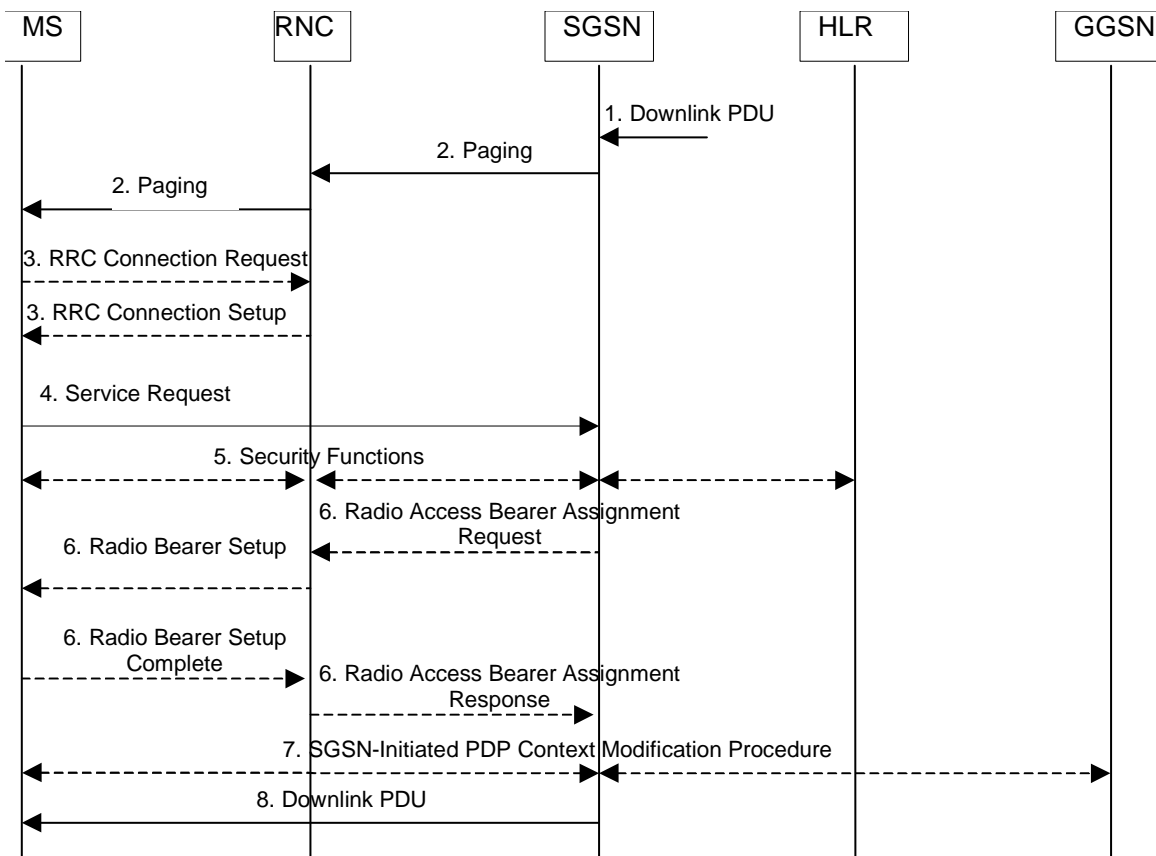
For any Service Type, in case the service request cannot be accepted, the network returns a Service Reject message to the MS with an appropriate cause value.

For Service Type = Data, in case the SGSN fails to re-establish RAB(s) for the PDP context(s), the SGSN determines if an SM procedure, such as SGSN-Initiated PDP Context Modification or PDP Context Deactivation, should be initiated. The appropriate action depends on the QoS profile of the PDP context and is an operator choice.

For each PDP context using streaming or conversational traffic class with maximum bit rate for uplink and downlink of 0 kbit/s the MS starts the MS-Initiated PDP Context Modification procedure or the MS-Initiated PDP Context Deactivation procedure to inform the SGSN whether to re-activate or to delete the PDP contexts. If the PDP context has been deactivated locally in the MS, the MS shall not perform the PDP context deactivation procedure for this PDP context because the list of active and inactive PDP contexts is included in the Service Request Message sent prior to the network.

6.12.2   Network Initiated Service Request Procedure

When the 3G-SGSN receives a downlink packet (e.g. Request PDP Context Activation, MT SMS, user data) for an MS in PMM-IDLE state, the 3G-SGSN sends a paging request to UTRAN. The paging request triggers the Service Request procedure in the MS.

Figure 51: Network Initiated Service Request Procedure

1) The SGSN receives a downlink PDP PDU for an MS in PMM-IDLE state.

2) The SGSN sends a Paging message to the RNC. The RNC pages the MS by sending a Paging message to the MS. See clause "PS Paging Initiated by 3G-SGSN without RRC Connection for CS" for details.

3) The MS establishes an RRC connection if none exists for CS traffic.

4) The MS sends a Service Request (P-TMSI, RAI, CKSN, Service Type) message to the SGSN. Service Type specifies Paging Response. The Service Request is carried over the radio in an RRC Direct Transfer message and over the Iu interface in the RANAP Initial MS message. At this point, the SGSN may perform the authentication procedure. The SGSN knows whether the downlink packet requires RAB establishment (e.g. downlink PDU) or not (e.g. Request PDP Context Activation or MT SMS).

5) The SGSN shall perform the security mode procedure.

6) If resources for the PDP contexts are re-established, the SGSN sends a Radio Access Bearer Assignment Request (RAB ID(s), TEID(s), QoS Profile(s), SGSN IP Address(es)) message to the RNC. The RNC sends a Radio Bearer Setup (RAB ID(s)) to the MS. The MS responds by returning a Radio Bearer Setup Complete message to the RNC. The RNC sends a Radio Access Bearer Assignment Response (RAB ID(s), TEID(s), RNC IP Address(es)) message to the SGSN in order to indicate that GTP tunnels are established on the Iu interface and radio access bearers are established between the RNC and the MS. If the RNC returns a Radio Access Bearer Assignment Response message with a cause indicating that the requested QoS profile(s) can not be provided, e.g. "Requested Maximum Bit Rate not Available", the SGSN may send a new Radio Access Bearer Assignment Request message with different QoS profile(s). The number of re-attempts, if any, as well as how the new QoS profile(s) values are determined is implementation dependent.

7) For each RAB re-established with a modified QoS profile, the SGSN initiates a PDP Context Modification procedure to inform the MS and the GGSN of the new negotiated QoS profile for the corresponding PDP context.
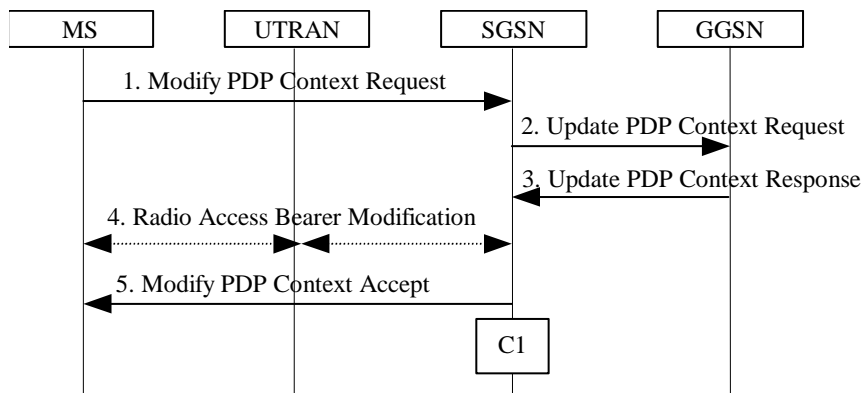
8) The SGSN sends the downlink packet.

For Service Type = Page Response, the MS knows that the Service Request message was successfully received in the SGSN when the MS receives the RRC Security Mode Control Command message.

In the case the SGSN fails to re-establish RAB(s) for the PDP context(s), the SGSN determines if an SM procedure, such as SGSN-Initiated PDP Context Modification or PDP Context Deactivation, should be initiated. The appropriate action depends on the QoS profile of the PDP context and is an operator choice.

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*****NEXT MODIFIED SECTION *******

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9.2.3.3 MS-Initiated PDP Context Modification Procedure

The MS-Initiated PDP Context Modification procedure is illustrated in Figure 72.

Figure 72: MS-Initiated PDP Context Modification Procedure

1) The MS sends a Modify PDP Context Request (TI, QoS Requested, TFT) message to the SGSN. Either QoS Requested or TFT or both may be included. QoS Requested indicates the desired QoS profile, while TFT indicates the TFT that is to be added or modified or deleted from the PDP context.

2) The SGSN may restrict the desired QoS profile given its capabilities, the current load, and the subscribed QoS profile. The SGSN sends an Update PDP Context Request (TEID, NSAPI, QoS Negotiated, TFT) message to the GGSN. If QoS Negotiated and/or TFT received from the SGSN is incompatible with the PDP context being modified (e.g., TFT contains inconsistent packet filters), the GGSN rejects the Update PDP Context Request. The GGSN operator configures the compatible QoS profile.

3) The GGSN may further restrict QoS Negotiated given its capabilities and the current load. The GGSN stores QoS Negotiated, stores, modifies, or deletes TFT of that PDP context as indicated in TFT, and returns an Update PDP Context Response (TEID, QoS Negotiated) message.

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

5) The SGSN selects Radio Priority and Packet Flow Id based on QoS Negotiated, and returns a Modify PDP Context Accept (TI, QoS Negotiated, Radio Priority, Packet Flow Id) message to the MS.

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

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

C1) CAMEL_GPRS_Change_Of_QoS.

The procedure returns as result "Continue".

9.2.3.4   RNC-Initiated PDP Context Modification Procedure

The RNC can request the release of the Iu connection (see clause "Iu Release Procedure") e.g. due to a break of the radio connection or due to user inactivity. After Iu Release the PDP contexts are modified as follows:

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

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

The following procedures shall be performed in the MS when radio coverage is lost:

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

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

9.2.3.5   RAB Release-Initiated Local PDP Context Modification Procedure

The RNC can request a RAB to be released through the RAB Release procedure ~~on the streaming or conversational traffic class bearers~~ without releasing the Iu connection ~~when there is a break in the radio connection~~.

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

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

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

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

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

-   For a PDP context using streaming or conversational traffic class, the PDP context is preserved, but the maximum bit rate is downgraded to 0 kbit/s (for both uplink and downlink) ~~when the RRC re-establishment procedure has failed~~.
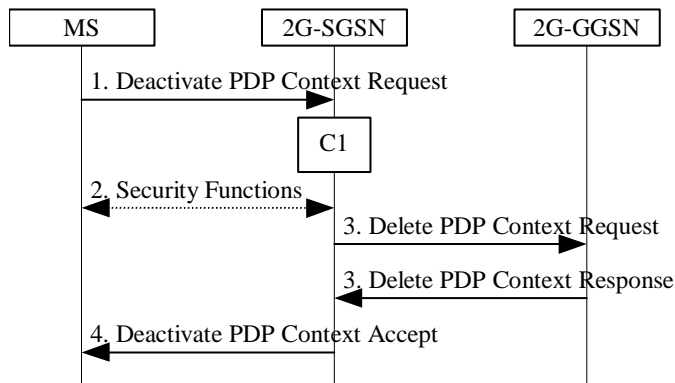
    At this point or at a later stage, the MS may start a PDP Context Deactivation procedure or PDP Context Modification procedure. ~~After coverage is regained the MS should start the MS-Initiated PDP Context Modification procedure or the PDP Context Deactivation Initiated by MS procedure.~~ The MS shall use the PDP context modification procedure to re-activate the PDP context and to re-establish the RAB.

~~The radio access bearer shall be released by the RNC only when RRC re-establishment is not any longer possible.~~
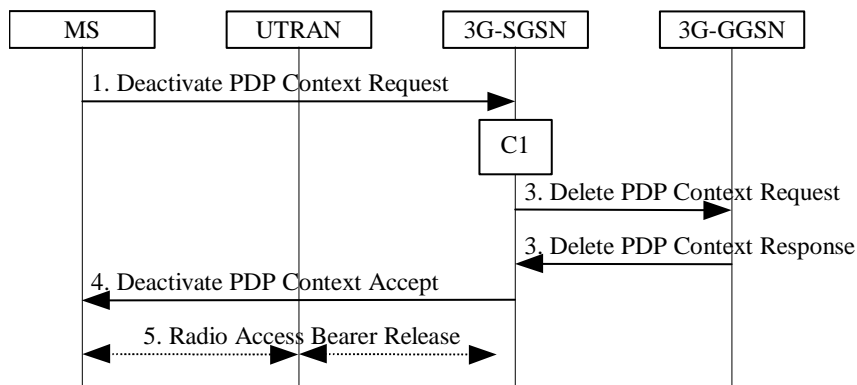~~Therefore the change happens simultaneously in the MS and in the SGSN.~~

****NEXT MODIFIED SECTION ******

9.2.4.1 MS Initiated PDP Context Deactivation Procedure

The PDP Context Deactivation Initiated by MS procedures for GSM and UMTS are illustrated in Figure 74 andFigure 75, respectively.

Figure 74: MS Initiated PDP Context Deactivation Procedure for GSM

Figure 75: MS Initiated PDP Context Deactivation Procedure for UMTS

1) The MS sends a Deactivate PDP Context Request (TI, Teardown Ind) message to the SGSN.

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

3) The SGSN sends a Delete PDP Context Request (TEID, NSAPI, Teardown Ind) message to the GGSN. If the MS in the Deactivate PDP Context Request message included Teardown Ind, then the SGSN deactivates all PDP contexts associated with this PDP address by including Teardown Ind in the Delete PDP Context Request message. The GGSN removes the PDP context(s) and returns a Delete PDP Context Response (TEID) message to the SGSN. If the MS was using a dynamic PDP address allocated by the GGSN, and if the context being deactivated is the last PDP context associated with this PDP address, then the GGSN releases this PDP address and makes it available for subsequent activation by other MSs. The Delete PDP Context messages are sent over the backbone network.

4) The SGSN returns a Deactivate PDP Context Accept (TI) message to the MS.

5) In Iu mode, radio access bearer release is done by the RAB Assignment procedure, if a RAB exists for this PDP context.

At GPRS detach, all PDP contexts for the MS are implicitly deactivated.

If the SGSN receives a Deactivate PDP Context Request (TI) message for a PDP context that is currently being activated, the SGSN shall stop the PDP Context Activation procedure without responding to the MS, and continue with the PDP Context Deactivation initiated by MS procedure.

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

    C1)   CAMEL_GPRS_PDP_Context_Disconnection.

The procedure returns as result "Continue".

<div style="text-align:center">****NEXT MODIFIED SECTION *******</div>

9.2.5.2   Re-establishment of RABs

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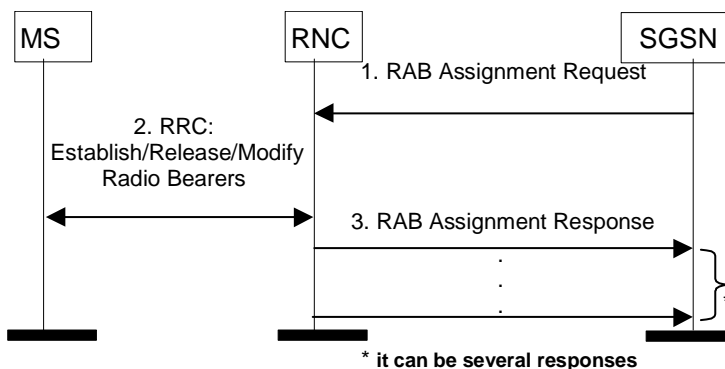
The MS initiates the re-establishment of RABs by using the Service Request (Service Type = Data) message. This is described in the sub-clause "MS Initiated Service Request Procedure". SGSN shall not establish RABs for PDP contexts with maximum bit rate for uplink and downlink of 0 kbit/s. For these PDP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

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

<div style="text-align:center">****NEXT MODIFIED SECTION *******</div>

12.7.4   RAB Assignment Procedure

The purpose of the RAB Assignment procedure is to enable establishment of new RABs for a given MS and/or modification and/or release of already established RABs. When this procedure is executed and if there is any PDP context without radio access bearer assigned, all the radio access bearer are re-established, except the ones having maximum bit rates of 0 kbit/s for uplink and downlink. The same messages are used for the three mentioned actions and it is only the content carried by the messages that is different. The RAB Assignment procedure, which is shown below, is specified in 3GPP TS 25.413. The RRC protocol is specified in 3GPP TS 25.331.

Figure 90: RAB Assignment Procedure

1) The SGSN sends a RAB Assignment Request message to the RNC to establish, modify, or release one or several RABs. For each requested RAB or modified, if the RAB is allowed for queuing and the resource situation requires it, the RNC may place the RAB in the establishment queue.

2) The RNC establishes, modifies, or releases the appropriate radio bearers.

3) The RNC returns a RAB Assignment Response message to the SGSN. If the request to establish or modify one or several RABs has been queued, the RNC will report the outcome of the establishment or modification in subsequent RAB Assignment Response messages. If the SGSN receives a RAB Assignment Response message with a cause indicating that the requested QoS profile(s) can not be provided (e.g. "Requested Maximum Bit Rate not Available"), then the SGSN may send a new RAB Assignment Request message with different QoS

profile(s). The number of re-attempts, if any, as well as how the new QoS profile(s) values are determined is implementation dependent.

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CR-Form-v7

CHANGE REQUEST

| ⌘ | **23.060** CR | **375** ⌘ rev | ⌘ | Current version: | **5.2.0** | ⌘ |

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

</div>

Proposed change affects: UICC apps⌘ ☐   ME **X** Radio Access Network ☐   Core Network **X**

Title:	⌘	Clarification to preserved real-time PDP contexts RAB establishment
Source:	⌘	Nokia
Work item code:	⌘ TEI5	**Date:** ⌘ 28/06/2002
Category:	⌘ **A**	**Release:** ⌘ Rel-5

Use <u>one</u> of the following categories:
F (correction)
A (corresponds to a correction in an earlier release)
B (addition of feature),
C (functional modification of feature)
D (editorial modification)
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use <u>one</u> of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)

Reason for change: ⌘	In case of an Iu or RAB release the PDP contexts are preserved in the SGSN and GGSN. The associated RABs can be re-established at later stage. When PDP contexts using streaming or conversational traffic class are preserved in the core network, the maximum bit rate is dowgraded to 0 kbit/s (for uplink and downlink). Due to the fact that RANAP protocol does not allow to establish RABs with value of 0 kbit/s for the maximum bit rate (for both uplink and downlink), it needs to be clarified that to re-establish such RAB the MS shall start PDP Context Modification procedure (and upgrade max bit rate to correct value) or deactivate the PDP context.
Summary of change: ⌘	It is clarified: - that SGSN shall not establish RABs for PDP contexts with maximum bitrate for uplink and downlink of 0 kbit/s. - to re-establish such RAB the MS shall start PDP Context Modification procedure (and upgrade max bit rate to correct value) or deactivate the PDP context.
Consequences if not approved: ⌘	The current specification text does not describe how RABs can be re-established in the case of preserved PDP context with 0kbit/s for maximum bit rate (for uplink and downlink. This may result different implementations of ME and/or PS Core Network elements with incorrect and undesirable effects.

Clauses affected:	⌘	6.9.2.2.1-3; 6.12.1-2; 9.2.3.3-5; 9.2.4.1; 9.2.5.2; 12.7.4		

		Y	**N**			
Other specs	⌘	X		Other core specifications	⌘	24.008
affected:				Test specifications		
				O&M Specifications		

Other comments:	⌘		

6.9.2.2.1 Serving RNS Relocation Procedure

This procedure is only performed for an MS in PMM-CONNECTED state where the Iur interface carries both the control signalling and the user data. This procedure is not applicable for GERAN.

The Serving SRNS Relocation procedure is used to move the RAN to CN connection point at the RAN side from the source SRNC to the target RNC, from a "standing still position". In the procedure, the Iu links are relocated. If the target RNC is connected to the same SGSN as the source SRNC, an Intra-SGSN SRNS Relocation procedure is performed. If the routeing area is changed, this procedure is followed by an Intra-SGSN Routeing Area Update procedure. The SGSN detects 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 HLR about new location of the MS.

Figure 37 shows user data routing before SRNS relocation when source SRNC and target RNC are connected to different SGSNs. Figure 38 shows the user data routing after SRNS Relocation procedure and Routeing Area Update procedure is completed. In case depicted in Figure 37 and Figure 38, the MS is in state PMM-CONNECTED.

Figure 37: Before SRNS Relocation and Routeing Area Update

Before the SRNS Relocation procedure and RA update, the MS is registered in the old SGSN. The source RNC is acting as a serving RNC (SRNC).

Figure 38: After SRNS Relocation and Routeing Area Update

After the SRNS Relocation procedure and RA update, the MS is registered in the new SGSN. The MS is in the state PMM-CONNECTED towards the new SGSN, and the target RNC is acting as the serving RNC.

The Serving SRNS Relocation procedure is illustrated in Figure 39. The sequence is valid for both intra-SGSN SRNS relocation and inter-SGSN SRNS relocation.

Figure 39: SRNS Relocation Procedure

1) The source SRNC decides to perform/initiate SRNS relocation. At this point both uplink and downlink user data flows via the following tunnel(s): Radio Bearer between MS and source SRNC (data flows via the target RNC, which acts as a drift RNC); GTP-U tunnel(s) between source SRNC and old-SGSN; GTP-U tunnel(s) between old-SGSN and GGSN.

2) The source SRNC sends a Relocation Required message (Relocation Type, Cause, Source ID, Target ID, Source RNC to target RNC transparent container) to the old SGSN. The source SRNC shall set the Relocation Type to "UE not involved". The Source SRNC to Target RNC Transparent Container includes the necessary information for Relocation co-ordination, security functionality and RRC protocol context information (including MS Capabilities).

3) The old SGSN determines from the Target ID if the SRNS Relocation is intra-SGSN SRNS relocation or inter-SGSN SRNS relocation. In case of inter-SGSN SRNS relocation, the old SGSN initiates the relocation resource allocation procedure by sending a Forward Relocation Request message (IMSI, Tunnel Endpoint Identifier Signalling, MM Context, PDP Context, Target Identification, RAN transparent container, RANAP Cause) to the new SGSN. For relocation to an area where Intra Domain Connection of RAN Nodes to Multiple CN Nodes is

used, the old SGSN may – if it provides Intra Domain Connection of RAN Nodes to Multiple CN Nodes -have multiple target SGSNs for each relocation target in a pool area, in which case the old SGSN will select one of them to become the new SGSN, as specified in 3GPP TS 23.236 [73]. The PDP context contains GGSN Address for User Plane and Uplink TEID for Data (to this GGSN Address and Uplink TEID for Data the old SGSN and the new SGSN send uplink packets). At the same time a timer is started on the MM and PDP contexts in the old SGSN (see the Routeing Area Update procedure in subclause "Location Management Procedures (Iu mode)"). The Forward Relocation Request message is applicable only in the case of inter-SGSN SRNS relocation.

4) The new SGSN sends a Relocation Request message (Permanent NAS UE Identity, Cause, CN Domain Indicator, Source-RNC to target RNC transparent container, RABs to be setup) to the target RNC. Only the Iu Bearers of the RABs are setup between the target RNC and the new-SGSN as the existing Radio Bearers will be reallocated between the MS and the target RNC when the target RNC takes the role of the serving RNC. For each requested RAB, the RABs to be setup information elements shall contain information such as RAB ID, RAB parameters, Transport Layer Address, and Iu Transport Association. SGSN shall not establish RABs for PDP contexts with maximum bitrate for uplink and downlink of 0 kbit/s. The RAB ID information element contains the NSAPI value, and the RAB parameters information element gives the QoS profile. The Transport Layer Address is the SGSN Address for user data, and the Iu Transport Association corresponds to the uplink Tunnel Endpoint Identifier Data. After all necessary resources for accepted RABs including the Iu user plane are successfully allocated; the target RNC shall send the Relocation Request Acknowledge message (RABs setup, RABs failed to setup) to the new SGSN. Each RAB to be setup is defined by a Transport Layer Address, which is the target RNC Address for user data, and an Iu Transport Association, which corresponds to the downlink Tunnel Endpoint Identifier for user data. For each RAB to be set up, the target RNC may receive simultaneously downlink user packets both from the source SRNC and from the new SGSN.

5) When resources for the transmission of user data between the target RNC and the new SGSN have been allocated and the new SGSN is ready for relocation of SRNS, the Forward Relocation Response message (Cause, RANAP Cause, and RAB Setup Information) is sent from the new SGSN to old SGSN. This message indicates that the target RNC is ready to receive from source SRNC the forwarded downlink PDUs, i.e. the relocation resource allocation procedure is terminated successfully. RANAP Cause is information from the target RNC to be forwarded to the source SRNC. The RAB Setup Information, one information element for each RAB, contains the RNC Tunnel Endpoint Identifier and the RNC IP address for data forwarding from the source SRNC to the target RNC. If the target RNC or the new SGSN failed to allocate resources, the RAB Setup Information element contains only NSAPI indicating that the source SRNC shall release the resources associated with the NSAPI. The Forward Relocation Response message is applicable only in case of inter-SGSN SRNS relocation.

6) The old SGSN continues the relocation of SRNS by sending a Relocation Command message (RABs to be released, and RABs subject to data forwarding) to the source SRNC. The old SGSN decides the RABs to be subject for data forwarding based on QoS, and those RABs shall be contained in RABs subject to data forwarding. For each RAB subject to data forwarding, the information element shall contain RAB ID, Transport Layer Address, and Iu Transport Association. These are the same Transport Layer Address and Iu Transport Association that the target RNC had sent to new SGSN in Relocation Request Acknowledge message, and these are used for forwarding of downlink N-PDU from source SRNC to target RNC. The source SRNC is now ready to forward downlink user data directly to the target RNC over the Iu interface. This forwarding is performed for downlink user data only.

7) The source SRNC may, according to the QoS profile, begin the forwarding of data for the RABs to be subject for data forwarding. The data forwarding at SRNS relocation shall be carried out through the Iu interface, meaning that the data exchanged between the source SRNC and the target RNC are duplicated in the source SRNC and routed at IP layer towards the target RNC. For each radio bearer which uses lossless PDCP the GTP-PDUs related to transmitted but not yet acknowledged PDCP-PDUs are duplicated and routed at IP layer towards the target RNC together with their related downlink PDCP sequence numbers. The source RNC continues transmitting duplicates of downlink data and receiving uplink data. Before the serving RNC role is not yet taken over by target RNC and when downlink user plane data starts to arrive to target RNC, the target RNC may buffer or discard arriving downlink GTP-PDUs according to the related QoS profile.

Note: The order of steps, starting from step 7 onwards, does not necessarily reflect the order of events. For instance, source RNC may start data forwarding (step 7) and send Relocation Commit message (step 8) almost simultaneously except in the delivery order required case where step 7 triggers step 8. Target RNC may send Relocation Detect message (step 9) and RAN Mobility Information message (step 10) at the same time. Hence, target RNC may receive RAN Mobility Information Confirm message (step 10) while data forwarding (step 7) is still underway, and before the new SGSN receives Update PDP Context Response message (step 11).

8) Before sending the Relocation Commit the uplink and downlink data transfer in the source, SRNC shall be suspended for RABs, which require delivery order. The source RNC shall start the data-forwarding timer. When the source SRNC is ready, the source SRNC shall trigger the execution of relocation of SRNS by sending a Relocation Commit message (SRNS Contexts) to the target RNC over the Iur interface. The purpose of this procedure is to transfer SRNS contexts from the source RNC to the target RNC, and to move the SRNS role from the source RNC to the target RNC. SRNS contexts are sent for each concerned RAB and contain the sequence numbers of the GTP-PDUs next to be transmitted in the uplink and downlink directions and the next PDCP sequence numbers that would have been used to send and receive data from the MS. For PDP context(s) using delivery order not required (QoS profile), the sequence numbers of the GTP-PDUs next to be transmitted are not used by the target RNC. PDCP sequence numbers are only sent by the source RNC for radio bearers, which used lossless PDCP [57]. The use of lossless PDCP is selected by the RNC when the radio bearer is set up or reconfigured.

If delivery order is required (QoS profile), consecutive GTP-PDU sequence numbering shall be maintained throughout the lifetime of the PDP context(s). Therefore, during the entire SRNS relocation procedure for the PDP context(s) using delivery order required (QoS profile), the responsible GTP-U entities (RNCs and GGSN) shall assign consecutive GTP-PDU sequence numbers to user packets belonging to the same PDP context for uplink and downlink, respectively.

9) The target RNC shall send a Relocation Detect message to the new SGSN when the relocation execution trigger is received. For SRNS relocation type "UE not involved", the relocation execution trigger is the reception of the Relocation Commit message from the Iur interface. When the Relocation Detect message is sent, the target RNC shall start SRNC operation.

10) The target SRNC sends a RAN Mobility Information message. This message contains UE information elements and CN information elements. The UE information elements include among others new SRNC identity and S-RNTI. The CN information elements contain among others Location Area Identification and Routeing Area Identification. The procedure shall be co-ordinated in all Iu signalling connections existing for the MS.

The target SRNC establishes and/or restarts the RLC, and exchanges the PDCP sequence numbers (PDCP-SNU, PDCP-SND) between the target SRNC and the MS. PDCP-SND is the PDCP sequence number for the next expected in-sequence downlink packet to be received in the MS per radio bearer, which used lossless PDCP in the source RNC. PDCP-SND confirms all mobile-terminated packets successfully transferred before the SRNC relocation. If PDCP-SND confirms reception of packets that were forwarded from the source SRNC, the target SRNC shall discard these packets. PDCP-SNU is the PDCP sequence number for the next expected in-sequence uplink packet to be received in the RNC per radio bearer, which used lossless PDCP in the source RNC. PDCP-SNU confirms all mobile originated packets successfully transferred before the SRNC relocation. If PDCP-SNU confirms reception of packets that were received in the source SRNC, the MS shall discard these packets.

Upon reception of the RAN Mobility Information message the MS may start sending uplink user data to the target SRNC. When the MS has reconfigured itself, it sends the RAN Mobility Information Confirm message to the target SRNC. This indicates that the MS is also ready to receive downlink data from the target SRNC.

If new the SGSN has already received the Update PDP Context Response message from the GGSN, it shall forward the uplink user data to GGSN over this new GTP-U tunnel. Otherwise, the new SGSN shall forward the uplink user data to that GGSN IP address and TEID(s), which the new SGSN had received earlier by the Forward Relocation Request message.

For all RABs, the target RNC should:

start uplink reception of data and start transmission of uplink GTP-PDUs towards the new SGSN;

start processing the already buffered and the arriving downlink GTP-PDUs and start downlink transmission towards the MS.

11) Upon receipt of the Relocation Detect message, the CN may switch the user plane from source RNC to target SRNC. If the SRNS Relocation is an inter SGSN SRNS relocation, the new SGSN sends Update PDP Context Request messages (new SGSN Address, SGSN Tunnel Endpoint Identifier, QoS Negotiated) to the GGSNs concerned. The GGSNs update their PDP context fields and return an Update PDP Context Response (GGSN Tunnel Endpoint Identifier).

12) When the target SRNC receives the RAN Mobility Information Confirm message, i.e. the new SRNC—ID + S-RNTI are successfully exchanged with the MS by the radio protocols, the target SRNC shall initiate the

Relocation Complete procedure by sending the Relocation Complete message to the new SGSN. The purpose of the Relocation Complete procedure is to indicate by the target SRNC the completion of the relocation of the SRNS to the CN. If the user plane has not been switched at Relocation Detect and upon reception of Relocation Complete, the CN shall switch the user plane from source RNC to target SRNC. If the SRNS Relocation is an inter-SGSN SRNS relocation, the new SGSN shall signal to the old SGSN the completion of the SRNS relocation procedure by sending a Forward Relocation Complete message.

13) Upon receiving the Relocation Complete message or if it is an inter-SGSN SRNS relocation; the Forward Relocation Complete message, the old SGSN sends an Iu Release Command message to the source RNC. When the RNC data-forwarding timer has expired the source RNC responds with an Iu Release Complete.

14) After the MS has finished the RNTI reallocation procedure and if the new Routeing Area Identification is different from the old one, the MS initiates the Routeing Area Update procedure. See subclause "Location Management Procedures (Iu mode)". Note that it is only a subset of the RA update procedure that is performed, since the MS is in PMM-CONNECTED mode.

If the SRNS Relocation is inter-SGSN, then the following CAMEL procedure calls shall be performed (see referenced procedures in 3GPP TS 23.078)C1)   CAMEL_GPRS_PDP_Context_Disconnection and CAMEL_GPRS_Detach.

They are called in the following order:

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

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

If the SRNS Relocation is intra-SGSN, then the above mentioned CAMEL procedures calls shall not be performed.

If Routeing Area Update occurs, then the following CAMEL procedure calls shall be performed (see referenced procedures in 3GPP TS 23.078):

C2)   CAMEL_GPRS_Routeing_Area_Update_Session.

The procedure returns as result "Continue".

C3)   CAMEL_GPRS_Routeing_Area_Update_Context.

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

For C2 and C3: refer to Routing Area Update procedure description for detailed message flow.
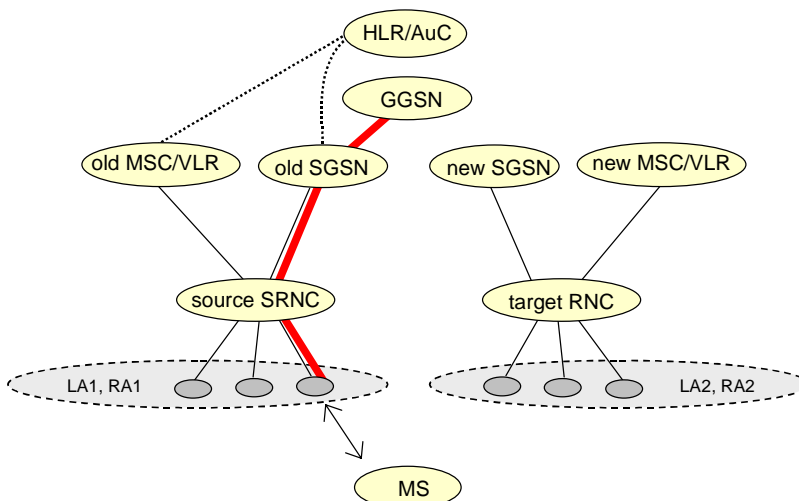
6.9.2.2.2   Combined Hard Handover and SRNS Relocation Procedure

This procedure is only performed for an MS in PMM-CONNECTED state in case the Iur interface is not available. In the context of this specification, the terms RNS or RNC refer also to a GERAN BSS or BSC (respectively) when serving a mobile in Iu mode.

The Combined Hard Handover and SRNS Relocation procedure is used to move the RAN to CN connection point at the RAN side from the source SRNC to the target RNC, while performing a hard handover decided by the RAN. In the procedure, the Iu links are relocated. If the target RNC is connected to the same SGSN as the source SRNC, an Intra-SGSN SRNS Relocation procedure is performed. If the routeing area is changed, this procedure is followed by an Intra-SGSN Routeing Area Update procedure. 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 HLR about the new MS location.

If the target RNC is connected to a different SGSN than the source SRNC, an Inter-SGSN SRNS Relocation procedure is performed. This procedure is followed by an Inter-SGSN Routeing Area Update procedure.

Figure 40 shows the situation before a Combined Hard Handover and SRNS Relocation procedure when source and target RNC are connected to different SGSNs. Figure 41 shows the situation after the Combined Hard Handover and SRNS Relocation procedure and RA update procedure have been completed. In the case described in Figure 40 and Figure 41 the MS is in PMM-CONNECTED state. Both figures are also applicable to BSS to RNS relocation and vice-versa, as well as for BSS to BSS relocation.

Figure 40: Before Combined Hard Handover and SRNS Relocation and Routeing Area Update

Before the SRNS Relocation and Routeing Area Update the MS is registered in the old SGSN and in the old MSC/VLR. The source RNC is acting as serving RNC.

Figure 41: After Combined Hard Handover and SRNS Relocation and Routeing Area Update

After the SRNS relocation and RA update, the MS is registered in the new SGSN and in the new MSC/VLR. The MS is in state PMM-CONNECTED towards the new SGSN and in MM IDLE state towards the new MSC/VLR. The target RNC is acting as serving RNC.

The Combined Hard Handover and SRNS Relocation procedure for the PS domain is illustrated in Figure 42. The sequence is valid for both intra-SGSN SRNS relocation and inter-SGSN SRNS relocation. Furthermore, this signalling flow is also applicable for BSS to RNS relocation and vice-versa, as well as BSS to BSS relocation.

Figure 42: Combined Hard Handover and SRNS Relocation Procedure

1) Based on measurement results and knowledge of the RAN topology, the source SRNC decides to initiate a combined hard handover and SRNS relocation. At this point both uplink and downlink user data flows via the following tunnel(s): Radio Bearer between the MS and the source SRNC (no drift RNC available); GTP-U tunnel(s) between the source SRNC and the old SGSN; GTP-U tunnel(s) between the old SGSN and the GGSN.

2) The source SRNC sends a Relocation Required message (Relocation Type, Cause, Source ID, Target ID, Source RNC To Target RNC Transparent Container) to the old SGSN. The source SRNC shall set Relocation Type to "UE Involved". Source RNC To Target RNC Transparent Container includes the necessary information for

relocation co-ordination, security functionality and RRC protocol context information (including MS Capabilities).

3) The old SGSN determines from the Target ID if the SRNS relocation is intra-SGSN SRNS relocation or inter-SGSN SRNS relocation. In case of inter-SGSN SRNS relocation the old SGSN initiates the relocation resource allocation procedure by sending a Forward Relocation Request message (IMSI, Tunnel Endpoint Identifier Signalling, MM Context, PDP Context, Target Identification, RAN Transparent Container, RANAP Cause) to the new SGSN. For relocation to an area where Intra Domain Connection of RAN Nodes to Multiple CN Nodes is used, the old SGSN may – if it provides Intra Domain Connection of RAN Nodes to Multiple CN Nodes -have multiple target SGSNs for each relocation target in a pool area, in which case the old SGSN will select one of them to become the new SGSN, as specified in 3GPP TS 23.236 [73]. PDP context contains GGSN Address for User Plane and Uplink TEID for Data (to this GGSN Address and Uplink TEID for Data, the old SGSN and the new SGSN send uplink packets). At the same time a timer is started on the MM and PDP contexts in the old SGSN (see Routeing Area Update procedure in subclause "Location Management Procedures (Iu mode)"). The Forward Relocation Request message is applicable only in case of inter-SGSN SRNS relocation.

4) The new SGSN sends a Relocation Request message (Permanent NAS UE Identity, Cause, CN Domain Indicator, Source RNC To Target RNC Transparent Container, RAB To Be Setup) to the target RNC. For each RAB requested to be established, RABs To Be Setup shall contain information such as RAB ID, RAB parameters, Transport Layer Address, and Iu Transport Association. SGSN shall not establish RABs for PDP contexts with maximum bitrate for uplink and downlink of 0 kbit/s. The RAB ID information element contains the NSAPI value, and the RAB parameters information element gives the QoS profile. The Transport Layer Address is the SGSN Address for user data, and the Iu Transport Association corresponds to the uplink Tunnel Endpoint Identifier Data.

After all the necessary resources for accepted RABs including the Iu user plane are successfully allocated, the target RNC shall send the Relocation Request Acknowledge message (Target RNC To Source RNC Transparent Container, RABs Setup, RABs Failed To Setup) to the new SGSN. Each RAB to be setup is defined by a Transport Layer Address, which is the target RNC Address for user data, and the Iu Transport Association, which corresponds to the downlink Tunnel Endpoint Identifier for user data. The transparent container contains all radio-related information that the MS needs for the handover, i.e., a complete RRC message (e.g., Physical Channel Reconfiguration in UTRAN case, or Handover From UTRAN, or Handover Command in GERAN Iu mode case) to be sent transparently via CN and source SRNC to the MS. For each RAB to be set up, the target RNC may receive simultaneously downlink user packets both from the source SRNC and from the new SGSN.

5) When resources for the transmission of user data between target RNC and new SGSN have been allocated and the new SGSN is ready for relocation of SRNS, the Forward Relocation Response (Cause, RAN Transparent Container, RANAP Cause, Target-RNC Information) message is sent from the new SGSN to the old SGSN. This message indicates that the target RNC is ready to receive from source SRNC the forwarded downlink PDUs, i.e., the relocation resource allocation procedure is terminated successfully. RAN transparent container and RANAP Cause are information from the target RNC to be forwarded to the source SRNC. The Target RNC Information, one information element for each RAB to be set up, contains the RNC Tunnel Endpoint Identifier and RNC IP address for data forwarding from the source SRNC to the target RNC. The Forward Relocation Response message is applicable only in case of inter-SGSN SRNS relocation.

6) The old SGSN continues the relocation of SRNS by sending a Relocation Command message (Target RNC To Source RNC Transparent Container, RABs To Be Released, RABs Subject To Data Forwarding) to the source SRNC. The old SGSN decides the RABs to be subject for data forwarding based on QoS, and those RABs shall be contained in RABs subject to data forwarding. For each RAB subject to data forwarding, the information element shall contain RAB ID, Transport Layer Address, and Iu Transport Association. These are the same Transport Layer Address and Iu Transport Association that the target RNC had sent to new SGSN in Relocation Request Acknowledge message, and these are used for forwarding of downlink N-PDU from the source SRNC to the target RNC. The source SRNC is now ready to forward downlink user data directly to the target RNC over the Iu interface. This forwarding is performed for downlink user data only.

7) The source SRNC may, according to the QoS profile, begins the forwarding of data for the RABs to be subject for data forwarding.

NOTE: The order of steps, starting from step 7 onwards, does not necessarily reflect the order of events. For instance, source RNC may start data forwarding (step 7), send the RRC message to MS (step 8) and forward SRNS Context message to the old SGSN (step 9) almost simultaneously.

The data forwarding at SRNS relocation shall be carried out through the Iu interface, meaning that the GTP-PDUs exchanged between the source SRNC and the target RNC are duplicated in the source SRNC and routed at the IP layer towards the target RNC. For each radio bearer which uses lossless PDCP the GTP-PDUs related to transmitted but not yet acknowledged PDCP-PDUs are duplicated and routed at IP layer towards the target RNC together with their related downlink PDCP sequence numbers. The source RNC continues transmitting duplicates of downlink data and receiving uplink data.

Before the serving RNC role is not yet taken over by target RNC and when downlink user plane data starts to arrive to target RNC, the target RNC may buffer or discard arriving downlink GTP-PDUs according to the related QoS profile.

8) Before sending the RRC message the uplink and downlink data transfer shall be suspended in the source SRNC for RABs, which require delivery order. The RRC message is for example Physical Channel Reconfiguration for RNS to RNS relocation, or Intersystem to UTRAN Handover for BSS to RNS relocation, or Handover from UTRAN Command for BSS relocation, or Handover Command for BSS to BSS relocation. When the source SRNC is ready, the source RNC shall trigger the execution of relocation of SRNS by sending to the MS the RRC message provided in the Target RNC to source RNC transparent container, e.g., a Physical Channel Reconfiguration (UE Information Elements, CN Information Elements) message. UE Information Elements include among others new SRNC identity and S-RNTI. CN Information Elements contain among others Location Area Identification and Routeing Area Identification.

When the MS has reconfigured itself, it sends an RRC message e.g., a Physical Channel Reconfiguration Complete message to the target SRNC. If the Forward SRNS Context message with the sequence numbers is received, the exchange of packets with the MS may start. If this message is not yet received, the target RNC may start the packet transfer for all RABs, which do not require maintaining the delivery order.

9) The source SRNC continues the execution of relocation of SRNS by sending a Forward SRNS Context (RAB Contexts) message to the target RNC via the old and the new SGSN, which is acknowledged by a Forward SRNS Context Acknowledge message. The purpose of this procedure is to transfer SRNS contexts from the source RNC to the target RNC, and to move the SRNS role from the source RNC to the target RNC. SRNS contexts are sent for each concerned RAB and contain the sequence numbers of the GTP PDUs next to be transmitted in the uplink and downlink directions and the next PDCP sequence numbers that would have been used to send and receive data from the MS. PDCP sequence numbers are only sent by the source RNC for the radio bearers which used lossless PDCP [57]. The use of lossless PDCP is selected by the RNC when the radio bearer is set up or reconfigured. For PDP context(s) using delivery order not required (QoS profile), the sequence numbers of the GTP-PDUs next to be transmitted are not used by the target RNC.

If delivery order is required (QoS profile), consecutive GTP-PDU sequence numbering shall be maintained throughout the lifetime of the PDP context(s). Therefore, during the entire SRNS relocation procedure for the PDP context(s) using delivery order required (QoS profile), the responsible GTP-U entities (RNCs and GGSN) shall assign consecutive GTP-PDU sequence numbers to user packets belonging to the same PDP context uplink and downlink, respectively.

The target RNC establishes and/or restarts the RLC and exchanges the PDCP sequence numbers (PDCP-SNU, PDCP-SND) between the target RNC and the MS. PDCP-SND is the PDCP sequence number for the next expected in-sequence downlink packet to be received by the MS per radio bearer, which used lossless PDCP in the source RNC. PDCP-SND confirms all mobile terminated packets successfully transferred before the SRNC relocation. If PDCP-SND confirms reception of packets that were forwarded from the source SRNC, then the target SRNC shall discard these packets. PDCP-SNU is the PDCP sequence number for the next expected in-sequence uplink packet to be received in the RNC per radio bearer, which used lossless PDCP in the source RNC. PDCP-SNU confirms all mobile originated packets successfully transferred before the SRNC relocation. If PDCP-SNU confirms reception of packets that were received in the source SRNC, the MS shall discard these packets.

10) The target RNC shall send a Relocation Detect message to the new SGSN when the relocation execution trigger is received. For SRNS relocation type "UE Involved", the relocation execution trigger may be received from the Uu interface; i.e., when target RNC detects the MS on the lower layers. When the Relocation Detect message is sent, the target RNC shall start SRNC operation.

11) Upon reception of the Relocation Detect message, the CN may switch the user plane from the source RNC to the target SRNC. If the SRNS relocation is an inter-SGSN SRNS relocation, the new SGSN sends an Update PDP Context Request (New SGSN Address, SGSN Tunnel Endpoint Identifier, QoS Negotiated) message to the

GGSNs concerned. The GGSNs update their PDP context fields and return an Update PDP Context Response (GGSN Tunnel Endpoint Identifier) message.

12) When the target SRNC receives the appropriate RRC message, e.g. Physical Channel Reconfiguration Complete message or the Radio Bearer Release Complete message in UTRAN case, or the Handover To UTRAN Complete message or Handover Complete message in GERAN case, i.e. the new SRNC-ID + S-RNTI are successfully exchanged with the MS by the radio protocols, the target SRNC shall initiate a Relocation Complete procedure by sending the Relocation Complete message to the new SGSN. The purpose of the Relocation Complete procedure is to indicate by the target SRNC the completion of the relocation of the SRNS to the CN. If the user plane has not been switched at Relocation Detect, the CN shall upon reception of Relocation Complete switch the user plane from source RNC to target SRNC. If the SRNS Relocation is an inter-SGSN SRNS relocation, the new SGSN signals to the old SGSN the completion of the SRNS relocation procedure by sending a Forward Relocation Complete message.

13) Upon receiving the Relocation Complete message or, if it is an inter-SGSN SRNS relocation, the Forward Relocation Complete message, the old SGSN sends an Iu Release Command message to the source RNC. When the RNC data-forwarding timer has expired, the source RNC responds with an Iu Release Complete message.

14) After the MS has finished the reconfiguration procedure and if the new Routeing Area Identification is different from the old one, the MS initiates the Routeing Area Update procedure. See subclause "Location Management Procedures (Iu mode)". Note that it is only a subset of the RA update procedure that is performed, since the MS is in PMM-CONNECTED state.

If the SRNS Relocation is inter-SGSN, then the following CAMEL procedure calls shall be performed (see referenced procedures in 3GPP TS 23.078)

C1)   CAMEL_GPRS_PDP_Context_Disconnection and CAMEL_GPRS_Detach

They are called in the following order:

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

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

If the SRNS Relocation is intra-SGSN, then the above mentioned CAMEL procedures calls shall not be performed.

If Routeing Area Update occurs, then the following CAMEL procedure calls shall be performed (see referenced procedures in 3GPP TS 23.078):

C2)   CAMEL_GPRS_Routeing_Area_Update_Session.

In Figure 42, the procedure returns as result "Continue".

C3)   CAMEL_GPRS_Routeing_Area_Update_Context.

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

For C2 and C3: refer to Routing Area Update procedure description for detailed message flow.

6.9.2.2.3   Combined Cell / URA Update and SRNS Relocation Procedure

This procedure is only performed for an MS in PMM-CONNECTED state, where the Iur/Iur-g interface carries control signalling but no user data In the context of this specification, the terms RNS or RNC refer also to a GERAN BSS or BSC (respectively) when serving an MS in Iu mode.

The Combined Cell / URA Update and SRNS Relocation or Combined Cell/GRA Update and SBSS Relocation procedure is used to move the RAN to CN connection point at the RAN side from the source SRNC to the target RNC, while performing a cell re-selection in the RAN. In the procedure, the Iu links are relocated. If the target RNC is connected to the same SGSN as the source SRNC, an Intra-SGSN SRNS Relocation procedure is performed. If the routeing area is changed, this procedure is followed by an Intra-SGSN Routeing Area Update procedure. 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 HLR about the new MS location.

Before the Combined Cell / URA Update and SRNS Relocation or Combined Cell/GRA Update and SBSS Relocation and before the Routeing Area Update, the MS is registered in the old SGSN. The source RNC is acting as serving RNC or serving BSS.

After the Combined Cell / URA Update and SRNS Relocation or Combined Cell/GRA Update and SBSS Relocation and after the Routeing Area Update, the MS is registered in the new SGSN. The MS is in state PMM-CONNECTED towards the new SGSN, and the target RNC is acting as serving RNC.

The Combined Cell / URA Update and SRNS Relocation or Combined Cell/GRA Update and SBSS relocation procedure for the PS domain is illustrated in Figure 43. The sequence is valid for both intra-SGSN SRNS relocation and inter-SGSN SRNS relocation. This signalling flow is also applicable to BSS to RNS relocation and vice-versa, as well as for BSS to BSS relocation.
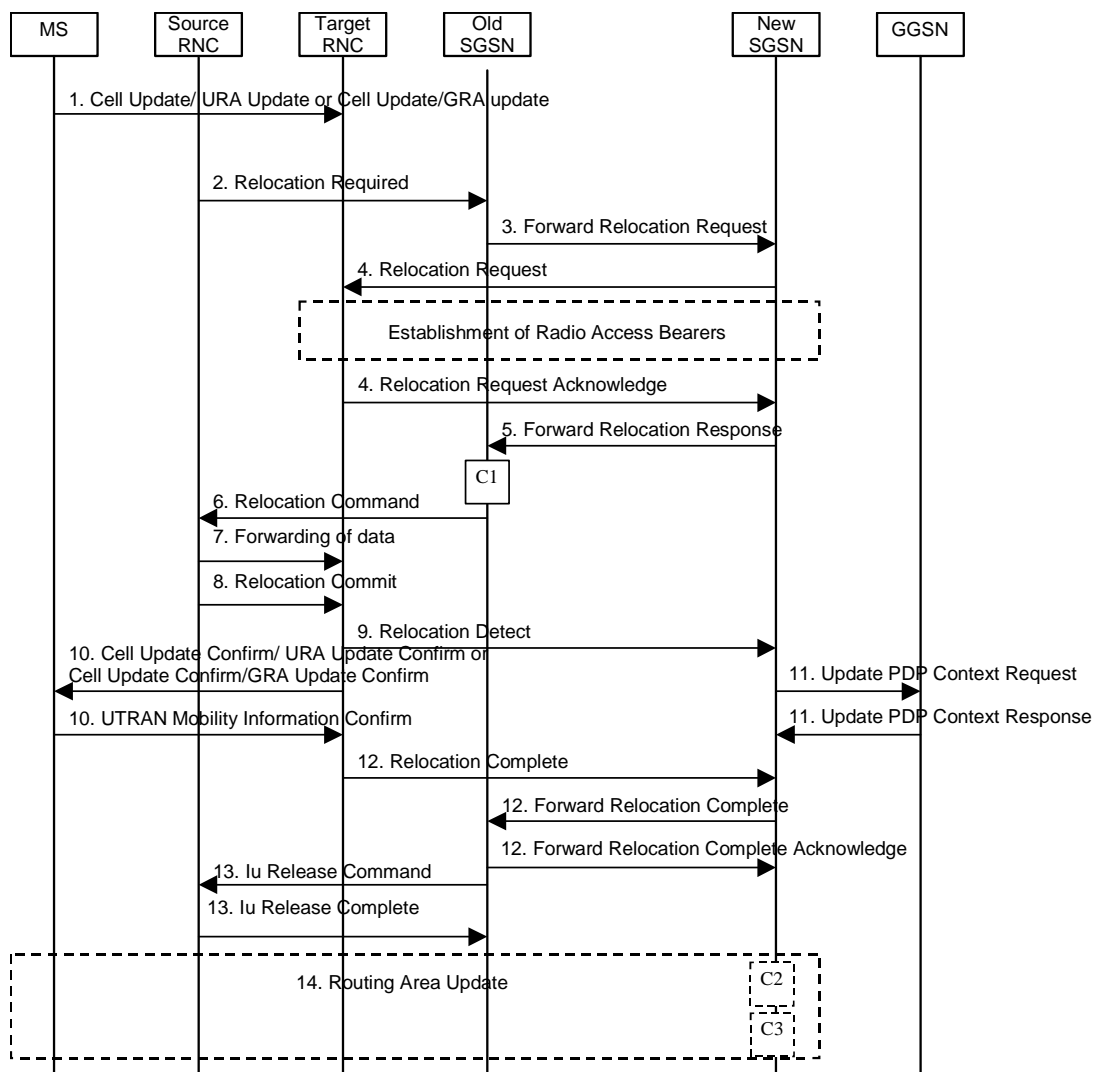

Figure 43: Combined Cell / URA Update and SRNS Relocation Procedure

1) The MS sends a Cell Update / URA Update or a Cell Update / GRA Update message to the source SRNC (if the cell is located under another RNC the message is routed via the DRNC to SRNC over the Iur). The source SRNC decides whether or not to perform a combined cell / URA update and SRNS relocation towards the target RNC. The rest of this subclause describes the case where a combined cell / URA update and SRNS relocation applies. In this case no radio bearer is established between the source SRNC and the UE. Nonetheless the following tunnel(s) are established: GTP-U tunnel(s) between source SRNC and old-SGSN; GTP-U tunnel(s) between old-SGSN and GGSN.

2) The source SRNC sends a Relocation Required message (Relocation Type, Cause, Source ID, Target ID, Source RNC to Target RNC Transparent Container) to the old SGSN. The source SRNC shall set Relocation Type to "UE not involved". Source RNC to Target RNC Transparent Container includes the necessary information for Relocation co-ordination, security functionality, and RRC protocol context information (including MS Capabilities).

3) The old SGSN determines from the Target ID if the SRNS Relocation is intra-SGSN SRNS relocation or inter-SGSN SRNS relocation. In the case of inter-SGSN SRNS relocation the old SGSN initiates the relocation resource allocation procedure by sending a Forward Relocation Request (IMSI, Tunnel Endpoint Identifier Signalling, MM Context, PDP Context, Target Identification, RAN Transparent Container, RANAP Cause) message to the new SGSN. For relocation to an area where Intra Domain Connection of RAN Nodes to Multiple CN Nodes is used, the old SGSN may – if it provides Intra Domain Connection of RAN Nodes to Multiple CN Nodes -have multiple target SGSNs for each relocation target in a pool area, in which case the old SGSN will select one of them to become the new SGSN, as specified in 3GPP TS 23.236 [73]. PDP context contains GGSN Address for User Plane and Uplink TEID for Data (to this GGSN Address and Uplink TEID for Data, the old SGSN and the new SGSN send uplink packets). At the same time a timer is started on the MM and PDP contexts in the old SGSN, see Routeing Area Update procedure in subclause "Location Management Procedures (Iu mode)". The Forward Relocation Request message is applicable only in case of inter-SGSN SRNS relocation.

4) The new SGSN sends a Relocation Request message (Permanent NAS UE Identity, Cause, CN Domain Indicator, Source RNC to Target RNC Transparent Container, RABs To Be Setup) to the target RNC. For each requested RAB, RABs To Be Setup shall contain information such as RAB ID, RAB parameters, Transport Layer Address, and Iu Transport Association. SGSN shall not establish RABs for PDP contexts with maximum bitrate for uplink and downlink of 0 kbit/s. The RAB ID information element contains the NSAPI value, and the RAB parameters information element gives the QoS profile. The Transport Layer Address is the SGSN Address for user data, and the Iu Transport Association corresponds to the uplink Tunnel Endpoint Identifier Data.

   After all necessary resources for accepted RABs including the Iu user plane are successfully allocated, the target RNC shall send the Relocation Request Acknowledge message (RABs setup, RABs failed to setup) to the new SGSN. Each RAB to be setup is defined by a Transport Layer Address, which is the target RNC Address for user data, and a Iu Transport Association which corresponds to the downlink Tunnel Endpoint Identifier for user data. The target-RNC may simultaneously receive for each RAB to be set up downlink user packets both from the source SRNC and from the new SGSN.

   After the new SGSN receives the Relocation Request Acknowledge message, the GTP-U tunnels are established between the target RNC and the new-SGSN.

5) When resources for the transmission of user data between the target RNC and the new SGSN have been allocated and the new SGSN is ready for relocation of SRNS, the Forward Relocation Response message (Cause, RANAP Cause, and Target RNC Information) is sent from the new SGSN to the old SGSN. This message indicates that the target RNC is ready to receive from the source SRNC the forwarded downlink packets, i.e., the relocation resource allocation procedure is terminated successfully. RANAP Cause is information from the target RNC to be forwarded to the source SRNC. The RAB Setup Information, one information element for each RAB, contains the RNC Tunnel Endpoint Identifier and RNC IP address for data forwarding from the source SRNC to the target RNC. If the target RNC or the new SGSN failed to allocate resources, the RAB Setup Information element contains only NSAPI indicating that the source SRNC shall release the resources associated with the NSAPI. The Forward Relocation Response message is applicable only in case of inter-SGSN SRNS relocation.

6) The old SGSN continues the relocation of SRNS by sending a Relocation Command (RABs to be released, and RABs subject to data forwarding) message to the source SRNC. The old SGSN decides the RABs subject to data forwarding based on QoS, and those RABs shall be contained in RABs subject to data forwarding. For each RAB subject to data forwarding, the information element shall contain RAB ID, Transport Layer Address, and Iu Transport Association. These are the same Transport Layer Address and Iu Transport Association that the target RNC had sent to new SGSN in Relocation Request Acknowledge message, and these are used for forwarding of downlink N-PDU from the source SRNC to the target RNC. The source SRNC is now ready to forward

downlink data directly to the target RNC over the Iu interface. This forwarding is performed for downlink user data only.

7) The source SRNC may, according to the QoS profile, begin the forwarding of data for the RABs subject to data forwarding and starts the data-forwarding timer. The data forwarding at SRNS relocation shall be carried out through the Iu interface, meaning that the data exchanged between the source SRNC and the target RNC are duplicated in the source SRNC and routed at the IP layer towards the target RNC. For each radio bearer which uses lossless PDCP the GTP-PDUs related to transmitted but not yet acknowledged PDCP-PDUs are duplicated and routed at IP layer towards the target RNC together with their related downlink PDCP sequence numbers. The source RNC continues transmitting duplicates of downlink data and receiving uplink data.

Note: The order of steps, starting from step 7 onwards, does not necessarily reflect the order of events. For instance, source RNC may send data forwarding (step 7) and start Relocation Commit message (step 8) almost simultaneously. Target RNC may send Relocation Detect message (step 9) and Cell Update Confirm/URA Update Confirm (or Cell Update Confirm/GRA Update Confirm) message (step 10) at the same time. Hence, target RNC may receive the UTRAN or GERAN Mobility Information Confirm message from MS (step 10) while data forwarding (step 8) is still underway, and before the new SGSN receives Update PDP Context Response message (step 11).

Before the serving RNC role is not yet taken over by target RNC and when downlink user plane data starts to arrive to target RNC, the target RNC may buffer or discard arriving downlink GTP-PDUs according to the related QoS profile.

8) Before sending the Relocation Commit the uplink and downlink data transfer in the source, SRNC shall be suspended for RABs, which require delivery order.

When the source SRNC is ready, the source SRNC shall trigger the execution of relocation of SRNS by sending a Relocation Commit message (SRNS Contexts) to the target RNC over the UTRAN Iur interface or over the GERAN Iur-g interface, respectively. The purpose of this procedure is to transfer SRNS contexts from the source RNC to the target RNC, and to move the SRNS role from the source RNC to the target RNC. SRNS contexts are sent for each concerned RAB and contain the sequence numbers of the GTP-PDUs next to be transmitted in the uplink and downlink directions and the next PDCP sequence numbers that would have been used to send and receive data from the MS. . PDCP sequence numbers are only sent by the source RNC for radio bearers, which used lossless PDCP [57]. The use of lossless PDCP is selected by the RNC when the radio bearer is set up or reconfigured. For PDP context(s) using delivery order not required (QoS profile), the sequence numbers of the GTP-PDUs next to be transmitted are not used by the target RNC.

If delivery order is required (QoS profile), consecutive GTP-PDU sequence numbering shall be maintained throughout the lifetime of the PDP context(s). Therefore, during the entire SRNS relocation procedure for the PDP context(s) using delivery order required (QoS profile), the responsible GTP-U entities (RNCs and GGSN) shall assign consecutive GTP-PDU sequence numbers to user packets belonging to the same PDP context for uplink and downlink respectively.

9) The target RNC shall send a Relocation Detect message to the new SGSN when the relocation execution trigger is received. For SRNS relocation type "UE not involved", the relocation execution trigger is the reception of the Relocation Commit message from the Iur interface. When the Relocation Detect message is sent, the target RNC shall start SRNC operation.

10) The target SRNC sends a Cell Update Confirm / URA Update Confirm or Cell Update Confirm / GRA Update Confirm message. This message contains UE information elements and CN information elements. The UE information elements include among others new SRNC identity and S-RNTI. The CN information elements contain among others Location Area Identification and Routeing Area Identification. The procedure shall be co-ordinated in all Iu signalling connections existing for the MS.

Upon reception of the Cell Update Confirm / URA Update Confirm or Cell Update Confirm / GRA Update Confirm message the MS may start sending uplink user data to the target SRNC. When the MS has reconfigured itself, it sends the RAN Mobility Information Confirm message to the target SRNC. This indicates that the MS is also ready to receive downlink data from the target SRNC.

If the new SGSN has already received the Update PDP Context Response message from the GGSN, it shall forward the uplink user data to the GGSN over this new GTP-U tunnel. Otherwise, the new SGSN shall forward the uplink user data to that GGSN IP address and TEID(s), which the new SGSN had received earlier by the Forward Relocation Request message.

The target SRNC and the MS exchange the PDCP sequence numbers; PDCP-SNU and PDCP-SND. PDCP-SND is the PDCP sequence number for the next expected in-sequence downlink packet to be received in the MS per radio bearer, which used lossless PDCP in the source RNC. PDCP-SND confirms all mobile terminated packets successfully transferred before the SRNC relocation procedure. . If PDCP-SND confirms the reception of packets that were forwarded from the source SRNC, the target SRNC shall discard these packets. PDCP-SNU is the PDCP sequence number for the next expected in-sequence uplink packet to be received in the RNC per radio bearer, which used lossless PDCP in the source RNC. PDCP-SNU confirms all mobile originated packets successfully transferred before the SRNC relocation. If PDCP-SNU confirms reception of packets that were received in the source SRNC, the target SRNC shall discard these packets.

11) Upon receipt of the Relocation Detect message, the CN may switch the user plane from the source RNC to the target SRNC. If the SRNS Relocation is an inter-SGSN SRNS relocation, the new SGSN sends Update PDP Context Request messages (new SGSN Address, SGSN Tunnel Endpoint Identifier, QoS Negotiated) to the GGSNs concerned. The GGSNs update their PDP context fields and return an Update PDP Context Response (GGSN Tunnel Endpoint Identifier) message.

12) When the target SRNC receives the RAN Mobility Information Confirm message, i.e. the new SRNC-ID + S-RNTI are successfully exchanged with the MS by the radio protocols, the target SRNC shall initiate the Relocation Complete procedure by sending the Relocation Complete message to the new SGSN. The purpose of the Relocation Complete procedure is to indicate by the target SRNC the completion of the relocation of the SRNS to the CN. If the user plane has not been switched at Relocation Detect, the CN shall upon reception of Relocation Complete switch the user plane from the source RNC to the target SRNC. If the SRNS Relocation is an inter SGSN SRNS relocation, the new SGSN signals to the old SGSN the completion of the SRNS relocation procedure by sending a Forward Relocation Complete message.

13) Upon receiving the Relocation Complete message or if it is an inter-SGSN SRNS relocation, the Forward Relocation Complete message, the old SGSN sends an Iu Release Command message to the source RNC. When the RNC data-forwarding timer has expired the source RNC responds with an Iu Release Complete.

14) After the MS has finished the Cell / URA update or the Cell / GRA update and RNTI reallocation procedure and if the new Routeing Area Identification is different from the old one, the MS initiates the Routeing Area Update procedure. See subclause "Location Management Procedures (Iu mode)". Note that it is only a subset of the RA update procedure that is performed, since the MS is in PMM-CONNECTED state.

If the SRNS Relocation is inter-SGSN, then the following CAMEL procedure calls shall be performed (see referenced procedures in 3GPP TS 23.078)

C1) CAMEL_GPRS_PDP_Context_Disconnection and CAMEL_GPRS_Detach

They are called in the following order:

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

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

If the SRNS Relocation is intra-SGSN, then the above mentioned CAMEL procedures calls shall not be performed.

If Routeing Area Update occurs, then the following CAMEL procedure calls shall be performed (see referenced procedures in 3GPP TS 23.078):

C2) CAMEL GPRS Routeing Area Update-Session

The procedure returns as result "Continue".

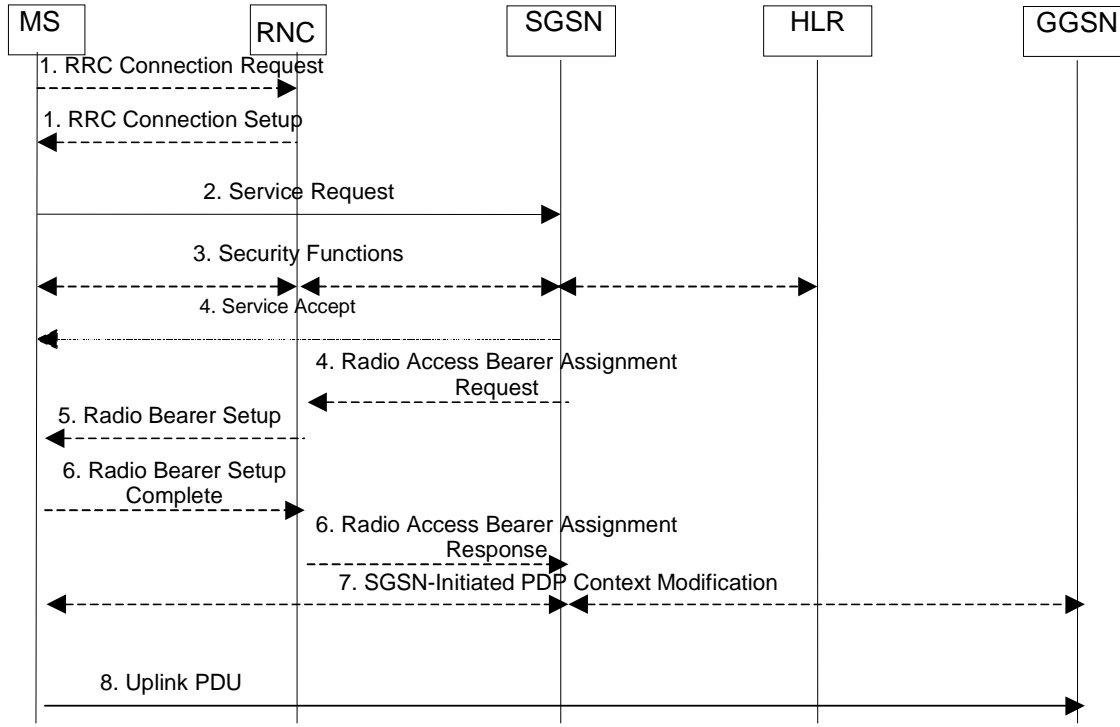C3) CAMEL_GPRS_Routeing_Area_Update_Context.

This procedure is called several times: once per PDP context. It returns as result "Continue". For C2 and C3: refer to Routing Area Update procedure description for detailed message flow.

****NEXT MODIFIED SECTION *******

6.12.1   MS Initiated Service Request Procedure

The MS in PMM-IDLE state sends the Service Request message to the 3G-SGSN in order to establish the PS signalling connection for the upper layer signalling or for the resource reservation for active PDP context(s). After receiving the Service Request message, the 3G-SGSN may perform authentication, and it shall perform the security mode procedure. After the establishment of the secure PS signalling connection to a 3G-SGSN, the MS may send signalling messages, e.g. Activate PDP Context Request, to the 3G-SGSN, or the 3G-SGSN may start the resource reservation for the active PDP contexts depending on the requested service in the Service Request message. An MS in PMM-CONNECTED state also requests the resource reservation for the active PDP contexts through this procedure.
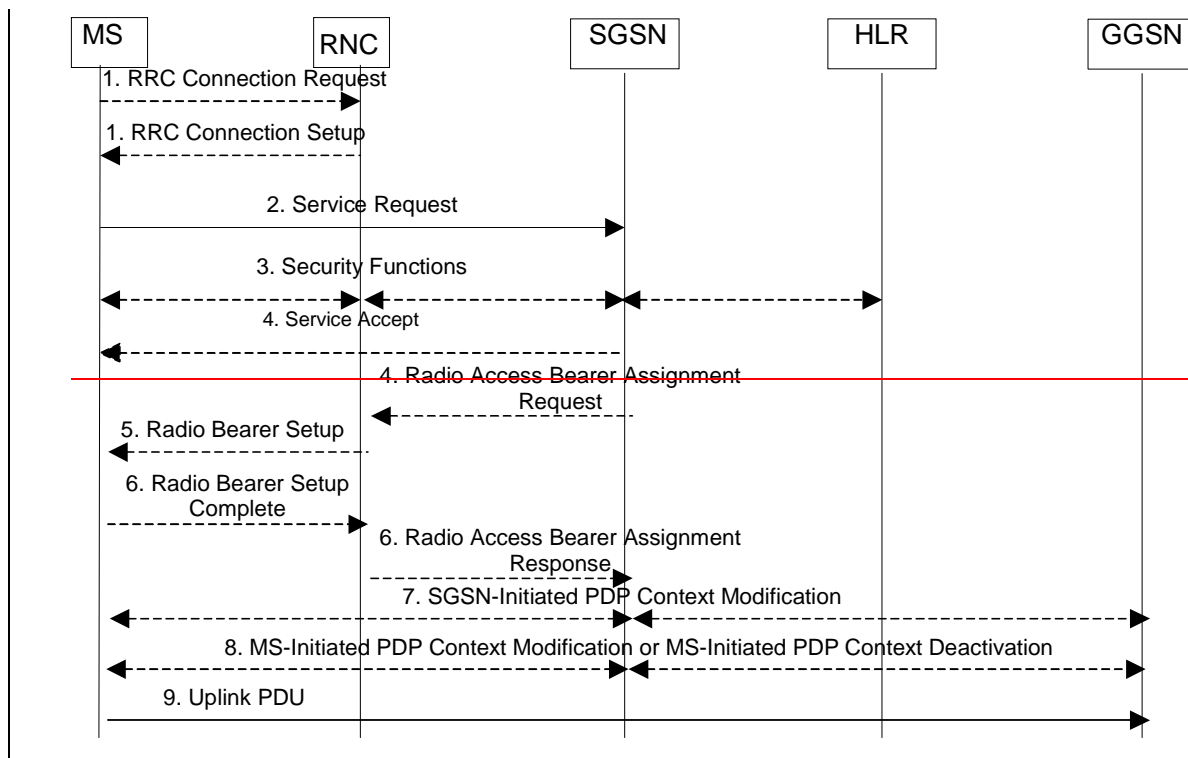
Figure 50: MS Initiated Service Request Procedure

1) The MS establishes an RRC connection, if none exists for CS traffic.

2) The MS sends 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. At this point, the SGSN may perform the authentication procedure.

   If Service Type indicates Data, a signalling connection is established between the MS and the SGSN, and resources for active PDP context(s) are allocated, i.e. RAB establishment for the activated PDP context(s).

   If Service Type indicates Signalling, the signalling connection is established between the MS and the SGSN for sending upper-layer signalling messages, e.g. Activate PDP Context Request. The resources for active PDP context(s) are not allocated.

3) The SGSN shall perform the security functions if the MS in PMM-IDLE state initiated the service request.

4) If the network is in PMM-CONNECTED state and the Service Type indicates Data, the SGSN shall respond with a Service Accept message towards the MS, in case the service request can be accepted. In case Service Type indicates Data, the SGSN sends a Radio Access Bearer Assignment Request (NSAPIRAB ID(s), TEID(s), QoS Profile(s), SGSN IP Address(es)) message to re-establish radio access bearer for every activated PDP context, except the ones having maximum bit rates for uplink and downlink of 0 kbit/s.

5) The RNC indicates to the MS the new Radio Bearer Identity established and the corresponding RAB ID with the RRC radio bearer setup procedure.

6) SRNC responds with the Radio Access Bearer Assignment Response (RAB ID(s), TEID(s), QoS Profile(s), RNC IP Address(es)) message. The GTP tunnel(s) are established on the Iu interface. If the RNC returns a Radio Access Bearer Assignment Response message with a cause indicating that the requested QoS profile(s) can not be provided, e.g. "Requested Maximum Bit Rate not Available", the SGSN may send a new Radio Access Bearer Assignment Request message with different QoS profile(s). The number of re-attempts, if any, as well as how the new QoS profile(s) values are determined is implementation dependent.

7) For each RAB re-established with a modified QoS profile, the SGSN initiates a PDP Context Modification procedure to inform the MS and the GGSN of the new negotiated QoS profile for the corresponding PDP context.

8) For each RAB using streaming or conversational traffic class with maximum bitrate of 0 kbit/s (e.g. after 'RNC-Initiated PDP Context Modification Procedure') the MS starts the MS-Initiated PDP Context Modification procedure or the PDP Context Deactivation Initiated by MS procedure to inform the CN whether to re-activate or to delete the PDP contexts.

89) The MS sends the uplink packet.

For Service Type = Signalling, the MS knows that the Service Request message was successfully received in the SGSN when the MS receives the RRC Security Mode Control Command message.

For Service Type = Data, in PMM-IDLE, the MS knows that the Service Request was successfully received when the MS receives the RRC Security Mode Control Command message from the RNC; in PMM-CONNECTED state, the MS knows that the Service Request was successfully received when the MS receives the Service Accept message.

   NOTE: The reception of the Service Accept message does not imply the successful re-establishment of the RAB(s).
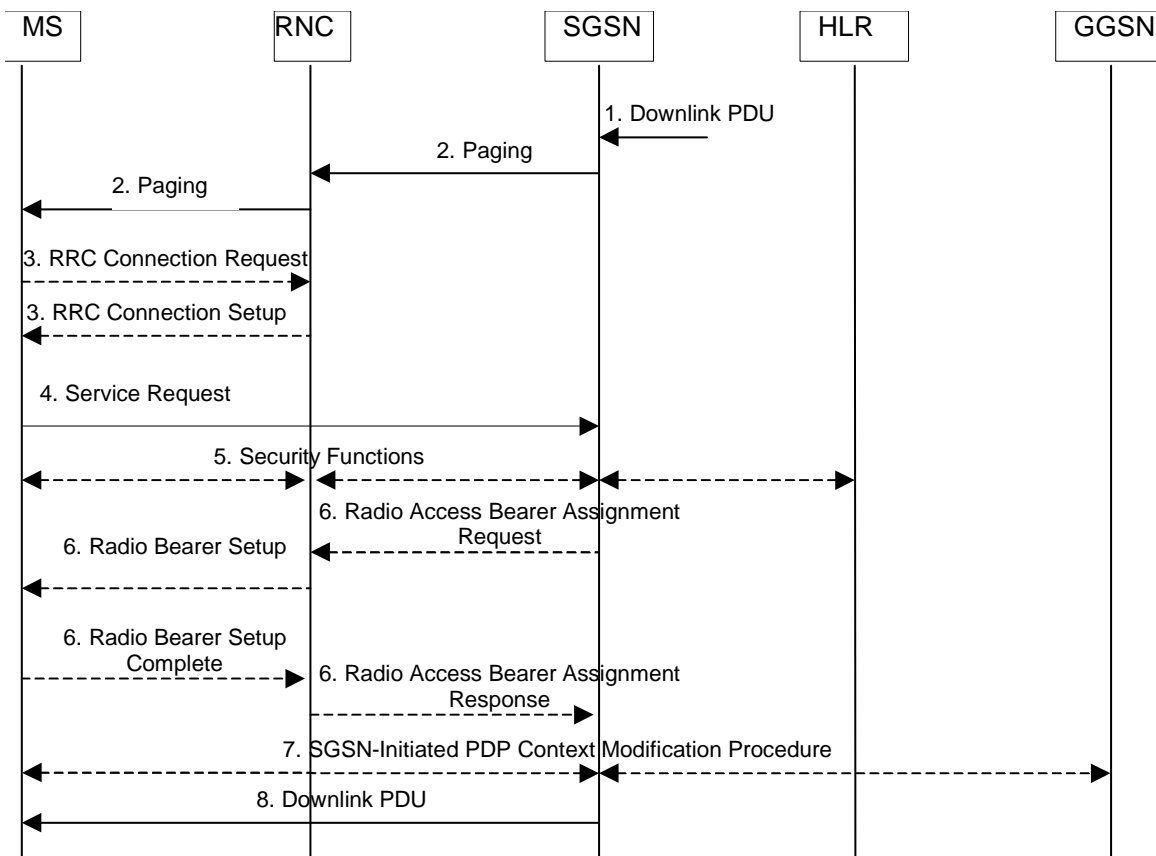
For any Service Type, in case the service request cannot be accepted, the network returns a Service Reject message to the MS with an appropriate cause value.

For Service Type = Data, in case the SGSN fails to re-establish RAB(s) for the PDP context(s), the SGSN determines if an SM procedure, such as SGSN-Initiated PDP Context Modification or PDP Context Deactivation, should be initiated. The appropriate action depends on the QoS profile of the PDP context and is an operator choice.

For each PDP context using streaming or conversational traffic class with maximum bit rate for uplink and downlink of 0 kbit/s the MS starts the MS-Initiated PDP Context Modification procedure or the MS-Initiated PDP Context Deactivation procedure to inform the SGSN whether to re-activate or to delete the PDP contexts. If the PDP context has been deactivated locally in the MS, the MS shall not perform the PDP context deactivation procedure for this PDP context because the list of active and inactive PDP contexts is included in the Service Request Message sent prior to the network.

6.12.2   Network Initiated Service Request Procedure

When the 3G-SGSN receives a downlink packet (e.g. Request PDP Context Activation, MT SMS, user data) for an MS in PMM-IDLE state, the 3G-SGSN sends a paging request to RAN. The paging request triggers the Service Request procedure in the MS.

Figure 51: Network Initiated Service Request Procedure

1) The SGSN receives a downlink PDP PDU for an MS in PMM-IDLE state.

2) The SGSN sends a Paging message to the RNC. The RNC pages the MS by sending a Paging message to the MS. See clause "PS Paging Initiated by 3G-SGSN without RRC Connection for CS" for details.

3) The MS establishes an RRC connection if none exists for CS traffic.

4) The MS sends a Service Request (P-TMSI, RAI, CKSN, Service Type) message to the SGSN. Service Type specifies Paging Response. The Service Request is carried over the radio in an RRC Direct Transfer message and over the Iu interface in the RANAP Initial MS message. At this point, the SGSN may perform the authentication procedure. The SGSN knows whether the downlink packet requires RAB establishment (e.g. downlink PDU) or not (e.g. Request PDP Context Activation or MT SMS).

5) The SGSN shall perform the security mode procedure.

6) If resources for the PDP contexts are re-established, the SGSN sends a Radio Access Bearer Assignment Request (RAB ID(s), TEID(s), QoS Profile(s), SGSN IP Address(es)) message to the RNC. The RNC sends a Radio Bearer Setup (RAB ID(s)) to the MS. The MS responds by returning a Radio Bearer Setup Complete message to the RNC. The RNC sends a Radio Access Bearer Assignment Response (RAB ID(s), TEID(s), RNC IP Address(es)) message to the SGSN in order to indicate that GTP tunnels are established on the Iu interface and radio access bearers are established between the RNC and the MS. If the RNC returns a Radio Access Bearer Assignment Response message with a cause indicating that the requested QoS profile(s) can not be provided, e.g. "Requested Maximum Bit Rate not Available", the SGSN may send a new Radio Access Bearer Assignment Request message with different QoS profile(s). The number of re-attempts, if any, as well as how the new QoS profile(s) values are determined is implementation dependent.

7) For each RAB re-established with a modified QoS profile, the SGSN initiates a PDP Context Modification procedure to inform the MS and the GGSN of the new negotiated QoS profile for the corresponding PDP context.

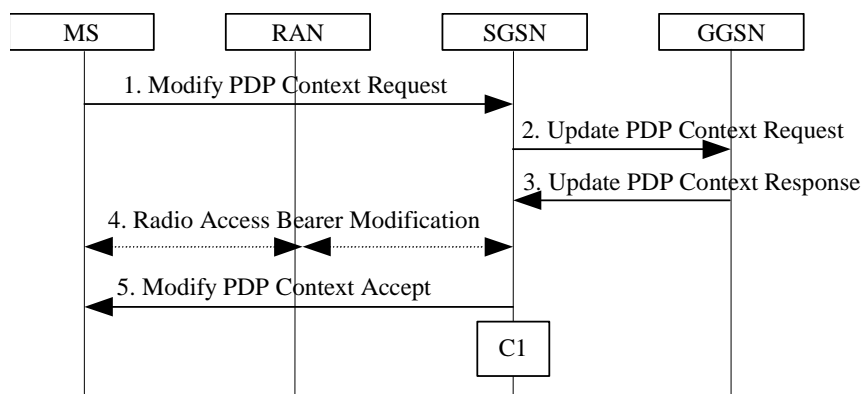8) The SGSN sends the downlink packet.

For Service Type = Page Response, the MS knows that the Service Request message was successfully received in the SGSN when the MS receives the RRC Security Mode Control Command message.

In the case the SGSN fails to re-establish RAB(s) for the PDP context(s), the SGSN determines if an SM procedure, such as SGSN-Initiated PDP Context Modification or PDP Context Deactivation, should be initiated. The appropriate action depends on the QoS profile of the PDP context and is an operator choice.

> *****NEXT MODIFIED SECTION *******

9.2.3.3   MS-Initiated PDP Context Modification Procedure

The MS-Initiated PDP Context Modification procedure is illustrated in Figure 72.

Figure 72: MS-Initiated PDP Context Modification Procedure

1) The MS sends a Modify PDP Context Request (TI, QoS Requested, TFT) message to the SGSN. Either QoS Requested or TFT or both may be included. QoS Requested indicates the desired QoS profile, while TFT indicates the TFT that is to be added or modified or deleted from the PDP context.

2) The SGSN may restrict the desired QoS profile given its capabilities, the current load, and the subscribed QoS profile. The SGSN sends an Update PDP Context Request (TEID, NSAPI, QoS Negotiated, TFT) message to the GGSN. If QoS Negotiated and/or TFT received from the SGSN is incompatible with the PDP context being modified (e.g., TFT contains inconsistent packet filters), the GGSN rejects the Update PDP Context Request. The GGSN operator configures the compatible QoS profile.

3) The GGSN may further restrict QoS Negotiated given its capabilities and the current load. The GGSN stores QoS Negotiated, stores, modifies, or deletes TFT of that PDP context as indicated in TFT, and returns an Update PDP Context Response (TEID, QoS Negotiated) message.

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

5) The SGSN selects Radio Priority and Packet Flow Id based on QoS Negotiated, and returns a Modify PDP Context Accept (TI, QoS Negotiated, Radio Priority, Packet Flow Id) message to the MS.

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

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

C1)   CAMEL_GPRS_Change_Of_QoS.

The procedure returns as result "Continue".

9.2.3.4   RNC-Initiated PDP Context Modification Procedure

The RNC can request the release of the Iu connection (see clause "Iu Release Procedure") e.g. due to a break of the radio connection or due to user inactivity. After Iu Release the PDP contexts are modified as follows:

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

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

The following procedures shall be performed in the MS when radio coverage is lost:

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

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

9.2.3.5   RAB Release-Initiated Local PDP Context Modification Procedure

The RNC can request a RAB to be released through the RAB Release procedure ~~on the streaming or conversational traffic class bearers~~ without releasing the Iu connection ~~when there is a break in the radio connection~~.

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

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

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

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

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

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

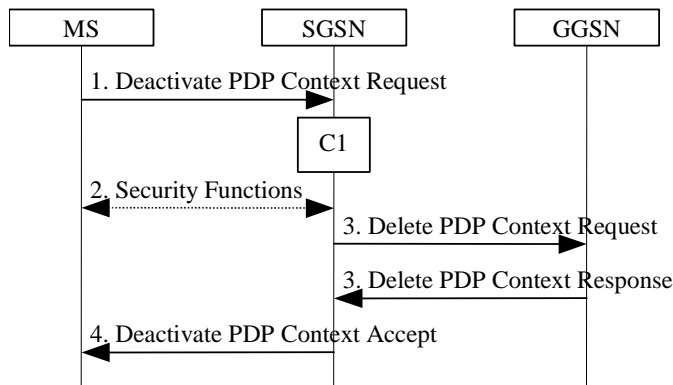   At this point or at a later stage, the MS may start a PDP Context Deactivation procedure or PDP Context Modification procedure. ~~After coverage is regained the MS should start the MS-Initiated PDP Context Modification procedure or the PDP Context Deactivation Initiated by MS procedure.~~ The MS shall use the PDP context modification procedure to re-activate the PDP context and to re-establish the RAB.

~~The radio access bearer shall be released by the RNC only when RRC re-establishment is not any longer possible. Therefore the change happens simultaneously in the MS and in the SGSN.~~
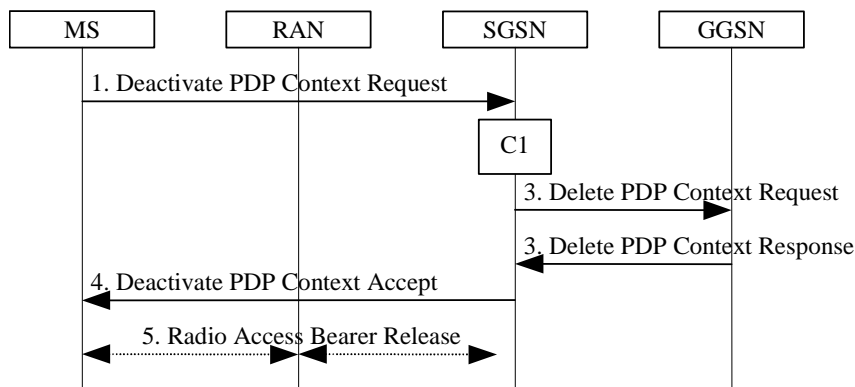
<div align="center">

****NEXT MODIFIED SECTION *******

</div>

9.2.4.1   MS Initiated PDP Context Deactivation Procedure

The PDP Context Deactivation Initiated by MS procedures for A/Gb mode and Iu mode are illustrated in Figure 74 and Figure 75, respectively.

Figure 74: MS Initiated PDP Context Deactivation Procedure for A/Gb mode

Figure 75: MS Initiated PDP Context Deactivation Procedure for Iu mode

1) The MS sends a Deactivate PDP Context Request (TI, Teardown Ind) message to the SGSN.

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

3) The SGSN sends a Delete PDP Context Request (TEID, NSAPI, Teardown Ind) message to the GGSN. If the MS in the Deactivate PDP Context Request message included Teardown Ind, then the SGSN deactivates all PDP contexts associated with this PDP address by including Teardown Ind in the Delete PDP Context Request message. The GGSN removes the PDP context(s) and returns a Delete PDP Context Response (TEID) message to the SGSN. If the MS was using a dynamic PDP address allocated by the GGSN, and if the context being deactivated is the last PDP context associated with this PDP address, then the GGSN releases this PDP address and makes it available for subsequent activation by other MSs. The Delete PDP Context messages are sent over the backbone network.

4) The SGSN returns a Deactivate PDP Context Accept (TI) message to the MS.

5) In Iu mode, radio access bearer release is done by the RAB Assignment procedure, if a RAB exists for this PDP context.

At GPRS detach, all PDP contexts for the MS are implicitly deactivated.

If the SGSN receives a Deactivate PDP Context Request (TI) message for a PDP context that is currently being activated, the SGSN shall stop the PDP Context Activation procedure without responding to the MS, and continue with the PDP Context Deactivation initiated by MS procedure.

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

C1) CAMEL_GPRS_PDP_Context_Disconnection.

The procedure returns as result "Continue".

<div align="center">****NEXT MODIFIED SECTION *******</div>

9.2.5.2 Re-establishment of RABs

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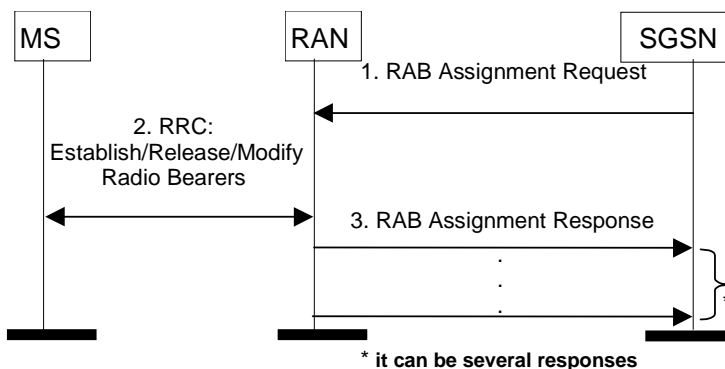
The MS initiates the re-establishment of RABs by using the Service Request (Service Type = Data) message. This is described in the sub-clause "MS Initiated Service Request Procedure". SGSN shall not establish RABs for PDP contexts with maximum bit rate for uplink and downlink of 0 kbit/s. For these PDP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

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

<div align="center">****NEXT MODIFIED SECTION *******</div>

12.7.4 RAB Assignment Procedure

The purpose of the RAB Assignment procedure is to enable establishment of new RABs for a given MS and/or modification and/or release of already established RABs. When this procedure is executed and if there is any PDP context without radio access bearer assigned, all the radio access bearer are re-established, except the ones having maximum bit rates of 0 kbit/s for uplink and downlink. The same messages are used for the three mentioned actions and it is only the content carried by the messages that is different. The RAB Assignment procedure, which is shown below, is specified in 3GPP TS 25.413. The RRC protocol is specified in 3GPP TS 25.331.

Figure 90: RAB Assignment Procedure

1) The SGSN sends a RAB Assignment Request message to the RAN to establish, modify, or release one or several RABs. For each requested RAB or modified, if the RAB is allowed for queuing and the resource situation requires it, the RAN may place the RAB in the establishment queue.

2) The RAN establishes, modifies, or releases the appropriate radio bearers.

3) The RAN returns a RAB Assignment Response message to the SGSN. If the request to establish or modify one or several RABs has been queued, the RAN will report the outcome of the establishment or modification in subsequent RAB Assignment Response messages. If the SGSN receives a RAB Assignment Response message with a cause indicating that the requested QoS profile(s) can not be provided (e.g. "Requested Maximum Bit Rate not Available"), then the SGSN may send a new RAB Assignment Request message with different QoS

profile(s). The number of re-attempts, if any, as well as how the new QoS profile(s) values are determined is implementation dependent.

CR-Form-v5.1

CHANGE REQUEST

| ⌘ | **23.060** CR **379** | ⌘ **rev** | | ⌘ | Current version: | **5.2.0** | ⌘ |

*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:	⌘	Addition of PCO IE to PDP Modification procedure
Source:	⌘	Nokia, Ericsson
Work item code: ⌘	IMS-CCR	*Date:* ⌘ 19.06.2002
Category:	⌘ **F**	*Release:* ⌘ Rel-5

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

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

Reason for change: ⌘	In the last TSG CN W1 meeting, CN1#24, the addition of PCO IE to PDP context modification procedures was agreed. This decision was made according to SA2's liasion statement in Tdoc S2-021530.
	The purpose is to allow a consistent use of the PCO in PDP context activation and modification procedures so that they are ready for any future need that might appear. However, so far no application of the PCO in the PDP context modification procedure has been defined.
Summary of change: ⌘	PCO added to 9.2.3.3 MS-Initiated PDP Context Modification Procedure
Consequences if not approved: ⌘	Stage 2 specifications will not be consistent with stage 3.

Clauses affected:	⌘	9.2.2.2.2 (Secondary PDP Context Activation Procedure), 9.2.3.3 (MS-Initiated PDP Context Modification Procedure)
Other specs Affected:	⌘	**X** Other core specifications ⌘ 29.060
		☐ Test specifications
		☐ O&M Specifications
Other comments:	⌘	PCO was added to Secondary PDP Context Activation REQUEST and RESPONSE messages in SA#24, Tdoc S2-021119.
		24.008 agreed CR, Tdoc N1-0211475, attached for information.

9.2.2.1.1 Secondary PDP Context Activation Procedure

The Secondary PDP Context Activation procedure may be used to activate a PDP context while reusing the PDP address and other PDP context information from an already active PDP context, but with a different QoS profile. Procedures for APN selection and PDP address negotiation are not executed. A unique TI and a unique NSAPI shall identify each PDP context sharing the same PDP address and APN.

The Secondary PDP Context Activation procedure may be executed without providing a Traffic Flow Template (TFT) to the newly activated PDP context if all other active PDP contexts for this PDP address and APN already have an associated TFT. Otherwise a TFT shall be provided. The TFT contains attributes that specify an IP header filter that is used to direct data packets received from the interconnected packet data network to the newly activated PDP context.

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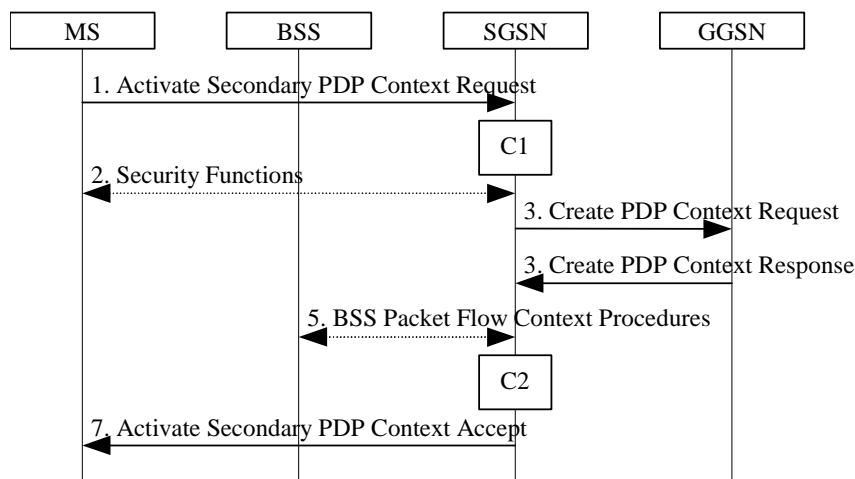

Figure 65: Secondary PDP Context Activation Procedure for A/Gb mode
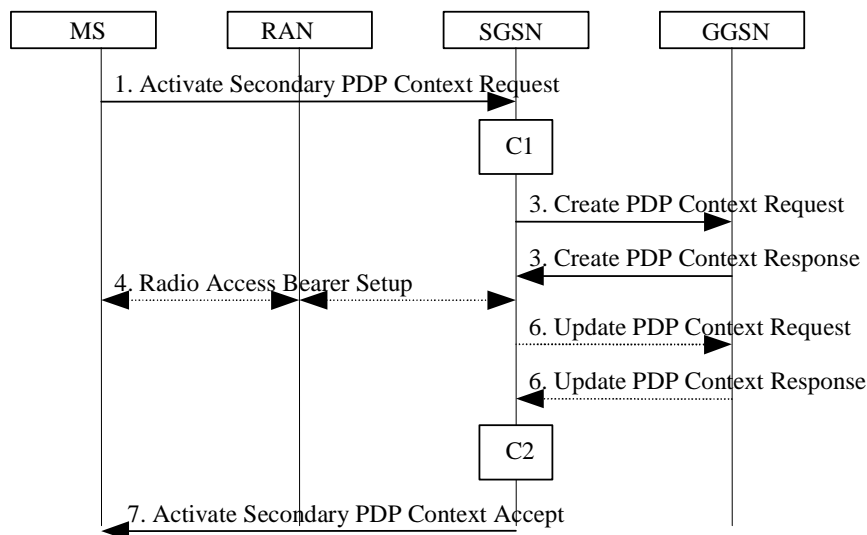
Figure 66: Secondary PDP Context Activation Procedure for Iu mode

1) The MS sends an Activate Secondary PDP Context Request (Linked TI, NSAPI, TI, QoS Requested, TFT, PDP Configuration Options) message to the SGSN. Linked TI indicates the TI value assigned to any one of the already activated PDP contexts for this PDP address and APN. QoS Requested indicates the desired QoS profile. TFT is sent transparently through the SGSN to the GGSN to enable packet classification for downlink data transfer. TI and NSAPI contain values not used by any other activated PDP context. PDP Configuration Options

may be used to transfer optional PDP parameters and/or requests to the GGSN (see GSM 29.060 [26] and 24.229 [75]). PDP Configuration Options is sent transparently through the SGSN.

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

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

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

   The GGSN uses the same packet data network as used by the already-activated PDP context(s) for that PDP address, generates a new entry in its PDP context table, and stores the TFT. The new entry allows the GGSN to route PDP PDUs via different GTP tunnels between the SGSN and the packet data network. The GGSN returns a Create PDP Context Response (TEID, QoS Negotiated, Cause, PDP Configuration Options) message to the SGSN. PDP Configuration Options may be used to transfer optional PDP parameters to the UE (see GSM 29.060 [26] and 24.229 [75]).

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

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

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

7) The SGSN selects Radio Priority and Packet Flow Id based on QoS Negotiated, and returns an Activate Secondary PDP Context Accept (TI, QoS Negotiated, Radio Priority, Packet Flow Id, PDP Configuration Options) message to the MS. PDP Configuration Options is sent transparently through the SGSN if received in the Create PDP Context Response message. The SGSN is now able to route PDP PDUs between the GGSN and the MS via different GTP tunnels and possibly different LLC links.

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

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

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

   C1) CAMEL_GPRS_PDP_Context_Establishment.

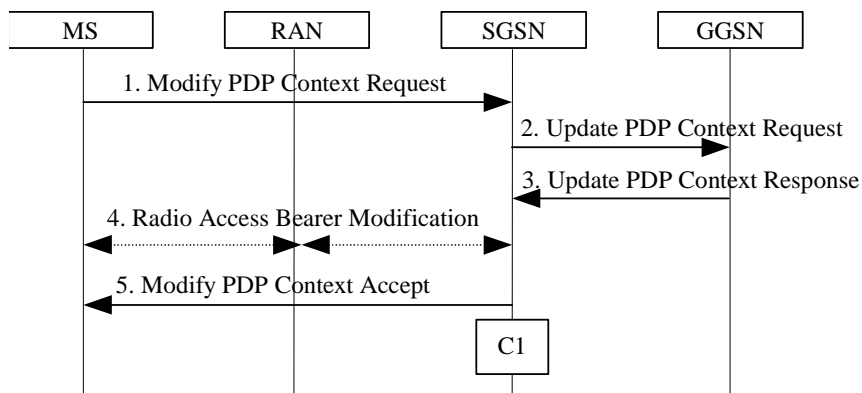In Figure 65 and in Figure 66, procedures return as result "Continue".

   C2) CAMEL_GPRS_PDP_Context_Establishment_Acknowledgement.

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

9.2.3.3 MS-Initiated PDP Context Modification Procedure

The MS-Initiated PDP Context Modification procedure is illustrated in Figure 72.

Figure 72: MS-Initiated PDP Context Modification Procedure

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

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

3) The GGSN may further restrict QoS Negotiated given its capabilities and the current load. The GGSN stores QoS Negotiated, stores, modifies, or deletes TFT of that PDP context as indicated in TFT, and returns an Update PDP Context Response (TEID, QoS Negotiated, PDP Configuration Options) message. PDP Configuration Options may be used to transfer optional PDP parameters to the UE.

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

5) The SGSN selects Radio Priority and Packet Flow Id based on QoS Negotiated, and returns a Modify PDP Context Accept (TI, QoS Negotiated, Radio Priority, Packet Flow Id, PDP Configuration Options) message to the MS. PDP Configuration Options is sent transparently through the SGSN if received in Modify PDP Context Response message.

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

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

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

C1) CAMEL_GPRS_Change_Of_QoS.

The procedure returns as result "Continue".

CR-Form-v7

CHANGE REQUEST

| ⌘ | **23.060** CR **383** | ⌘ **rev** | **1** | ⌘ | Current version: | **3.12.0** | ⌘ |

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Proposed change affects: UICC apps⌘ ☐   ME **X** Radio Access Network ☐ Core Network **X**

Title:	⌘	Handling of PDP contexts using an extended TI

Source:	⌘	Siemens

Work item code:	⌘	TEI	**Date:** ⌘	24/06/2002

Category:	⌘	**F**		**Release:** ⌘	R99

Use <u>one</u> of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can
be found in 3GPP TR 21.900.

Use <u>one</u> of the following releases:
2   *(GSM Phase 2)*
R96   *(Release 1996)*
R97   *(Release 1997)*
R98   *(Release 1998)*
R99   *(Release 1999)*
Rel-4   *(Release 4)*
Rel-5   *(Release 5)*
Rel-6   *(Release 6)*

Reason for change:	⌘	As a pre-release 99 network (SGSN) is not able to handle PDP context using an extended TI, the old SGSN (R99 or later) and the MS shall delete all PDP contexts using an extended TI, when a change to a pre-release 99 SGSN takes place.

Summary of change:	⌘	PDP contexts using an extended TI shall be deleted locally by the MS and the network once a change to a pre-release 99 network is done.

Consequences if not approved:	⌘	The pre-release 99 SGSN is not able to handle those PDP contexts.

Clauses affected:	⌘	11.1.1

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

Other comments:	⌘	

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2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be

downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

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

11.1.1 Interactions Between GTP v0 (R97) and GTP v1 (R99)

When a first GSN receives a GTP PDU from a second GSN using a version not supported, then the first GSN shall return a "version not supported" error message to the second GSN. The second GSN shall then fall back to the most-recent version supported by the first GSN. A GSN shall use its most-recent GTP version when initiating GTP PDU transmission to a new GSN.

When an SGSN that supports GTP v1 establishes a GTP tunnel to a GGSN that supports GTP v0, the SGSN shall convert a release 99 QoS profile to a release 97 QoS profile before transmitting the QoS profile to the GGSN. If the MS supports the R99 QoS profile, the SGSN shall convert the negotiated R97 QoS profile to an R99 QoS profile before transmitting the QoS profile to the MS.

A GGSN shall be able to fall back to GTP v0 during an Update PDP Context procedure. That is, the GGSN shall accept an Update PDP Context Request of GTP v0 even if the established GTP tunnel is of GTP v1.

When an inter-SGSN RA update procedure is performed from a first SGSN that supports GTP v1 to a second SGSN that supports GTP v0, the first SGSN shall convert the R99 QoS profile to an R97 QoS profile before sending the SGSN Context Response message. Furthermore, it fills the Uplink Flow Label Signalling field in the PDP Context information element of the SGSN Context Response message with the lower two octets of the Uplink TEID Control Plane. All PDP contexts that are identified by an extended TI (see 3GPP TS 24.007~~8~~ [~~13~~12]) shall be deleted locally in the MS and the first SGSN, and the first SGSN shall initiate the deletion of these PDP contexts in the GGSN after receiving an SGSN Context Acknowledge message from the second SGSN. If several of the remaining PDP contexts have been activated for the same APN and PDP address in the first SGSN (secondary PDP context activation), then all PDP contexts except the PDP context with the highest-quality QoS profile ~~are~~ shall be deleted locally in the MS and in the first SGSN, and the first SGSN shall initiate the deletion of these PDP contexts in the GGSN.

MS detects that the new SGSN is supporting only GTPv0 from the Release Indication broadcasted on the GSM radio.

3G TS 23.107 [58] specifies how to determine the highest-quality QoS profile. The second SGSN shall be responsible for updating the remaining PDP context in the GGSN, and the GGSN shall remove the TFT if present when it receives the GTP v0 Update PDP Context Request message.

NOTE: The conversion between an R99 QoS profile and an R97 QoS profile is defined in 3G TS 23.107.

When an inter-SGSN RA update procedure is performed from a first SGSN that supports GTP v0 to a second SGSN that supports GTP v1, the second SGSN shall convert the R97 QoS profile to the R99 QoS profile, ignore the delivered Uplink Flow Label Signalling and use GTP v1 to send the Update PDP Context Request message to the GGSN. The Update PDP Context Request message shall be sent with a header containing a TEID set to all zeros and with an additional IE containing the IMSI for the PDP context.

A GGSN shall be able to change to GTP v1 during an Update PDP Context procedure. That is, the GGSN shall accept an Update PDP Context Request of GTP v1 with a TEID set to all zeros and containing the IMSI in addition to the NSAPI, even if the established GTP tunnel is of GTP v0.

When a GTP v0 tunnel was established between the old SGSN and the GGSN, and both old and new SGSNs support GTPv1, the respective uplink Flow Label signalling shall be inserted in the two lower octets of the Uplink TEID Control Plane field of the SGSN Context Response message; the upper two octets shall be set to all zeros.

CR-Form-v7

CHANGE REQUEST

| ⌘ | **23.060** CR **384** | ⌘ **rev** | **1** | ⌘ | Current version: | **4.5.0** | ⌘ |

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Proposed change affects: UICC apps⌘ ☐ ME **X** Radio Access Network ☐ Core Network **X**

Title: ⌘	Handling of PDP contexts using an extended TI	
Source: ⌘	Siemens	
Work item code: ⌘	TEI4	*Date:* ⌘ 24/06/2002
Category: ⌘	**A**	*Release:* ⌘ Rel-4

Use <u>one</u> of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use <u>one</u> of the following releases:
2 *(GSM Phase 2)*
R96 *(Release 1996)*
R97 *(Release 1997)*
R98 *(Release 1998)*
R99 *(Release 1999)*
Rel-4 *(Release 4)*
Rel-5 *(Release 5)*
Rel-6 *(Release 6)*

Reason for change: ⌘	As a pre-release 99 network (SGSN) is not able to handle PDP context using an extended TI, the old SGSN (R99 or later) and the MS shall delete all PDP contexts using an extended TI, when a change to a pre-release 99 SGSN takes place.
Summary of change: ⌘	PDP contexts using an extended TI shall be deleted locally by the MS and the network once a change to a pre-release 99 network is done.
Consequences if not approved: ⌘	The pre-release 99 SGSN is not able to handle those PDP contexts.

Clauses affected: ⌘	11.1.1

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

Other comments: ⌘	

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downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

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

11.1.1   Interactions Between GTP v0 (R97) and GTP v1 (R99)

When a first GSN receives a GTP PDU from a second GSN using a version not supported, then the first GSN shall return a "version not supported" error message to the second GSN. The second GSN shall then fall back to the most-recent version supported by the first GSN. A GSN shall use its most-recent GTP version when initiating GTP PDU transmission to a new GSN.

When an SGSN that supports GTP v1 establishes a GTP tunnel to a GGSN that supports GTP v0, the SGSN shall convert a release 99 QoS profile to a release 97 QoS profile before transmitting the QoS profile to the GGSN. If the MS supports the R99 QoS profile, the SGSN shall convert the negotiated R97 QoS profile to an R99 QoS profile before transmitting the QoS profile to the MS.

A GGSN shall be able to fall back to GTP v0 during an Update PDP Context procedure. That is, the GGSN shall accept an Update PDP Context Request of GTP v0 even if the established GTP tunnel is of GTP v1.

When an inter-SGSN RA update procedure is performed from a first SGSN that supports GTP v1 to a second SGSN that supports GTP v0, the first SGSN shall convert the R99 QoS profile to an R97 QoS profile before sending the SGSN Context Response message. Furthermore, it fills the Uplink Flow Label Signalling field in the PDP Context information element of the SGSN Context Response message with the lower two octets of the Uplink TEID Control Plane. All PDP contexts that are identified by an extended TI (see 3GPP TS 24.0087 [1312]) shall be deleted locally in the MS and the first SGSN, and the first SGSN shall initiate the deletion of these PDP contexts in the GGSN after receiving an SGSN Context Acknowledge message from the second SGSN. If several of the remaining PDP contexts have been activated for the same APN and PDP address in the first SGSN (secondary PDP context activation), then all PDP contexts except the PDP context with the highest-quality QoS profile are shall be deleted locally in the MS and in the first SGSN, and the first SGSN shall initiate the deletion of these PDP contexts in the GGSN.

The MS detects that the new SGSN is supporting only GTPv0 from the Release Indication broadcasted on the GSM radio.

3GPP TS 23.107 [58] specifies how to determine the highest-quality QoS profile. The second SGSN shall be responsible for updating the remaining PDP context in the GGSN, and the GGSN shall remove the TFT if present when it receives the GTP v0 Update PDP Context Request message.

   NOTE: The conversion between an R99 QoS profile and an R97 QoS profile is defined in 3GPP TS 23.107.

When an inter-SGSN RA update procedure is performed from a first SGSN that supports GTP v0 to a second SGSN that supports GTP v1, the second SGSN shall convert the R97 QoS profile to the R99 QoS profile, ignore the delivered Uplink Flow Label Signalling and use GTP v1 to send the Update PDP Context Request message to the GGSN. The Update PDP Context Request message shall be sent with a header containing a TEID set to all zeros and with an additional IE containing the IMSI for the PDP context.

A GGSN shall be able to change to GTP v1 during an Update PDP Context procedure. That is, the GGSN shall accept an Update PDP Context Request of GTP v1 with a TEID set to all zeros and containing the IMSI in addition to the NSAPI, even if the established GTP tunnel is of GTP v0.

When a GTP v0 tunnel was established between the old SGSN and the GGSN, and both old and new SGSNs support GTPv1 the respective uplink Flow Label signalling shall be inserted in the two lower octets of the Uplink TEID Control Plane field of the SGSN Context Response message; the upper two octets shall be set to all zeros.

CR-Form-v7

CHANGE REQUEST

| ⌘ | **23.060** CR **385** | ⌘ **rev** | **1** | ⌘ | Current version: | **5.2.0** | ⌘ |

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

Proposed change affects: UICC apps⌘ ☐ ME **X** Radio Access Network ☐ Core Network **X**

Title: ⌘	Handling of PDP contexts using an extended TI	
Source: ⌘	Siemens	
Work item code: ⌘	TEI5	**Date:** ⌘ 24/06/2002
Category: ⌘	**A**	**Release:** ⌘ Rel-5

Use <u>one</u> of the following categories:
F (correction)
A (corresponds to a correction in an earlier release)
B (addition of feature),
C (functional modification of feature)
D (editorial modification)
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use <u>one</u> of the following releases:
2   (GSM Phase 2)
R96   (Release 1996)
R97   (Release 1997)
R98   (Release 1998)
R99   (Release 1999)
Rel-4   (Release 4)
Rel-5   (Release 5)
Rel-6   (Release 6)

Reason for change: ⌘	As a pre-release 99 network (SGSN) is not able to handle PDP context using an extended TI, the old SGSN (R99 or later) and the MS shall delete all PDP contexts using an extended TI, when a change to a pre-release 99 SGSN takes place.
Summary of change: ⌘	PDP contexts using an extended TI shall be deleted locally by the MS and the network once a change to a pre-release 99 network is done.
Consequences if not approved: ⌘	The pre-release 99 SGSN is not able to handle those PDP contexts.

Clauses affected: ⌘	11.1.1

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

Other comments: ⌘	

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be

downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

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

11.1.1   Interactions Between GTP v0 (R97) and GTP v1 (R99)

When a first GSN receives a GTP PDU from a second GSN using a version not supported, then the first GSN shall return a "version not supported" error message to the second GSN. The second GSN shall then fall back to the most-recent version supported by the first GSN. A GSN shall use its most-recent GTP version when initiating GTP PDU transmission to a new GSN.

When an SGSN that supports GTP v1 establishes a GTP tunnel to a GGSN that supports GTP v0, the SGSN shall convert a release 99 QoS profile to a release 97 QoS profile before transmitting the QoS profile to the GGSN. If the MS supports the R99 QoS profile, the SGSN shall convert the negotiated R97 QoS profile to an R99 QoS profile before transmitting the QoS profile to the MS.

A GGSN shall be able to fall back to GTP v0 during an Update PDP Context procedure. That is, the GGSN shall accept an Update PDP Context Request of GTP v0 even if the established GTP tunnel is of GTP v1.

When an inter-SGSN RA update procedure is performed from a first SGSN that supports GTP v1 to a second SGSN that supports GTP v0, the first SGSN shall convert the R99 QoS profile to an R97 QoS profile before sending the SGSN Context Response message. Furthermore, it fills the Uplink Flow Label Signalling field in the PDP Context information element of the SGSN Context Response message with the lower two octets of the Uplink TEID Control Plane. All PDP contexts that are identified by an extended TI (see 3GPP TS 24.008~~7~~ [~~13~~12]) shall be deleted locally in the MS and the first SGSN, and the first SGSN shall initiate the deletion of these PDP contexts in the GGSN after receiving an SGSN Context Acknowledge message from the second SGSN. If several of the remaining PDP contexts have been activated for the same APN and PDP address in the first SGSN (secondary PDP context activation), then all PDP contexts except the PDP context with the highest-quality QoS profile ~~are~~ shall be deleted locally in the MS and in the first SGSN, and the first SGSN shall initiate the deletion of these PDP contexts in the GGSN.

The MS detects that the new SGSN is supporting only GTPv0 from the Release Indication broadcasted by the RAN.

3GPP TS 23.107 [58] specifies how to determine the highest-quality QoS profile. The second SGSN shall be responsible for updating the remaining PDP context in the GGSN, and the GGSN shall remove the TFT if present when it receives the GTP v0 Update PDP Context Request message.

NOTE: The conversion between an R99 QoS profile and an R97 QoS profile is defined in 3GPP TS 23.107.

When an inter-SGSN RA update procedure is performed from a first SGSN that supports GTP v0 to a second SGSN that supports GTP v1, the second SGSN shall convert the R97 QoS profile to the R99 QoS profile, ignore the delivered Uplink Flow Label Signalling and use GTP v1 to send the Update PDP Context Request message to the GGSN. The Update PDP Context Request message shall be sent with a header containing a TEID set to all zeros and with an additional IE containing the IMSI for the PDP context.

A GGSN shall be able to change to GTP v1 during an Update PDP Context procedure. That is, the GGSN shall accept an Update PDP Context Request of GTP v1 with a TEID set to all zeros and containing the IMSI in addition to the NSAPI, even if the established GTP tunnel is of GTP v0.

When a GTP v0 tunnel was established between the old SGSN and the GGSN, and both old and new SGSNs support GTPv1 the respective uplink Flow Label signalling shall be inserted in the two lower octets of the Uplink TEID Control Plane field of the SGSN Context Response message; the upper two octets shall be set to all zeros.

CR-Form-v7

CHANGE REQUEST

⌘	**23.060** CR **388**	⌘ **rev**	**1**	⌘	Current version:	**5.2.0**	⌘

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

Proposed change affects: UICC apps⌘ ☐   ME **X** Radio Access Network ☐   Core Network ☐

Title: ⌘	Clarification on MS Initiated Service Request Procedure	
Source: ⌘	Siemens	
Work item code: ⌘	TEI5	***Date:*** ⌘ 24/06/2002
Category: ⌘ **F**		***Release:*** ⌘ Rel-5

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

Use one of the following releases:
  2   *(GSM Phase 2)*
  R96   *(Release 1996)*
  R97   *(Release 1997)*
  R98   *(Release 1998)*
  R99   *(Release 1999)*
  Rel-4 *(Release 4)*
  Rel-5 *(Release 5)*
  Rel-6 *(Release 6)*

Reason for change: ⌘	As the RAB assignment may be queued by the RNC, it is possible that the assignment of the RABs via RRC signalling will occur later then the reception of the SERVICE ACCEPT message. It is even possible that certain RAB(s) will not be established at all. As it is under the control of the network to assign the corresponding RABs, the MS shall not trigger any re-attempts of the Service Request Procedure if the corresponding RABs are not assigned to the MS. It is proposed to explicitly state that the re-establishment of the RABs is successfully completed upon the reception of the SERVICE ACCEPT message irrespectively whether the RABs are already assigned to the MS or not.
Summary of change: ⌘	It is clarified, that the MS shall not start a second Service Request with service type set to data if a Service Request with service type data was accepted previously.
Consequences if ⌘ ***not approved:***	Possible misinterpretation that the MS shall trigger the Service Request Procedure again if the corresponding RABs are not established by the network.

Clauses affected: ⌘	6.12.1

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

Other comments: ⌘	

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Below is a brief summary:

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2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

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

6.12.1   MS Initiated Service Request Procedure

The MS in PMM-IDLE state sends the Service Request message to the 3G-SGSN in order to establish the PS signalling connection for the upper layer signalling or for the resource reservation for active PDP context(s). After receiving the Service Request message, the 3G-SGSN may perform authentication, and it shall perform the security mode procedure. After the establishment of the secure PS signalling connection to a 3G-SGSN, the MS may send signalling messages, e.g. Activate PDP Context Request, to the 3G-SGSN, or the 3G-SGSN may start the resource reservation for the active PDP contexts depending on the requested service in the Service Request message. An MS in PMM-CONNECTED state also requests the resource reservation for the active PDP contexts through this procedure.

Figure 50: MS Initiated Service Request Procedure

1) The MS establishes an RRC connection, if none exists for CS traffic.

2) The MS sends 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. At this point, the SGSN may perform the authentication procedure.

    If Service Type indicates Data, a signalling connection is established between the MS and the SGSN, and resources for active PDP context(s) are allocated, i.e. RAB establishment for the activated PDP context(s).

    If Service Type indicates Signalling, the signalling connection is established between the MS and the SGSN for sending upper-layer signalling messages, e.g. Activate PDP Context Request. The resources for active PDP context(s) are not allocated.

3) The SGSN shall perform the security functions if the MS in PMM-IDLE state initiated the service request.

4) If the network is in PMM-CONNECTED state and the Service Type indicates Data, the SGSN shall respond with a Service Accept message towards the MS, in case the service request can be accepted. In case Service Type indicates Data, the SGSN sends a Radio Access Bearer Assignment Request (NSAPIRAB ID(s), TEID(s), QoS Profile(s), SGSN IP Address(es)) message to re-establish radio access bearer for every activated PDP context.

5) The RNC indicates to the MS the new Radio Bearer Identity established and the corresponding RAB ID with the RRC radio bearer setup procedure.

6) SRNC responds with the Radio Access Bearer Assignment Response (RAB ID(s), TEID(s), QoS Profile(s), RNC IP Address(es)) message. The GTP tunnel(s) are established on the Iu interface. If the RNC returns a Radio Access Bearer Assignment Response message with a cause indicating that the requested QoS profile(s) can not be provided, e.g. "Requested Maximum Bit Rate not Available", the SGSN may send a new Radio Access Bearer Assignment Request message with different QoS profile(s). The number of re-attempts, if any, as well as how the new QoS profile(s) values are determined is implementation dependent.

7) For each RAB re-established with a modified QoS profile, the SGSN initiates a PDP Context Modification procedure to inform the MS and the GGSN of the new negotiated QoS profile for the corresponding PDP context.

8) For each RAB using streaming or conversational traffic class with maximum bitrate of 0 kbit/s (e.g. after 'RNC-Initiated PDP Context Modification Procedure') the MS starts the MS-Initiated PDP Context Modification procedure or the PDP Context Deactivation Initiated by MS procedure to inform the CN whether to re-activate or to delete the PDP contexts.

9) The MS sends the uplink packet.

For Service Type = Signalling, the MS knows that the Service Request message was successfully received in the SGSN when the MS receives the RRC Security Mode Control Command message.

For Service Type = Data, in PMM-IDLE, the MS knows that the Service Request was successfully received when the MS receives the RRC Security Mode Control Command message from the RNC; in PMM-CONNECTED state, the MS knows that the Service Request was successfully received when the MS receives the Service Accept message.

NOTE: The reception of the Service Accept message does not imply the successful re-establishment of the RAB(s).

For any Service Type, in case the service request cannot be accepted, the network returns a Service Reject message to the MS with an appropriate cause value.

For Service Type = Data, in case the SGSN fails to re-establish RAB(s) for the PDP context(s), the SGSN determines if an SM procedure, such as SGSN-Initiated PDP Context Modification or PDP Context Deactivation, should be initiated. The appropriate action depends on the QoS profile of the PDP context and is an operator choice.

If in PMM-CONNECTED state, a Service Request with Service Type = Data was already accepted by the network the MS shall not issue a second Service Request with Service Type = Data unless the PMM-IDLE state is entered again.

CR-Form-v7

CHANGE REQUEST

| ⌘ | **TS 23.060** CR **391** | ⌘ **rev** **1** | ⌘ | Current version: | **5.2.0** | ⌘ |

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

Proposed change affects: UICC apps⌘ ☐   ME ☐ Radio Access Network **X** Core Network **X**

Title:	⌘	Considering Gb mode in description of PDP context modification and deactivation

Source:	⌘	Siemens

Work item code:	⌘	TEI5		*Date:*	⌘	24/06/2002

Category:	⌘	**F**		*Release:*	⌘	Rel-5

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

Use one of the following releases:
2   *(GSM Phase 2)*
R96   *(Release 1996)*
R97   *(Release 1997)*
R98   *(Release 1998)*
R99   *(Release 1999)*
Rel-4 *(Release 4)*
Rel-5 *(Release 5)*
Rel-6 *(Release 6)*

Reason for change:	⌘	This CR covers BSS packet flow context procedures in the description for PDP context deactivation. It follows the corresponding description of the PDP context activation.

Summary of change:	⌘	This CR clarifies that BSS packet flow context procedures are applicable for PDP context deactivation procedures as well.

Consequences if not approved:	⌘	The TS 23.060 would leave the description for deactivation procedures in Gb mode unclear.

Clauses affected:	⌘	9.2.4.1, 9.2.4.2, 9.2.4.3

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

Other comments:	⌘	

How to create CRs using this form:
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1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

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

9.2.4.1   MS Initiated PDP Context Deactivation Procedure

The PDP Context Deactivation Initiated by MS procedures for A/Gb mode and Iu mode are illustrated in Figure 74 and Figure 75, respectively.

Figure 74: MS Initiated PDP Context Deactivation Procedure for A/Gb mode

Figure 75: MS Initiated PDP Context Deactivation Procedure for Iu mode

1) The MS sends a Deactivate PDP Context Request (TI, Teardown Ind) message to the SGSN.

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

3) The SGSN sends a Delete PDP Context Request (TEID, NSAPI, Teardown Ind) message to the GGSN. If the MS in the Deactivate PDP Context Request message included Teardown Ind, then the SGSN deactivates all PDP contexts associated with this PDP address by including Teardown Ind in the Delete PDP Context Request message. The GGSN removes the PDP context(s) and returns a Delete PDP Context Response (TEID) message to the SGSN. If the MS was using a dynamic PDP address allocated by the GGSN, and if the context being deactivated is the last PDP context associated with this PDP address, then the GGSN releases this PDP address and makes it available for subsequent activation by other MSs. The Delete PDP Context messages are sent over the backbone network.

4) The SGSN returns a Deactivate PDP Context Accept (TI) message to the MS.

5) 5) In Iu mode, radio access bearer release is done by the RAB Assignment procedure.

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

At GPRS detach, all PDP contexts for the MS are implicitly deactivated.

If the SGSN receives a Deactivate PDP Context Request (TI) message for a PDP context that is currently being activated, the SGSN shall stop the PDP Context Activation procedure without responding to the MS, and continue with the PDP Context Deactivation initiated by MS procedure.

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

C1) CAMEL_GPRS_PDP_Context_Disconnection.

The procedure returns as result "Continue".

9.2.4.2 SGSN-initiated PDP Context Deactivation Procedure

The PDP Context Deactivation Initiated by SGSN procedure is illustrated in Figure 76.

Figure 76: SGSN-initiated PDP Context Deactivation Procedure

1) The SGSN sends a Delete PDP Context Request (TEID, NSAPI, Teardown Ind) message to the GGSN. If Teardown Ind is included by the SGSN, the GGSN deactivates all PDP contexts associated with this PDP address. The GGSN removes the PDP context and returns a Delete PDP Context Response (TEID) message to the SGSN. If the MS was using a dynamic PDP address allocated by the GGSN, and if the context being deactivated is the last PDP context associated with this PDP address, the GGSN releases this PDP address and makes it available for subsequent activation by other MSs. The Delete PDP Context messages are sent over the backbone network. The SGSN may not wait for the response from the GGSN before sending the Deactivate PDP Context Request message.

2) The SGSN sends a Deactivate PDP Context Request (TI, Teardown Ind) message to the MS. If Teardown Ind is included, all PDP contexts associated with this PDP address are deactivated. The MS removes the PDP context(s) and returns a Deactivate PDP Context Accept (TI, Teardown Ind) message to the SGSN. Teardown Ind is included if received from the SGSN.

3) In Iu mode, radio access bearer release is done by the RAB Assignment procedure.

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

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

C1) CAMEL_GPRS_PDP_Context_Disconnection

The procedure returns as result "Continue".

9.2.4.3 GGSN-initiated PDP Context Deactivation Procedure

The PDP Context Deactivation Initiated by GGSN procedure is illustrated in Figure 77.
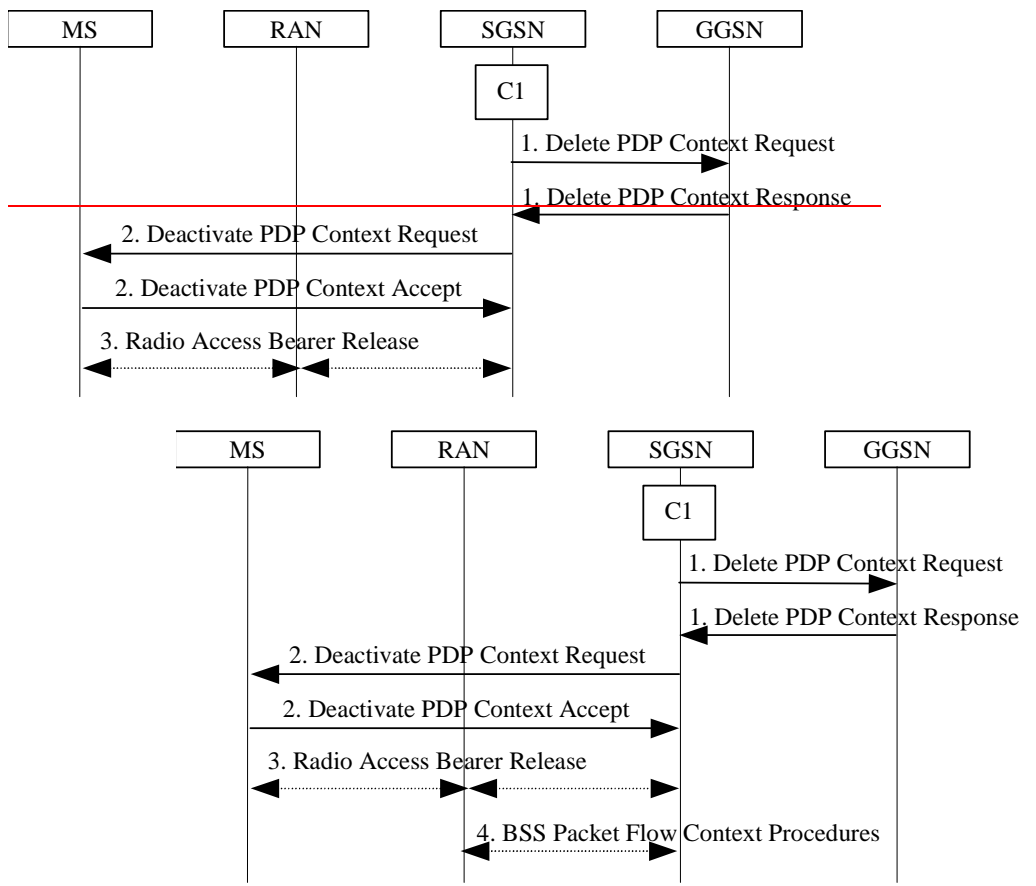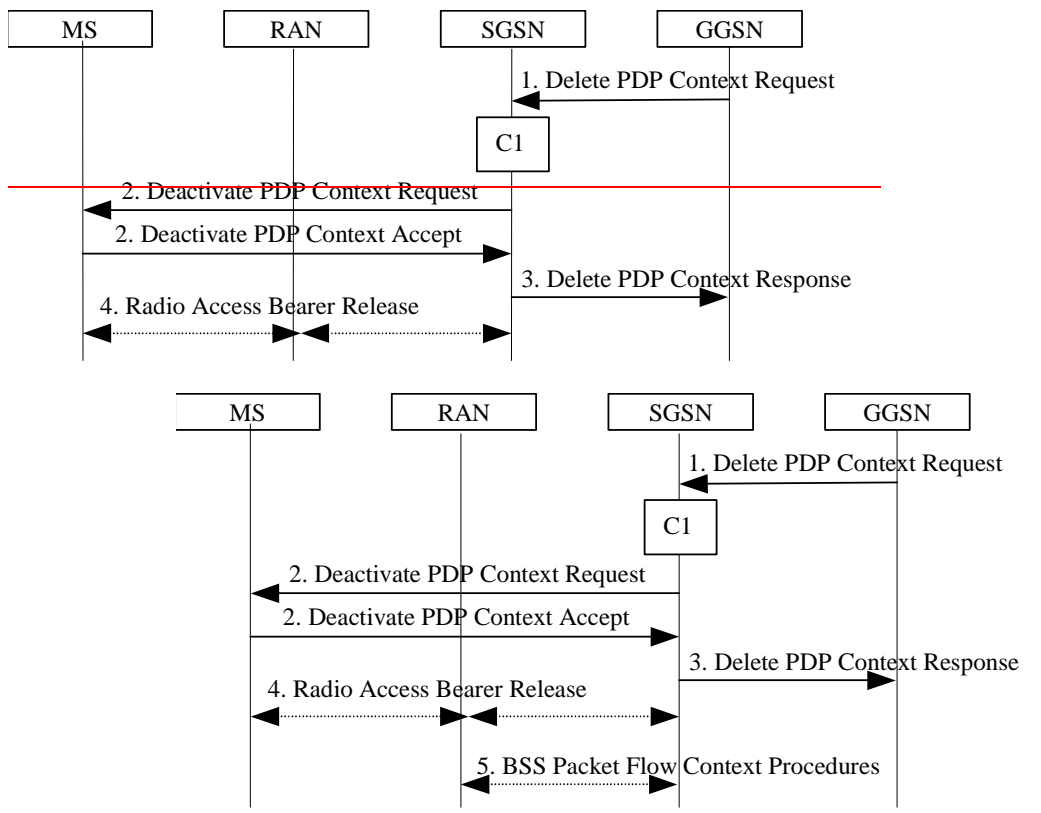

Figure 77: GGSN-initiated PDP Context Deactivation Procedure

1) The GGSN sends a Delete PDP Context Request (TEID, NSAPI, Teardown Ind) message to the SGSN. Teardown Ind indicates whether or not all PDP contexts associated with this PDP address shall be deactivated.

2) The SGSN sends a Deactivate PDP Context Request (TI, Teardown Ind) message to the MS. If Teardown Ind was included by the SGSN, then all PDP contexts associated with this PDP address are deactivated. The MS removes the PDP context(s) and returns a Deactivate PDP Context Accept (TI, Teardown Ind) message to the SGSN. Teardown Ind is included if received from the SGSN.

3) The SGSN returns a Delete PDP Context Response (TEID) message to the GGSN. If the MS was using a dynamic PDP address allocated by the GGSN, and if the context being deactivated is the last PDP context associated with this PDP address, the GGSN releases this PDP address and makes it available for subsequent activation by other MSs. The Delete PDP Context messages are sent over the backbone network. The SGSN may not wait for the response from the MS before sending the Delete PDP Context Response message.

4) In Iu mode, radio access bearer release is done by the RAB Assignment procedure.

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

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

C1) CAMEL_GPRS_PDP_Context_Disconnection.

The procedure returns as result "Continue".

CR-Form-v7

CHANGE REQUEST

⌘	**23.060** CR **392**	⌘ **rev**	**-**	⌘	Current version:	**4.5.0**	⌘

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

Proposed change affects: UICC apps⌘ ☐   ME **X** Radio Access Network **X** Core Network **X**

Title:	⌘	Correction of LCS reference
Source:	⌘	Siemens
Work item code:	⌘ TEI4	**Date:** ⌘ 19.06.02

Category:	⌘ **F**	**Release:** ⌘ Rel-4

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

Use one of the following releases:
2   *(GSM Phase 2)*
R96   *(Release 1996)*
R97   *(Release 1997)*
R98   *(Release 1998)*
R99   *(Release 1999)*
Rel-4   *(Release 4)*
Rel-5   *(Release 5)*
Rel-6   *(Release 6)*

Reason for change:	⌘	The LCS reference refers to the R99 specification.
Summary of change:	⌘	LCS reference corrected.
Consequences if not approved:	⌘	Reference indicates a wrong specification.

Clauses affected:	⌘	2

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

Other comments:	⌘	

How to create CRs using this form:

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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.

2   References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.

- For a specific reference, subsequent revisions do not apply.

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

[65]   3GPP TS 23.~~1~~271: "Functional stage 2 description of LCS~~location services in UMTS~~".

CR-Form-v7

CHANGE REQUEST

| ⌘ | **23.060** CR **393** | ⌘ rev | **-** | ⌘ | Current version: | **5.2.0** | ⌘ |

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

Proposed change affects: UICC apps⌘ ☐ ME **X** Radio Access Network **X** Core Network **X**

Title:	⌘	Correction of LCS reference	
Source:	⌘	Siemens	
Work item code: ⌘	TEI5	**Date:** ⌘	19.06.02
Category:	⌘ **A**	**Release:** ⌘	Rel-5

Use one of the following categories:
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A *(corresponds to a correction in an earlier release)*
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Use one of the following releases:
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R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change: ⌘	The LCS reference refers to the R99 specification.
Summary of change: ⌘	LCS reference corrected.
Consequences if not approved: ⌘	Reference indicates a wrong specification.

Clauses affected: ⌘	2	

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

Other comments: ⌘		

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Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

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

2   References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.

- For a specific reference, subsequent revisions do not apply.

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

[65]   3GPP TS 23.1271: "Functional stage 2 description of LCSlocation services in UMTS".

3GPP TSG-SA WG 2 #25   *Tdoc S2-021956*
Finland, 24-28/6/02   **rev of S2-021851**

CR-Form-v7	
CHANGE REQUEST	

⌘   **23.060 CR 394**   ⌘**rev** **1** ⌘   Current version: **5.2.0** ⌘

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

Proposed change affects: UICC apps⌘ ☐   ME ☐   Radio Access Network **X**   Core Network **X**

Title:	⌘	Sending downlink packets during SRNS relocation
Source:	⌘	Vodafone
Work item code: ⌘	TEI-5	***Date:*** ⌘ 26/06/02
Category: ⌘ **F**		***Release:*** ⌘ Rel-5

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

Use one of the following releases:
2 *(GSM Phase 2)*
R96 *(Release 1996)*
R97 *(Release 1997)*
R98 *(Release 1998)*
R99 *(Release 1999)*
Rel-4 *(Release 4)*
Rel-5 *(Release 5)*
Rel-6 *(Release 6)*

Reason for change:	⌘	The current text implies that the Target-RNC can receive packets from the SGSN before the SGSN has received the Relocation Request Acknowledge message.
		However, because the Acknowledge carries the GTP TEIDs, this is not possible.
Summary of change: ⌘		One sentence is moved down within step 4.
Consequences if not approved:	⌘	Time lost in answering questions arising from misleading text.

Clauses affected:	⌘	6.9.2.2.3

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

Other comments:	⌘	

6.9.2.2.3　　Combined Cell / URA Update and SRNS Relocation Procedure

This procedure is only performed for an MS in PMM-CONNECTED state, where the Iur/Iur-g interface carries control signalling but no user data In the context of this specification, the terms RNS or RNC refer also to a GERAN BSS or BSC (respectively) when serving an MS in Iu mode.

The Combined Cell / URA Update and SRNS Relocation or Combined Cell/GRA Update and SBSS Relocation procedure is used to move the RAN to CN connection point at the RAN side from the source SRNC to the target RNC, while performing a cell re-selection in the RAN. In the procedure, the Iu links are relocated. If the target RNC is connected to the same SGSN as the source SRNC, an Intra-SGSN SRNS Relocation procedure is performed. If the routeing area is changed, this procedure is followed by an Intra-SGSN Routeing Area Update procedure. 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 HLR about the new MS location.

Before the Combined Cell / URA Update and SRNS Relocation or Combined Cell/GRA Update and SBSS Relocation and before the Routeing Area Update, the MS is registered in the old SGSN. The source RNC is acting as serving RNC or serving BSS.

After the Combined Cell / URA Update and SRNS Relocation or Combined Cell/GRA Update and SBSS Relocation and after the Routeing Area Update, the MS is registered in the new SGSN. The MS is in state PMM-CONNECTED towards the new SGSN, and the target RNC is acting as serving RNC.

The Combined Cell / URA Update and SRNS Relocation or Combined Cell/GRA Update and SBSS relocation procedure for the PS domain is illustrated in Figure 43. The sequence is valid for both intra-SGSN SRNS relocation and inter-SGSN SRNS relocation. This signalling flow is also applicable to BSS to RNS relocation and vice-versa, as well as for BSS to BSS relocation.

Figure 43: Combined Cell / URA Update and SRNS Relocation Procedure

1) The MS sends a Cell Update / URA Update or a Cell Update / GRA Update message to the source SRNC (if the cell is located under another RNC the message is routed via the DRNC to SRNC over the Iur). The source SRNC decides whether or not to perform a combined cell / URA update and SRNS relocation towards the target RNC. The rest of this subclause describes the case where a combined cell / URA update and SRNS relocation applies. In this case no radio bearer is established between the source SRNC and the UE. Nonetheless the following tunnel(s) are established: GTP-U tunnel(s) between source SRNC and old-SGSN; GTP-U tunnel(s) between old-SGSN and GGSN.

2) The source SRNC sends a Relocation Required message (Relocation Type, Cause, Source ID, Target ID, Source RNC to Target RNC Transparent Container) to the old SGSN. The source SRNC shall set Relocation Type to "UE not involved". Source RNC to Target RNC Transparent Container includes the necessary information for Relocation co-ordination, security functionality, and RRC protocol context information (including MS Capabilities).

3) The old SGSN determines from the Target ID if the SRNS Relocation is intra-SGSN SRNS relocation or inter-SGSN SRNS relocation. In the case of inter-SGSN SRNS relocation the old SGSN initiates the relocation resource allocation procedure by sending a Forward Relocation Request (IMSI, Tunnel Endpoint Identifier Signalling, MM Context, PDP Context, Target Identification, RAN Transparent Container, RANAP Cause)

message to the new SGSN. For relocation to an area where Intra Domain Connection of RAN Nodes to Multiple CN Nodes is used, the old SGSN may – if it provides Intra Domain Connection of RAN Nodes to Multiple CN Nodes -have multiple target SGSNs for each relocation target in a pool area, in which case the old SGSN will select one of them to become the new SGSN, as specified in 3GPP TS 23.236 [73]. PDP context contains GGSN Address for User Plane and Uplink TEID for Data (to this GGSN Address and Uplink TEID for Data, the old SGSN and the new SGSN send uplink packets). At the same time a timer is started on the MM and PDP contexts in the old SGSN, see Routeing Area Update procedure in subclause "Location Management Procedures (Iu mode)". The Forward Relocation Request message is applicable only in case of inter-SGSN SRNS relocation.

4) The new SGSN sends a Relocation Request message (Permanent NAS UE Identity, Cause, CN Domain Indicator, Source RNC to Target RNC Transparent Container, RABs To Be Setup) to the target RNC. For each requested RAB, RABs To Be Setup shall contain information such as RAB ID, RAB parameters, Transport Layer Address, and Iu Transport Association. The RAB ID information element contains the NSAPI value, and the RAB parameters information element gives the QoS profile. The Transport Layer Address is the SGSN Address for user data, and the Iu Transport Association corresponds to the uplink Tunnel Endpoint Identifier Data.

After all necessary resources for accepted RABs including the Iu user plane are successfully allocated, the target RNC shall send the Relocation Request Acknowledge message (RABs setup, RABs failed to setup) to the new SGSN. Each RAB to be setup is defined by a Transport Layer Address, which is the target RNC Address for user data, and a Iu Transport Association which corresponds to the downlink Tunnel Endpoint Identifier for user data. ~~The target RNC may simultaneously receive for each RAB to be set up downlink user packets both from the source SRNC and from the new SGSN.~~

After the new SGSN receives the Relocation Request Acknowledge message, the GTP-U tunnels are established between the target RNC and the new-SGSN.

The target-RNC may simultaneously receive for each RAB to be set up downlink user packets both from the source SRNC and from the new SGSN.

5) When resources for the transmission of user data between the target RNC and the new SGSN have been allocated and the new SGSN is ready for relocation of SRNS, the Forward Relocation Response message (Cause, RANAP Cause, and Target RNC Information) is sent from the new SGSN to the old SGSN. This message indicates that the target RNC is ready to receive from the source SRNC the forwarded downlink packets, i.e., the relocation resource allocation procedure is terminated successfully. RANAP Cause is information from the target RNC to be forwarded to the source SRNC. The RAB Setup Information, one information element for each RAB, contains the RNC Tunnel Endpoint Identifier and RNC IP address for data forwarding from the source SRNC to the target RNC. If the target RNC or the new SGSN failed to allocate resources, the RAB Setup Information element contains only NSAPI indicating that the source SRNC shall release the resources associated with the NSAPI. The Forward Relocation Response message is applicable only in case of inter-SGSN SRNS relocation.

6) The old SGSN continues the relocation of SRNS by sending a Relocation Command (RABs to be released, and RABs subject to data forwarding) message to the source SRNC. The old SGSN decides the RABs subject to data forwarding based on QoS, and those RABs shall be contained in RABs subject to data forwarding. For each RAB subject to data forwarding, the information element shall contain RAB ID, Transport Layer Address, and Iu Transport Association. These are the same Transport Layer Address and Iu Transport Association that the target RNC had sent to new SGSN in Relocation Request Acknowledge message, and these are used for forwarding of downlink N-PDU from the source SRNC to the target RNC. The source SRNC is now ready to forward downlink data directly to the target RNC over the Iu interface. This forwarding is performed for downlink user data only.

7) The source SRNC may, according to the QoS profile, begin the forwarding of data for the RABs subject to data forwarding and starts the data-forwarding timer. The data forwarding at SRNS relocation shall be carried out through the Iu interface, meaning that the data exchanged between the source SRNC and the target RNC are duplicated in the source SRNC and routed at the IP layer towards the target RNC. For each radio bearer which uses lossless PDCP the GTP-PDUs related to transmitted but not yet acknowledged PDCP-PDUs are duplicated and routed at IP layer towards the target RNC together with their related downlink PDCP sequence numbers. The source RNC continues transmitting duplicates of downlink data and receiving uplink data.

Note: The order of steps, starting from step 7 onwards, does not necessarily reflect the order of events. For instance, source RNC may send data forwarding (step 7) and start Relocation Commit message (step 8) almost simultaneously. Target RNC may send Relocation Detect message (step 9) and Cell Update Confirm/URA Update Confirm (or Cell Update Confirm/GRA Update Confirm) message (step 10) at the same time. Hence, target RNC may receive the UTRAN or GERAN Mobility Information Confirm message from MS (step 10) while data forwarding (step 8) is still underway, and before the new SGSN receives Update PDP Context Response message (step 11).

Before the serving RNC role is not yet taken over by target RNC and when downlink user plane data starts to arrive to target RNC, the target RNC may buffer or discard arriving downlink GTP-PDUs according to the related QoS profile.

8) Before sending the Relocation Commit the uplink and downlink data transfer in the source, SRNC shall be suspended for RABs, which require delivery order.

When the source SRNC is ready, the source SRNC shall trigger the execution of relocation of SRNS by sending a Relocation Commit message (SRNS Contexts) to the target RNC over the UTRAN Iur interface or over the GERAN Iur-g interface, respectively. The purpose of this procedure is to transfer SRNS contexts from the source RNC to the target RNC, and to move the SRNS role from the source RNC to the target RNC. SRNS contexts are sent for each concerned RAB and contain the sequence numbers of the GTP-PDUs next to be transmitted in the uplink and downlink directions and the next PDCP sequence numbers that would have been used to send and receive data from the MS. . PDCP sequence numbers are only sent by the source RNC for radio bearers, which used lossless PDCP [57]. The use of lossless PDCP is selected by the RNC when the radio bearer is set up or reconfigured. For PDP context(s) using delivery order not required (QoS profile), the sequence numbers of the GTP-PDUs next to be transmitted are not used by the target RNC.

If delivery order is required (QoS profile), consecutive GTP-PDU sequence numbering shall be maintained throughout the lifetime of the PDP context(s). Therefore, during the entire SRNS relocation procedure for the PDP context(s) using delivery order required (QoS profile), the responsible GTP-U entities (RNCs and GGSN) shall assign consecutive GTP-PDU sequence numbers to user packets belonging to the same PDP context for uplink and downlink respectively.

9) The target RNC shall send a Relocation Detect message to the new SGSN when the relocation execution trigger is received. For SRNS relocation type "UE not involved", the relocation execution trigger is the reception of the Relocation Commit message from the Iur interface. When the Relocation Detect message is sent, the target RNC shall start SRNC operation.

10) The target SRNC sends a Cell Update Confirm / URA Update Confirm or Cell Update Confirm / GRA Update Confirm message. This message contains UE information elements and CN information elements. The UE information elements include among others new SRNC identity and S-RNTI. The CN information elements contain among others Location Area Identification and Routeing Area Identification. The procedure shall be co-ordinated in all Iu signalling connections existing for the MS.

Upon reception of the Cell Update Confirm / URA Update Confirm or Cell Update Confirm / GRA Update Confirm message the MS may start sending uplink user data to the target SRNC. When the MS has reconfigured itself, it sends the RAN Mobility Information Confirm message to the target SRNC. This indicates that the MS is also ready to receive downlink data from the target SRNC.

If the new SGSN has already received the Update PDP Context Response message from the GGSN, it shall forward the uplink user data to the GGSN over this new GTP-U tunnel. Otherwise, the new SGSN shall forward the uplink user data to that GGSN IP address and TEID(s), which the new SGSN had received earlier by the Forward Relocation Request message.

The target SRNC and the MS exchange the PDCP sequence numbers; PDCP-SNU and PDCP-SND. PDCP-SND is the PDCP sequence number for the next expected in-sequence downlink packet to be received in the MS per radio bearer, which used lossless PDCP in the source RNC. PDCP-SND confirms all mobile terminated packets successfully transferred before the SRNC relocation procedure. . If PDCP-SND confirms the reception of packets that were forwarded from the source SRNC, the target SRNC shall discard these packets. PDCP-SNU is the PDCP sequence number for the next expected in-sequence uplink packet to be received in the RNC per radio bearer, which used lossless PDCP in the source RNC. PDCP-SNU confirms all mobile originated packets successfully transferred before the SRNC relocation. If PDCP-SNU confirms reception of packets that were received in the source SRNC, the target SRNC shall discard these packets.

11) Upon receipt of the Relocation Detect message, the CN may switch the user plane from the source RNC to the target SRNC. If the SRNS Relocation is an inter-SGSN SRNS relocation, the new SGSN sends Update PDP Context Request messages (new SGSN Address, SGSN Tunnel Endpoint Identifier, QoS Negotiated) to the GGSNs concerned. The GGSNs update their PDP context fields and return an Update PDP Context Response (GGSN Tunnel Endpoint Identifier) message.

12) When the target SRNC receives the RAN Mobility Information Confirm message, i.e. the new SRNC-ID + S-RNTI are successfully exchanged with the MS by the radio protocols, the target SRNC shall initiate the Relocation Complete procedure by sending the Relocation Complete message to the new SGSN. The purpose of the Relocation Complete procedure is to indicate by the target SRNC the completion of the relocation of the SRNS to the CN. If the user plane has not been switched at Relocation Detect, the CN shall upon reception of

Relocation Complete switch the user plane from the source RNC to the target SRNC. If the SRNS Relocation is an inter SGSN SRNS relocation, the new SGSN signals to the old SGSN the completion of the SRNS relocation procedure by sending a Forward Relocation Complete message.

13) Upon receiving the Relocation Complete message or if it is an inter-SGSN SRNS relocation, the Forward Relocation Complete message, the old SGSN sends an Iu Release Command message to the source RNC. When the RNC data-forwarding timer has expired the source RNC responds with an Iu Release Complete.

14) After the MS has finished the Cell / URA update or the Cell / GRA update and RNTI reallocation procedure and if the new Routeing Area Identification is different from the old one, the MS initiates the Routeing Area Update procedure. See subclause "Location Management Procedures (Iu mode)". Note that it is only a subset of the RA update procedure that is performed, since the MS is in PMM-CONNECTED state.

If the SRNS Relocation is inter-SGSN, then the following CAMEL procedure calls shall be performed (see referenced procedures in 3GPP TS 23.078)

C1) CAMEL_GPRS_PDP_Context_Disconnection and CAMEL_GPRS_Detach

They are called in the following order:

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

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

If the SRNS Relocation is intra-SGSN, then the above mentioned CAMEL procedures calls shall not be performed.

If Routeing Area Update occurs, then the following CAMEL procedure calls shall be performed (see referenced procedures in 3GPP TS 23.078):

C2) CAMEL GPRS Routeing Area Update-Session

The procedure returns as result "Continue".

C3) CAMEL_GPRS_Routeing_Area_Update_Context.

This procedure is called several times: once per PDP context. It returns as result "Continue". For C2 and C3: refer to Routing Area Update procedure description for detailed message flow.

CR-Form-v7

CHANGE REQUEST

| ⌘ | **23.060** CR **395** | ⌘ **rev** | **-** | ⌘ | Current version: | **5.2.0** | ⌘ |

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

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network **X** Core Network **X**

Title:	⌘	Introduction of flow control per PFC between the SGSN and BSS

Source:	⌘	Ericsson, Alcatel

Work item code:	⌘	TEI5		**Date:**	⌘	21/06/2002

Category:	⌘	**F**		**Release:**	⌘	Rel-5

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

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)

| **Reason for change:** | ⌘ | Align 23.060 with GERAN stage 3.

GERAN background:
When several PFCs are active for a given Mobile Station, the BSS may schedule the DL LLC PDUs associated to the various PFCs at different rates on the radio interface. If the BSS only periodically indicates the filling of the overall MS buffer, the SGSN has no way to determine the volume of outstanding LLC PDUs for each PFC within the BSS. Then it cannot determine how to prioritise the sending of further DL LLC PDUs for each PFC. |
|---|---|---|

Summary of change:	⌘	A new optional mechanism is introduced on the Gb interface that allows the BSS to perform flow control on a per PFC basis.

Consequences if not approved:	⌘	Inconsistency between stage 2 and stage 3.

Clauses affected:	⌘	12.6.3.4

Other specs affected:	⌘	**Y** **N**			
		X ☐	Other core specifications	⌘	48.018 (CR already agreed in GERAN2)
		☐	Test specifications		
		☐	O&M Specifications		

Other comments:	⌘	

How to create CRs using this form:
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Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

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

12.6.3.4 Flow Control Between SGSN and BSS over the Gb Interface

The flow control mechanism controls the loading of the BSS LLC PDU queues per BVCI, ~~and~~ per MS and optionally per one or more PFCs between the SGSN and the BSS in the downlink direction. No flow control is performed in the uplink direction. Buffers and link capacity shall be dimensioned to avoid loss of uplink data.

The downlink flow control mechanism is based on the following principles:

- In the SGSN, queues for LLC PDUs are provided per BVCI. These queues may be split further, e.g. per MS or per packet flow. The SGSN shall pass LLC PDUs to LLC via BSSGP to the BSS as long as the allowed BSSGP throughput is not exceeded. The allowed BSSGP throughput is given per BVCI, ~~and~~ for a single MS on that BVCI and optionally for one or more PFCs of a single MS on a certain BVCI. The SGSN schedules the BSSGP downlink traffic of all MSs of a BVCI and, optionally of all PFCs of an MS, according to the maximum and guaranteed bitrate attributes and to the QoS profile related to each LLC PDU. The scheduling algorithm is implementation dependent.

- In the BSS, queues per BVCI context are provided at the BSSGP level. These queues may be split further, e.g. per MS or per packet flow. Depending on the queuing conditions and the available radio resource capacity in the cell, the BSS indicates the allowed BSSGP throughput per BVCI context and the default allowed BSSGP throughput for each individual MS of that BVCI context by BSSGP flow control messages to the SGSN. Additionally, the BSS may change the allowed BSSGP throughput for one or more PFCs of an individual MS or for an individual MS by a BSSGP flow control message. As more than one SGSN may send downlink data at the same time for a radio cell when the BSS applies Intra Domain Connection of RAN Nodes to Multiple CN Nodes, the BSS has to share the total possible downlink traffic between the SGSNs that can access a radio cell. The BSS should use the existing flow control procedure on BVCI level to control each of the SGSNs in a way not to violate the total possible traffic for the radio cell. How the BSS decides to share the downlink traffic between each of the SGSNs is an implementation specific issue.

12.6.3.5 BSS Context

CR-Form-v7

CHANGE REQUEST

⌘ **23.060** CR **396** ⌘ rev **1** ⌘ Current version: **3.12.0** ⌘

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

Proposed change affects: UICC apps⌘ ☐ ME **X** Radio Access Network ☐ Core Network ☐

Title: ⌘	QoS attributes requested in case of real-time QoS
Source: ⌘	Ericsson
Work item code: ⌘	E2EQoS **Date:** ⌘ 28/06/2002
Category: ⌘ **F**	**Release:** ⌘ R99

Use <u>one</u> of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can
be found in 3GPP TR 21.900.

Use <u>one</u> of the following releases:
2 *(GSM Phase 2)*
R96 *(Release 1996)*
R97 *(Release 1997)*
R98 *(Release 1998)*
R99 *(Release 1999)*
Rel-4 *(Release 4)*
Rel-5 *(Release 5)*
Rel-6 *(Release 6)*

Reason for change: ⌘	CR 111r2 to 23.107 introduces a description of how a QoS request with the traffic class set to 'subscribed' shall be handled (in the SGSN), i.e. in that case the QoS negotiated will be Interactive at maximum. A subscriber with a subscription allowing streaming or conversational traffic class will therefore be able to get a traffic class higher than Interactive only if the MS explicitly requests the traffic class. Also the subscription in the HLR, which can contain only one QoS profile for a given APN, will indicate the maximum values allowed for each QoS attribute for all possible cases. Consequently, the Maximum Bit Rate is likely to reflect the maximum value allowed for the Interactive or Background class, which is normally higher than what can be allowed for Streaming or Conversational, leading to an over-reservation of resources or to a higher probability to have the QoS request rejected if the subscribed value is taken. Likewise, the Guaranteed Bit Rate is likely higher for Streaming than for Conversational and could therefore also lead to similar problems.
Summary of change: ⌘	It is clarified that when the application in the MS requires streaming or conversational QoS, then the MS shall at least explicitly request the traffic class and should explicitly request the guaranteed bit rate and the maximum bit rate. It is also clarified that when the MS requests the traffic class as 'subscribed', the SGSN will assume a request for Interactive class.
Consequences if not approved: ⌘	Over-reservation of resources as well as increased probability of QoS requests being rejected, when the subscription allows Streaming or Conversational and the MS does not specify the critical QoS attributes.

Clauses affected:	⌘	15.2			

		Y	**N**		
Other specs affected:	⌘	**X**		Other core specifications	⌘ 23.107, 27.060
			X	Test specifications	
			X	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.

15.2   Quality of Service Profile

A QoS profile is associated with each PDP context. The QoS profile is considered to be a single parameter with multiple data transfer attributes. The definition of the QoS attributes for the packet domain can be found in 3G TS 23.107, which also defines the mapping between the packet-domain QoS attributes and the QoS attributes for GPRS releases 97 and 98.

At any given time, there should be a maximum of one PDP context, for a particular PDP address, that is not associated with a TFT.

During the QoS profile negotiation defined in subclause "Activation Procedures", it shall be possible for the MS to request a value for each of the QoS attributes, including the HLR-stored subscribed default values. However if the MS requests the traffic class as 'subscribed', the SGSN will assume a request for Interactive class. When the MS requests a QoS, the HLR-stored subscribed default values shall be interpreted as the maximum QoS per PDP context to the associated APN. When the application in the MS requires streaming or conversational QoS, then the MS shall at least explicitly request the traffic class and should explicitly request the guaranteed bit rate and the maximum bit rate.

The network shall negotiate each attribute to a level that is in accordance with the available GPRS resources. The network shall always attempt to provide adequate resources to support the negotiated QoS profiles.

CR-Form-v7

CHANGE REQUEST

| ⌘ | **23.060** CR **397** | ⌘ **rev** | **1** | ⌘ | Current version: | **4.5.0** | ⌘ |

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Proposed change affects: UICC apps⌘ ☐   ME **X** Radio Access Network ☐   Core Network ☐

Title: ⌘	QoS attributes requested in case of real-time QoS	
Source: ⌘	Ericsson	
Work item code: ⌘	E2EQoS	***Date:*** ⌘ 28/06/2002
Category: ⌘ **A**		***Release:*** ⌘ Rel-4

Use <u>one</u> of the following categories:
F (correction)
A (corresponds to a correction in an earlier release)
B (addition of feature),
C (functional modification of feature)
D (editorial modification)
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Use <u>one</u> of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)

Reason for change: ⌘	CR 112r2 to 23.107 introduces a description of how a QoS request with the traffic class set to 'subscribed' shall be handled (in the SGSN), i.e. in that case the QoS negotiated will be Interactive at maximum. A subscriber with a subscription allowing streaming or conversational traffic class will therefore be able to get a traffic class higher than Interactive only if the MS explicitly requests the traffic class. Also the subscription in the HLR, which can contain only one QoS profile for a given APN, will indicate the maximum values allowed for each QoS attribute for all possible cases. Consequently, the Maximum Bit Rate is likely to reflect the maximum value allowed for the Interactive or Background class, which is normally higher than what can be allowed for Streaming or Conversational, leading to an over-reservation of resources or to a higher probability to have the QoS request rejected if the subscribed value is taken. Likewise, the Guaranteed Bit Rate is likely higher for Streaming than for Conversational and could therefore also lead to similar problems.
Summary of change: ⌘	It is clarified that when the application in the MS requires streaming or conversational QoS, then the MS shall at least explicitly request the traffic class and should explicitly request the guaranteed bit rate and the maximum bit rate.
Consequences if not approved: ⌘	Over-reservation of resources as well as increased probability of QoS requests being rejected, when the subscription allows Streaming or Conversational and the MS does not specify the critical QoS attributes.
Clauses affected: ⌘	15.2

Y	N

Other specs affected:	⌘	**X**		Other core specifications	⌘	23.107, 27.060
			X	Test specifications		
			X	O&M Specifications		
Other comments:	⌘					

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

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

15.2 Quality of Service Profile

A QoS profile is associated with each PDP context. The QoS profile is considered to be a single parameter with multiple data transfer attributes. The definition of the QoS attributes for the packet domain can be found in 3GPP TS 23.107, which also defines the mapping between the packet-domain QoS attributes and the QoS attributes for GPRS releases 97 and 98.

At any given time, there should be a maximum of one PDP context, for a particular PDP address, that is not associated with a TFT.

During the QoS profile negotiation defined in clause "Activation Procedures", it shall be possible for the MS to request a value for each of the QoS attributes, including the HLR-stored subscribed default values. However if the MS requests the traffic class as 'subscribed', the SGSN will assume a request for Interactive class. When the MS requests a QoS, the HLR-stored subscribed default values shall be interpreted as the maximum QoS per PDP context to the associated APN. When the application in the MS requires streaming or conversational QoS, then the MS shall at least explicitly request the traffic class and should explicitly request the guaranteed bit rate and the maximum bit rate.

The network shall negotiate each attribute to a level that is in accordance with the available GPRS resources. The network shall always attempt to provide adequate resources to support the negotiated QoS profiles.

CR-Form-v7

CHANGE REQUEST

⌘ **23.060** CR **398** ⌘ rev **1** ⌘ Current version: **5.2.0** ⌘

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

Proposed change affects: UICC apps⌘ ☐ ME **X** Radio Access Network ☐ Core Network ☐

Title: ⌘	QoS attributes requested in case of real-time QoS
Source: ⌘	Ericsson
Work item code: ⌘ E2EQoS	***Date:*** ⌘ 28/06/2002
Category: ⌘ **A**	***Release:*** ⌘ Rel-5

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

Use one of the following releases:
2 *(GSM Phase 2)*
R96 *(Release 1996)*
R97 *(Release 1997)*
R98 *(Release 1998)*
R99 *(Release 1999)*
Rel-4 *(Release 4)*
Rel-5 *(Release 5)*
Rel-6 *(Release 6)*

Reason for change: ⌘	CR 113r2 to 23.107 introduces a description of how a QoS request with the traffic class set to 'subscribed' shall be handled (in the SGSN), i.e. in that case the QoS negotiated will be Interactive at maximum.

A subscriber with a subscription allowing streaming or conversational traffic class will therefore be able to get a traffic class higher than Interactive only if the MS explicitly requests the traffic class. Also the subscription in the HLR, which can contain only one QoS profile for a given APN, will indicate the maximum values allowed for each QoS attribute for all possible cases. Consequently, the Maximum Bit Rate is likely to reflect the maximum value allowed for the Interactive or Background class, which is normally higher than what can be allowed for Streaming or Conversational, leading to an over-reservation of resources or to a higher probability to have the QoS request rejected if the subscribed value is taken. Likewise, the Guaranteed Bit Rate is likely higher for Streaming than for Conversational and could therefore also lead to similar problems. |
Summary of change: ⌘	It is clarified that when the application in the MS requires streaming or conversational QoS, then the MS shall at least explicitly request the traffic class and should explicitly request the guaranteed bit rate and the maximum bit rate.
Consequences if not approved: ⌘	Over-reservation of resources as well as increased probability of QoS requests being rejected, when the subscription allows Streaming or Conversational and the MS does not specify the critical QoS attributes.
Clauses affected: ⌘	15.2

Y N

Other specs affected:	⌘	X		Other core specifications	⌘	23.107, 27.060
			X	Test specifications		
			X	O&M Specifications		
Other comments:	⌘					

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15.2 Quality of Service Profile

A QoS profile is associated with each PDP context. The QoS profile is considered to be a single parameter with multiple data transfer attributes. The definition of the QoS attributes for GPRS can be found in 3GPP TS 23.107, which also defines the mapping between the release 99 QoS attributes and the QoS attributes for GPRS releases 97 and 98.

At any given time, there should be a maximum of one PDP context, for a particular PDP address, that is not associated with a TFT.

During the QoS profile negotiation defined in clause "Activation Procedures", it shall be possible for the MS to request a value for each of the QoS attributes, including the HLR-stored subscribed default values. However if the MS requests the traffic class as 'subscribed', the SGSN will assume a request for Interactive class. When the MS requests a QoS, the HLR-stored subscribed default values shall be interpreted as the maximum QoS per PDP context to the associated APN. When the application in the MS requires streaming or conversational QoS, then the MS shall at least explicitly request the traffic class and should explicitly request the guaranteed bit rate and the maximum bit rate.

The network shall negotiate each attribute to a level that is in accordance with the available GPRS resources. The network shall always attempt to provide adequate resources to support the negotiated QoS profiles.

<table>
<tr><td colspan="3" align="right">CR-Form-v7</td></tr>
<tr><td colspan="3" align="center"># CHANGE REQUEST</td></tr>
</table>

⌘ **23.060 CR 372** ⌘**rev - ** ⌘ Current version: **5.2.0** ⌘

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

Proposed change affects: UICC apps⌘ [ ]   ME [ ] Radio Access Network [ ]   Core Network [ ]

Title: ⌘	Correction of Reference in the Scope
Source: ⌘	Motorola
Work item code: ⌘ TEI5	**Date:** ⌘ 26/06/2002
Category: ⌘ **F**	**Release:** ⌘ Rel-5

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

Use one of the following releases:
 2 (GSM Phase 2)
 R96 (Release 1996)
 R97 (Release 1997)
 R98 (Release 1998)
 R99 (Release 1999)
 Rel-4 (Release 4)
 Rel-5 (Release 5)
 Rel-6 (Release 6)

Reason for change: ⌘	The description reference in the scope refers to an overall description of the UMTS Terrestrial Radio Access Network, however, it points to document 25.301, which contains Radio Interface Protocol Architecture.
Summary of change: ⌘	The reference was corrected to be 25.401 and the reference number was changed from [50] to [53].
Consequences if not approved: ⌘	A reader will be referenced to incorrect spcification.

Clauses affected: ⌘	1

	Y	N		
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.

1   Scope

The present document defines the stage-2 service description for the General Packet Radio Service (GPRS) which is a packet bearer service and a main part of the packet domain. ITU-T Recommendation I.130 [29] describes a three-stage method for characterisation of telecommunication services, and ITU-T Recommendation Q.65 [31] defines stage 2 of the method.

The present document does not cover the Radio Access Network functionality. GSM 03.64 [11] contains an overall description of the GSM GPRS Access Network. 3GPP TS 25.301 401 [5053] contains an overall description of the UMTS Terrestrial Radio Access Network. 3GPP TS 43.051 [74] contains an overall description of GSM/EDGE Radio Access Network.

2   References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.

- For a specific reference, subsequent revisions do not apply.

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

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

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

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

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

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

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

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

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

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

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

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

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

[10]   Void.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

[34]   ITU-T Recommendation X.25: "Interface between Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) for terminals operating in the packet mode and connected to public data networks by dedicated circuit".

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

[65]   3GPP TS 23.171: "Functional stage 2 description of location services in UMTS".

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

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

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

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

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

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

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

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

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

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

3GPP TSG-SA WG2 meeting #26 **Tdoc S2-022232**

Toronto, Canada, 18th – 23rd August 2002

_____

3GPP TSG-CN WG3#24 **Tdoc N3-020738**

Helsinki, Finland. 29th July - 2nd Aug. 2002

Title:	**Proposed solutions for the identification of source IP address information over the Go interface**
Response to:	**Liaison statement on the wildcarding of source IP addresses and port numbers in the PCF for the packet classifier:**
	Tdoc S2-022045/N3-020560 and N1-021757/N3-020684.

Source:	**CN3**
To:	**SA2, CN1**
Cc:	

Contact Person:

    Name: Stephen Dutnall
    Company   AT&T Wireless Services, Inc.
    E-mail Address: steve.dutnall@northstream.se

Attachments: Potential CR for SA2v2, N3-020731

_____

CN3 thanks both SA2 and CN1 for their liaison statements (S2-022045/N3-020560 and N1-021757/N3-020684 respectively) concerning the identification of source IP address information available in the PCF in order to apply as a packet classifier over the Go interface.

CN3 has discussed the issue on the impacts of Mobile IPv6 and SBLP identified by SA2. CN3 conclude that the support of MobileIPv6 impacts both SBLP and TFT filter settings and is thus seen as a bigger issue to handle than just Mobile Ipv6 to SBLP. Given that Mobile IPv6 is still a draft within IETF with no clear sign when it will reach RFC status and hence there are no MobileIPv6 products in the market CN3 concludes that Mobile IPv6 should be studied as a general complete solution. CN3 therefore do not object to the essence of the CR proposed by SA2 for 23.207 on the grounds of adverse interaction with Mobile IPv6.

CN3 has also discussed the issues that CN1 has identified for the identification of source IP addresses of the non 3GPP end users, the fact that in the case where several UEs are behind a mobile router the IPv6 address prefix does not identify a specific UE and that the solution proposed by SA2 does not completely solve the misuse problem.

CN3 has thus developed on the SA2 solution stating that the mechanism identified by SA2 is an operator option. Furthermore CN3 is of the understanding that the developments in the identification of source address within SDP has just started within the IETF. Whilst it is agreed that it is currently unclear when this SDP feature will be

available, CN3 has included the ability for the PCF to use this information in the proposal put forward for CN3 specifications to enable the PCF to use this information when it becomes available.

Currently CN3 faces an administrative issue concerning the support of source address identification over the Go interface. Whilst it is agreed that this is an issue to resolve in the open items for 29.207 the stage 2 specification related to Go currently does not include the mechanism proposed. Thus the CN3 stage 3 CR concerning this issue has only been provisionally agreed within CN3 on the basis that SA2 introduces this feature in its documentation. CN3 includes the provisionally accepted CR for 29.207 and a proposed modification of the CR sent by SA2 for 23.207

2. Actions:

To SA2:

CN3 asks SA2 to consider the proposed CR to 23.207 CR 40 rev 2 for Release 5 changes from the original SA2 CR (rev 1) are highlighted in blue. The provisionally accepted CR for CN3 specification 29.207 CR 22rev 1 (N3-020731) is attached for information.

Given the deadlines for the inclusion of this functionality for Release 5 and the need to clarify the solution in the next CN plenary in September, CN3 asks SA2 to give an official response to CN3 of the outcome of the SA2 CR to 23.207.

To CN1:

No actions identified.

3. Date of Next SA2 Meetings:

Title	Date	Location
CN3#25	23 – 27 September 2002	USA.

CR-Form-v7

CHANGE REQUEST

⌘	**23.060** CR **400**	⌘**rev**	**-**	⌘	Current version:	**3.12.0** ⌘
						+ CR 383

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

Proposed change affects: UICC apps⌘ ☐   ME **X** Radio Access Network ☐   Core Network **X**

Title:	⌘	Handling of preserved PDP contexts
Source:	⌘	Siemens
Work item code:⌘	TEI	**Date:** ⌘ 14/08/2002
Category:	⌘ **F**	**Release:** ⌘ R99

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
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Use one of the following releases:
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R96   *(Release 1996)*
R97   *(Release 1997)*
R98   *(Release 1998)*
R99   *(Release 1999)*
Rel-4   *(Release 4)*
Rel-5   *(Release 5)*
Rel-6   *(Release 6)*

Reason for change:	⌘	In case the MS moves from a R99 SGSN (GTPv1) to a R97/98 SGSN (GTPv0) then the QoS attributes mapping table in 3GPP TS 23.107 section "9.1.2.3 Determining R97/98 attributes from R99 attributes" have to be used. Following the rules of this table, R99 real-time PDP contexts with a maximum bitrate in downlink and uplink of 0 kbit/s will be mapped to R97/98 non-real-time PDP contexts with a peak throughput class of 1. The peak throughput class 1 means the maximum bitrate is set to 8 kbit/s. That means that the preservation is abolished and charging starts again. This would contradict to the current approach defined in TS 23.060 that only the MS decides what happens with preserved PDP contexts.
		This CR proposes that the MS and network (old SGSN locally and towards GGSN) shall locally deactivate PDP contexts with maximum bitrate for uplink and downlink of 0 kbit/s.
Summary of change:⌘		PDP contexts with maximum bitrate for uplink and downlink of 0 kbit/s shall be deleted locally by the MS and the network once a change to a pre-release 99 network is done.
Consequences if not approved:	⌘	Preservation is not defined for pre-release 99. A change to a pre-release 99 SGSN would contradict to the approved approach in TS 23.060. Charging would start although the MS may not wish to re-establish this PDP context.
Clauses affected:	⌘	11.1.1

	Y	N		
Other specs affected: ⌘		X	Other core specifications ⌘	
		X	Test specifications	
		X	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.

11.1.1   Interactions Between GTP v0 (R97) and GTP v1 (R99)

When a first GSN receives a GTP PDU from a second GSN using a version not supported, then the first GSN shall return a "version not supported" error message to the second GSN. The second GSN shall then fall back to the most-recent version supported by the first GSN. A GSN shall use its most-recent GTP version when initiating GTP PDU transmission to a new GSN.

When an SGSN that supports GTP v1 establishes a GTP tunnel to a GGSN that supports GTP v0, the SGSN shall convert a release 99 QoS profile to a release 97 QoS profile before transmitting the QoS profile to the GGSN. If the MS supports the R99 QoS profile, the SGSN shall convert the negotiated R97 QoS profile to an R99 QoS profile before transmitting the QoS profile to the MS.

A GGSN shall be able to fall back to GTP v0 during an Update PDP Context procedure. That is, the GGSN shall accept an Update PDP Context Request of GTP v0 even if the established GTP tunnel is of GTP v1.

When an inter-SGSN RA update procedure is performed from a first SGSN that supports GTP v1 to a second SGSN that supports GTP v0, the first SGSN shall convert the R99 QoS profile to an R97 QoS profile before sending the SGSN Context Response message. Furthermore, it fills the Uplink Flow Label Signalling field in the PDP Context information element of the SGSN Context Response message with the lower two octets of the Uplink TEID Control Plane. All PDP contexts that are identified by an extended TI (see 3GPP TS 24.008 [13]) and all PDP contexts with a maximum bitrate for uplink and downlink of 0 kbit/s shall be deleted locally in the MS and the first SGSN,. and tThe first SGSN shall initiate the deletion of these PDP contexts in the GGSN. If several of the remaining PDP contexts have been activated for the same APN and PDP address in the first SGSN (secondary PDP context activation), then all PDP contexts except the PDP context with the highest-quality QoS profile shall be deleted locally in the MS and in the first SGSN, and the first SGSN shall initiate the deletion of these PDP contexts in the GGSN.

MS detects that the new SGSN is supporting only GTPv0 from the Release Indication broadcasted on the GSM radio.

3G TS 23.107 [58] specifies how to determine the highest-quality QoS profile. The second SGSN shall be responsible for updating the remaining PDP context in the GGSN, and the GGSN shall remove the TFT if present when it receives the GTP v0 Update PDP Context Request message.

   NOTE: The conversion between an R99 QoS profile and an R97 QoS profile is defined in 3G TS 23.107.

When an inter-SGSN RA update procedure is performed from a first SGSN that supports GTP v0 to a second SGSN that supports GTP v1, the second SGSN shall convert the R97 QoS profile to the R99 QoS profile, ignore the delivered Uplink Flow Label Signalling and use GTP v1 to send the Update PDP Context Request message to the GGSN. The Update PDP Context Request message shall be sent with a header containing a TEID set to all zeros and with an additional IE containing the IMSI for the PDP context.

A GGSN shall be able to change to GTP v1 during an Update PDP Context procedure. That is, the GGSN shall accept an Update PDP Context Request of GTP v1 with a TEID set to all zeros and containing the IMSI in addition to the NSAPI, even if the established GTP tunnel is of GTP v0.

When a GTP v0 tunnel was established between the old SGSN and the GGSN, and both old and new SGSNs support GTPv1, the respective uplink Flow Label signalling shall be inserted in the two lower octets of the Uplink TEID Control Plane field of the SGSN Context Response message; the upper two octets shall be set to all zeros.

<table>
<tr><td colspan="8" align="right"><i>CR-Form-v7</i></td></tr>
<tr><td colspan="8" align="center"><h1>CHANGE REQUEST</h1></td></tr>
</table>

| ⌘ | **23.060 CR 401** | ⌘**rev** | **-** | ⌘ | Current version: | **4.5.0** | ⌘ |

+ CR 384

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

Proposed change affects: UICC apps⌘ ☐ ME **X** Radio Access Network ☐ Core Network **X**

Title:	⌘	Handling of preserved PDP contexts
Source:	⌘	Siemens
Work item code: ⌘	TEI4	*Date:* ⌘ 14/08/2002
Category:	⌘ **A**	*Release:* ⌘ Rel-4

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

Use one of the following releases:
   2   (GSM Phase 2)
   R96   (Release 1996)
   R97   (Release 1997)
   R98   (Release 1998)
   R99   (Release 1999)
   Rel-4 (Release 4)
   Rel-5 (Release 5)
   Rel-6 (Release 6)

Reason for change:	⌘	In case the MS moves from a R99 SGSN (GTPv1) to a R97/98 SGSN (GTPv0) then the QoS attributes mapping table in 3GPP TS 23.107 section "9.1.2.3 Determining R97/98 attributes from R99 attributes" have to be used. Following the rules of this table, R99 real-time PDP contexts with a maximum bitrate in downlink and uplink of 0 kbit/s will be mapped to R97/98 non-real-time PDP contexts with a peak throughput class of 1. The peak throughput class 1 means the maximum bitrate is set to 8 kbit/s. That means that the preservation is abolished and charging starts again. This would contradict to the current approach defined in TS 23.060 that only the MS decides what happens with preserved PDP contexts.
		This CR proposes that the MS and network (old SGSN locally and towards GGSN) shall locally deactivate PDP contexts with maximum bitrate for uplink and downlink of 0 kbit/s.
Summary of change: ⌘		PDP contexts with maximum bitrate for uplink and downlink of 0 kbit/s shall be deleted locally by the MS and the network once a change to a pre-release 99 network is done.
Consequences if not approved:	⌘	Preservation is not defined for pre-release 99. A change to a pre-release 99 SGSN would contradict to the approved approach in TS 23.060. Charging would start although the MS may not wish to re-establish this PDP context.
Clauses affected:	⌘	11.1.1

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

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2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

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

11.1.1   Interactions Between GTP v0 (R97) and GTP v1 (R99)

When a first GSN receives a GTP PDU from a second GSN using a version not supported, then the first GSN shall return a "version not supported" error message to the second GSN. The second GSN shall then fall back to the most-recent version supported by the first GSN. A GSN shall use its most-recent GTP version when initiating GTP PDU transmission to a new GSN.

When an SGSN that supports GTP v1 establishes a GTP tunnel to a GGSN that supports GTP v0, the SGSN shall convert a release 99 QoS profile to a release 97 QoS profile before transmitting the QoS profile to the GGSN. If the MS supports the R99 QoS profile, the SGSN shall convert the negotiated R97 QoS profile to an R99 QoS profile before transmitting the QoS profile to the MS.

A GGSN shall be able to fall back to GTP v0 during an Update PDP Context procedure. That is, the GGSN shall accept an Update PDP Context Request of GTP v0 even if the established GTP tunnel is of GTP v1.

When an inter-SGSN RA update procedure is performed from a first SGSN that supports GTP v1 to a second SGSN that supports GTP v0, the first SGSN shall convert the R99 QoS profile to an R97 QoS profile before sending the SGSN Context Response message. Furthermore, it fills the Uplink Flow Label Signalling field in the PDP Context information element of the SGSN Context Response message with the lower two octets of the Uplink TEID Control Plane. All PDP contexts that are identified by an extended TI (see 3GPP TS 24.008 [13]) and all PDP contexts with a maximum bitrate for uplink and downlink of 0 kbit/s shall be deleted locally in the MS and the first SGSN, and tThe first SGSN shall initiate the deletion of these PDP contexts in the GGSN. If several of the remaining PDP contexts have been activated for the same APN and PDP address in the first SGSN (secondary PDP context activation), then all PDP contexts except the PDP context with the highest-quality QoS profile shall be deleted locally in the MS and in the first SGSN, and the first SGSN shall initiate the deletion of these PDP contexts in the GGSN.

The MS detects that the new SGSN is supporting only GTPv0 from the Release Indication broadcasted on the GSM radio.

3GPP TS 23.107 [58] specifies how to determine the highest-quality QoS profile. The second SGSN shall be responsible for updating the remaining PDP context in the GGSN, and the GGSN shall remove the TFT if present when it receives the GTP v0 Update PDP Context Request message.

NOTE: The conversion between an R99 QoS profile and an R97 QoS profile is defined in 3GPP TS 23.107.

When an inter-SGSN RA update procedure is performed from a first SGSN that supports GTP v0 to a second SGSN that supports GTP v1, the second SGSN shall convert the R97 QoS profile to the R99 QoS profile, ignore the delivered Uplink Flow Label Signalling and use GTP v1 to send the Update PDP Context Request message to the GGSN. The Update PDP Context Request message shall be sent with a header containing a TEID set to all zeros and with an additional IE containing the IMSI for the PDP context.

A GGSN shall be able to change to GTP v1 during an Update PDP Context procedure. That is, the GGSN shall accept an Update PDP Context Request of GTP v1 with a TEID set to all zeros and containing the IMSI in addition to the NSAPI, even if the established GTP tunnel is of GTP v0.

When a GTP v0 tunnel was established between the old SGSN and the GGSN, and both old and new SGSNs support GTPv1 the respective uplink Flow Label signalling shall be inserted in the two lower octets of the Uplink TEID Control Plane field of the SGSN Context Response message; the upper two octets shall be set to all zeros.

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<div align="right">CR-Form-v7</div>

CHANGE REQUEST

⌘	**23.060** CR **402**	⌘ **rev**	**-**	⌘	Current version:	**5.2.0 + CR 385**	⌘

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

</div>

Proposed change affects: UICC apps⌘ ☐   ME **X** Radio Access Network ☐   Core Network **X**

Title:	⌘	Handling of preserved PDP contexts
Source:	⌘	Siemens
Work item code:⌘	TEI5	***Date:*** ⌘ 14/08/2002
Category:	⌘ **A**	***Release:*** ⌘ Rel-5

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

Use one of the following releases:
2   *(GSM Phase 2)*
R96   *(Release 1996)*
R97   *(Release 1997)*
R98   *(Release 1998)*
R99   *(Release 1999)*
Rel-4   *(Release 4)*
Rel-5   *(Release 5)*
Rel-6   *(Release 6)*

Reason for change:	⌘	In case the MS moves from a R99 SGSN (GTPv1) to a R97/98 SGSN (GTPv0) then the QoS attributes mapping table in 3GPP TS 23.107 section "9.1.2.3 Determining R97/98 attributes from R99 attributes" have to be used. Following the rules of this table, R99 real-time PDP contexts with a maximum bitrate in downlink and uplink of 0 kbit/s will be mapped to R97/98 non-real-time PDP contexts with a peak throughput class of 1. The peak throughput class 1 means the maximum bitrate is set to 8 kbit/s. That means that the preservation is abolished and charging starts again. This would contradict to the current approach defined in TS 23.060 that only the MS decides what happens with preserved PDP contexts. This CR proposes that the MS and network (old SGSN locally and towards GGSN) shall locally deactivate PDP contexts with maximum bitrate for uplink and downlink of 0 kbit/s.
Summary of change:⌘		PDP contexts with maximum bitrate for uplink and downlink of 0 kbit/s shall be deleted locally by the MS and the network once a change to a pre-release 99 network is done.
Consequences if not approved:	⌘	Preservation is not defined for pre-release 99. A change to a pre-release 99 SGSN would contradict to the approved approach in TS 23.060. Charging would start although the MS may not wish to re-establish this PDP context.
Clauses affected:	⌘	11.1.1

		Y	N		
Other specs	⌘		X	Other core specifications	⌘
affected:			X	Test specifications	
			X	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.

11.1.1   Interactions Between GTP v0 (R97) and GTP v1 (R99)

When a first GSN receives a GTP PDU from a second GSN using a version not supported, then the first GSN shall return a "version not supported" error message to the second GSN. The second GSN shall then fall back to the most-recent version supported by the first GSN. A GSN shall use its most-recent GTP version when initiating GTP PDU transmission to a new GSN.

When an SGSN that supports GTP v1 establishes a GTP tunnel to a GGSN that supports GTP v0, the SGSN shall convert a release 99 QoS profile to a release 97 QoS profile before transmitting the QoS profile to the GGSN. If the MS supports the R99 QoS profile, the SGSN shall convert the negotiated R97 QoS profile to an R99 QoS profile before transmitting the QoS profile to the MS.

A GGSN shall be able to fall back to GTP v0 during an Update PDP Context procedure. That is, the GGSN shall accept an Update PDP Context Request of GTP v0 even if the established GTP tunnel is of GTP v1.

When an inter-SGSN RA update procedure is performed from a first SGSN that supports GTP v1 to a second SGSN that supports GTP v0, the first SGSN shall convert the R99 QoS profile to an R97 QoS profile before sending the SGSN Context Response message. Furthermore, it fills the Uplink Flow Label Signalling field in the PDP Context information element of the SGSN Context Response message with the lower two octets of the Uplink TEID Control Plane. All PDP contexts that are identified by an extended TI (see 3GPP TS 24.008 [13]) and all PDP contexts with a maximum bitrate for uplink and downlink of 0 kbit/s shall be deleted locally in the MS and the first SGSN,. and tThe first SGSN shall initiate the deletion of these PDP contexts in the GGSN. If several of the remaining PDP contexts have been activated for the same APN and PDP address in the first SGSN (secondary PDP context activation), then all PDP contexts except the PDP context with the highest-quality QoS profile shall be deleted locally in the MS and in the first SGSN, and the first SGSN shall initiate the deletion of these PDP contexts in the GGSN.

The MS detects that the new SGSN is supporting only GTPv0 from the Release Indication broadcasted by the RAN.

3GPP TS 23.107 [58] specifies how to determine the highest-quality QoS profile. The second SGSN shall be responsible for updating the remaining PDP context in the GGSN, and the GGSN shall remove the TFT if present when it receives the GTP v0 Update PDP Context Request message.

   NOTE: The conversion between an R99 QoS profile and an R97 QoS profile is defined in 3GPP TS 23.107.

When an inter-SGSN RA update procedure is performed from a first SGSN that supports GTP v0 to a second SGSN that supports GTP v1, the second SGSN shall convert the R97 QoS profile to the R99 QoS profile, ignore the delivered Uplink Flow Label Signalling and use GTP v1 to send the Update PDP Context Request message to the GGSN. The Update PDP Context Request message shall be sent with a header containing a TEID set to all zeros and with an additional IE containing the IMSI for the PDP context.

A GGSN shall be able to change to GTP v1 during an Update PDP Context procedure. That is, the GGSN shall accept an Update PDP Context Request of GTP v1 with a TEID set to all zeros and containing the IMSI in addition to the NSAPI, even if the established GTP tunnel is of GTP v0.

When a GTP v0 tunnel was established between the old SGSN and the GGSN, and both old and new SGSNs support GTPv1 the respective uplink Flow Label signalling shall be inserted in the two lower octets of the Uplink TEID Control Plane field of the SGSN Context Response message; the upper two octets shall be set to all zeros.

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CR-Form-v7

CHANGE REQUEST

⌘   **23.060** CR **405**   ⌘**rev** **-** ⌘   Current version: **4.5.0** ⌘

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

</div>

Proposed change affects: UICC apps⌘ ☐   ME ☐   Radio Access Network **X**   Core Network **X**

Title: ⌘	Removal of Forward SRNS Context Acknowledge message
Source: ⌘	Nortel Networks
Work item code: ⌘	TEI4 ***Date:*** ⌘ 14/08/2002

Category: ⌘	**F**	***Release:*** ⌘	Rel-4

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

Use one of the following releases:
   2   *(GSM Phase 2)*
   R96   *(Release 1996)*
   R97   *(Release 1997)*
   R98   *(Release 1998)*
   R99   *(Release 1999)*
   Rel-4   *(Release 4)*
   Rel-5   *(Release 5)*
   Rel-6   *(Release 6)*

Reason for change: ⌘	Section 6.9.2.2.2 of 23.060 incorrectly shows a Forward SRNS Context Acknowledge message from New SGSN to Target RNC. This contradicts 25.413 which specify that the New SGSN should forward the Forward SRNS Context to the Target RNC. No such Forward SRNS Context Acknowledge message is specified over Iu interface
Summary of change: ⌘	Remove Forward SRNS Context Acknowledge message and replace with a Forward SRNS Context message from New SGSN to Target RNC
Consequences if not approved: ⌘	Stage 2 and Stage 3 will not be aligned

Clauses affected: ⌘	6.9.2.2.2

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

Other comments: ⌘	

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm.
Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be

downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

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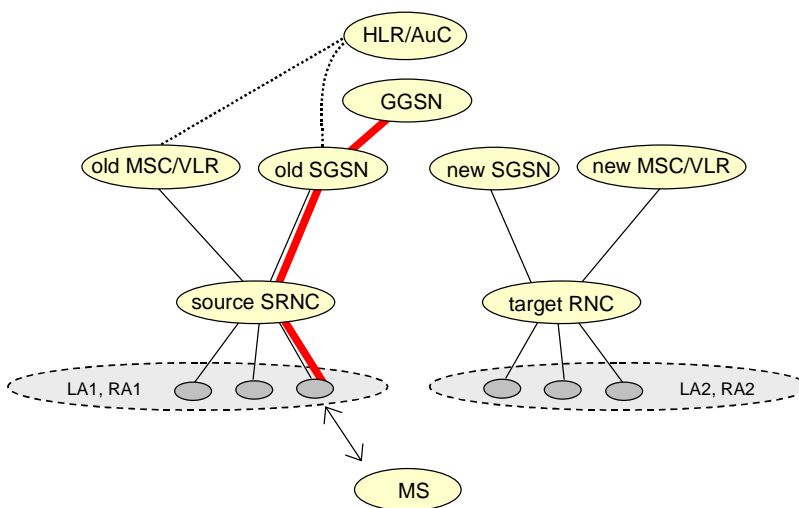
6.9.2.2.2   Combined Hard Handover and SRNS Relocation Procedure

This procedure is only performed for an MS in PMM-CONNECTED state in case the Iur interface is not available.

The Combined Hard Handover and SRNS Relocation procedure is used to move the UTRAN to CN connection point at the UTRAN side from the source SRNC to the target RNC, while performing a hard handover decided by the UTRAN. In the procedure, the Iu links are relocated. If the target RNC is connected to the same SGSN as the source SRNC, an Intra-SGSN SRNS Relocation procedure is performed. If the routeing area is changed, this procedure is followed by an Intra-SGSN Routeing Area Update procedure. 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 HLR about the new MS location.

If the target RNC is connected to a different SGSN than the source SRNC, an Inter-SGSN SRNS Relocation procedure is performed. This procedure is followed by an Inter-SGSN Routeing Area Update procedure.

Figure 40 shows the situation before a Combined Hard Handover and SRNS Relocation procedure when source and target RNC are connected to different SGSNs. Figure 41 shows the situation after the Combined Hard Handover and SRNS Relocation procedure and RA update procedure have been completed. In the case described in Figure 40 and Figure 41 the MS is in PMM-CONNECTED state.

Figure 40: Before Combined Hard Handover and SRNS Relocation and Routeing Area Update

Before the SRNS Relocation and Routeing Area Update the MS is registered in the old SGSN and in the old MSC/VLR. The source RNC is acting as serving RNC.

Figure 41: After Combined Hard Handover and SRNS Relocation and Routeing Area Update

After the SRNS relocation and RA update, the MS is registered in the new SGSN and in the new MSC/VLR. The MS is in state PMM-CONNECTED towards the new SGSN and in MM IDLE state towards the new MSC/VLR. The target RNC is acting as serving RNC.

The Combined Hard Handover and SRNS Relocation procedure for the PS domain is illustrated in Figure 42. The sequence is valid for both intra-SGSN SRNS relocation and inter-SGSN SRNS relocation.

Figure 42: Combined Hard Handover and SRNS Relocation Procedure

1) Based on measurement results and knowledge of the UTRAN topology, the source SRNC decides to initiate a combined hard handover and SRNS relocation. At this point both uplink and downlink user data flows via the following tunnel(s): Radio Bearer between the MS and the source SRNC (no drift RNC available); GTP-U tunnel(s) between the source SRNC and the old SGSN; GTP-U tunnel(s) between the old SGSN and the GGSN.

2) The source SRNC sends a Relocation Required message (Relocation Type, Cause, Source ID, Target ID, Source RNC To Target RNC Transparent Container) to the old SGSN. The source SRNC shall set Relocation Type to "UE Involved". Source RNC To Target RNC Transparent Container includes the necessary information for relocation co-ordination, security functionality and RRC protocol context information (including MS Capabilities).

3) The old SGSN determines from the Target ID if the SRNS relocation is intra-SGSN SRNS relocation or inter-SGSN SRNS relocation. In case of inter-SGSN SRNS relocation the old SGSN initiates the relocation resource allocation procedure by sending a Forward Relocation Request message (IMSI, Tunnel Endpoint Identifier Signalling, MM Context, PDP Context, Target Identification, UTRAN Transparent Container, RANAP Cause) to the new SGSN. PDP context contains GGSN Address for User Plane and Uplink TEID for Data (to this GGSN Address and Uplink TEID for Data, the old SGSN and the new SGSN send uplink packets). At the same time a timer is started on the MM and PDP contexts in the old SGSN (see Routeing Area Update procedure in subclause "Location Management Procedures (UMTS only)"). The Forward Relocation Request message is applicable only in case of inter-SGSN SRNS relocation.

4) The new SGSN sends a Relocation Request message (Permanent NAS UE Identity, Cause, CN Domain Indicator, Source RNC To Target RNC Transparent Container, RAB To Be Setup) to the target RNC. For each RAB requested to be established, RABs To Be Setup shall contain information such as RAB ID, RAB parameters, Transport Layer Address, and Iu Transport Association. The RAB ID information element contains the NSAPI value, and the RAB parameters information element gives the QoS profile. The Transport Layer Address is the SGSN Address for user data, and the Iu Transport Association corresponds to the uplink Tunnel Endpoint Identifier Data.

   After all the necessary resources for accepted RABs including the Iu user plane are successfully allocated, the target RNC shall send the Relocation Request Acknowledge message (Target RNC To Source RNC Transparent Container, RABs Setup, RABs Failed To Setup) to the new SGSN. Each RAB to be setup is defined by a Transport Layer Address, which is the target RNC Address for user data, and the Iu Transport Association, which corresponds to the downlink Tunnel Endpoint Identifier for user data. The transparent container contains all radio-related information that the MS needs for the handover, i.e., a complete RRC message (e.g., Physical Channel Reconfiguration) to be sent transparently via CN and source SRNC to the MS. For each RAB to be set up, the target RNC may receive simultaneously downlink user packets both from the source SRNC and from the new SGSN.

5) When resources for the transmission of user data between target RNC and new SGSN have been allocated and the new SGSN is ready for relocation of SRNS, the Forward Relocation Response (Cause, UTRAN Transparent Container, RANAP Cause, Target-RNC Information) message is sent from the new SGSN to the old SGSN. This message indicates that the target RNC is ready to receive from source SRNC the forwarded downlink PDUs, i.e., the relocation resource allocation procedure is terminated successfully. UTRAN transparent container and RANAP Cause are information from the target RNC to be forwarded to the source SRNC. The Target RNC Information, one information element for each RAB to be set up, contains the RNC Tunnel Endpoint Identifier and RNC IP address for data forwarding from the source SRNC to the target RNC. The Forward Relocation Response message is applicable only in case of inter-SGSN SRNS relocation.

6) The old SGSN continues the relocation of SRNS by sending a Relocation Command message (Target RNC To Source RNC Transparent Container, RABs To Be Released, RABs Subject To Data Forwarding) to the source SRNC. The old SGSN decides the RABs to be subject for data forwarding based on QoS, and those RABs shall be contained in RABs subject to data forwarding. For each RAB subject to data forwarding, the information element shall contain RAB ID, Transport Layer Address, and Iu Transport Association. These are the same Transport Layer Address and Iu Transport Association that the target RNC had sent to new SGSN in Relocation Request Acknowledge message, and these are used for forwarding of downlink N-PDU from the source SRNC to the target RNC. The source SRNC is now ready to forward downlink user data directly to the target RNC over the Iu interface. This forwarding is performed for downlink user data only.

7) The source SRNC may, according to the QoS profile, begins the forwarding of data for the RABs to be subject for data forwarding.

   Note: The order of steps, starting from step 7 onwards, does not necessarily reflect the order of events. For instance, source RNC may start data forwarding (step 7), send Physical Channel Reconfiguration message to MS (step 8) and forward SRNS Context message to the old SGSN (step 8) almost simultaneously.

   The data forwarding at SRNS relocation shall be carried out through the Iu interface, meaning that the GTP-PDUs exchanged between the source SRNC and the target RNC are duplicated in the source SRNC and routed at the IP layer towards the target RNC. For each radio bearer which uses lossless PDCP the GTP-PDUs related to transmitted but not yet acknowledged PDCP-PDUs are duplicated and routed at IP layer towards the target RNC together with their related downlink PDCP sequence numbers. The source RNC continues transmitting duplicates of downlink data and receiving uplink data.

Before the serving RNC role is not yet taken over by target RNC and when downlink user plane data starts to arrive to target RNC, the target RNC may buffer or discard arriving downlink GTP-PDUs according to the related QoS profile.

8) Before sending the Physical Channel Reconfiguration the uplink and downlink data transfer shall be suspended in the source SRNC for RABs, which require delivery order. When the source SRNC is ready, the source RNC shall trigger the execution of relocation of SRNS by sending to the MS the RRC message provided in the Target RNC to source RNC transparent container, e.g., a Physical Channel Reconfiguration (UE Information Elements, CN Information Elements) message. UE Information Elements include among others new SRNC identity and S-RNTI. CN Information Elements contain among others Location Area Identification and Routeing Area Identification.
Before the RRC message is sent (e,g, Physical Channel Reconfiguration) uplink and downlink data transfer in the source RNC shall be suspended for RABs which require to maintain the delivery order. .

When the MS has reconfigured itself, it sends e.g., a Physical Channel Reconfiguration Complete message to the target SRNC. If the Forward SRNS Context message with the sequence numbers is received, the exchange of packets with the MS may start. If this message is not yet received, the target RNC may start the packet transfer for all RABs, which do not require maintaining the delivery order.

9) The source SRNC continues the execution of relocation of SRNS by sending a Forward SRNS Context (RAB Contexts) message to the target RNC via the old and the new SGSN. The Forward SRNS Context message, which is acknowledged by a Forward SRNS Context Acknowledge message, from new to old SGSN. The purpose of this procedure is to transfer SRNS contexts from the source RNC to the target RNC, and to move the SRNS role from the source RNC to the target RNC. SRNS contexts are sent for each concerned RAB and contain the sequence numbers of the GTP PDUs next to be transmitted in the uplink and downlink directions and the next PDCP sequence numbers that would have been used to send and receive data from the MS. PDCP sequence numbers are only sent by the source RNC for the radio bearers which used losslessPDCP [57]. The use of lossless PDCP is selected by the RNC when the radio bearer is set up or reconfigured. For PDP context(s) using delivery order not required (QoS profile), the sequence numbers of the GTP-PDUs next to be transmitted are not used by the target RNC.

If delivery order is required (QoS profile), consecutive GTP-PDU sequence numbering shall be maintained throughout the lifetime of the PDP context(s). Therefore, during the entire SRNS relocation procedure for the PDP context(s) using delivery order required (QoS profile), the responsible GTP-U entities (RNCs and GGSN) shall assign consecutive GTP-PDU sequence numbers to user packets belonging to the same PDP context uplink and downlink, respectively.

The target RNC establishes and/or restarts the RLC and exchanges the PDCP sequence numbers (PDCP-SNU, PDCP-SND) between the target RNC and the MS. PDCP-SND is the PDCP sequence number for the next expected in-sequence downlink packet to be received by the MS per radio bearer, which used lossless PDCP in the source RNC. PDCP-SND confirms all mobile terminated packets successfully transferred before the SRNC relocation. If PDCP-SND confirms reception of packets that were forwarded from the source SRNC, then the target SRNC shall discard these packets. PDCP-SNU is the PDCP sequence number for the next expected in-sequence uplink packet to be received in the RNC per radio bearer, which used lossless PDCP in the source RNC. PDCP-SNU confirms all mobile originated packets successfully transferred before the SRNC relocation. If PDCP-SNU confirms reception of packets that were received in the source SRNC, the MS shall discard these packets.

10) The target RNC shall send a Relocation Detect message to the new SGSN when the relocation execution trigger is received. For SRNS relocation type "UE Involved", the relocation execution trigger may be received from the Uu interface; i.e., when target RNC detects the MS on the lower layers. When the Relocation Detect message is sent, the target RNC shall start SRNC operation.

11) Upon reception of the Relocation Detect message, the CN may switch the user plane from the source RNC to the target SRNC. If the SRNS relocation is an inter-SGSN SRNS relocation, the new SGSN sends an Update PDP Context Request (New SGSN Address, SGSN Tunnel Endpoint Identifier, QoS Negotiated) message to the GGSNs concerned. The GGSNs update their PDP context fields and return an Update PDP Context Response (GGSN Tunnel Endpoint Identifier) message.

12) When the target SRNC receives the Physical Channel Reconfiguration Complete message or the Radio Bearer Release Complete message, i.e. the new SRNC-ID + S-RNTI are successfully exchanged with the MS by the radio protocols, the target SRNC shall initiate a Relocation Complete procedure by sending the Relocation Complete message to the new SGSN. The purpose of the Relocation Complete procedure is to indicate by the

target SRNC the completion of the relocation of the SRNS to the CN. If the user plane has not been switched at Relocation Detect, the CN shall upon reception of Relocation Complete switch the user plane from source RNC to target SRNC. If the SRNS Relocation is an inter-SGSN SRNS relocation, the new SGSN signals to the old SGSN the completion of the SRNS relocation procedure by sending a Forward Relocation Complete message.

13) Upon receiving the Relocation Complete message or, if it is an inter-SGSN SRNS relocation, the Forward Relocation Complete message, the old SGSN sends an Iu Release Command message to the source RNC. When the RNC data-forwarding timer has expired, the source RNC responds with an Iu Release Complete message.

14) After the MS has finished the reconfiguration procedure and if the new Routeing Area Identification is different from the old one, the MS initiates the Routeing Area Update procedure. See subclause "Location Management Procedures (UMTS only)". Note that it is only a subset of the RA update procedure that is performed, since the MS is in PMM-CONNECTED state.

If the SRNS Relocation is inter-SGSN, then the following CAMEL procedure calls shall be performed (see referenced procedures in 3GPP TS 23.078):

C1)   CAMEL_GPRS_PDP_Context_Disconnection and CAMEL_GPRS_Detach

They are called in the following order:

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

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

If the SRNS Relocation is intra-SGSN, then the above mentioned CAMEL procedures calls shall not be performed.

If Routeing Area Update occurs, then the following CAMEL procedure calls shall be performed (see referenced procedures in 3GPP TS 23.078):

C2)   CAMEL_GPRS_Routeing_Area_Update_Session.

In Figure 42, the procedure returns as result "Continue".

C3)   CAMEL_GPRS_Routeing_Area_Update_Context.

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

For C2 and C3: refer to Routing Area Update procedure description for detailed message flow.

CR-Form-v7

CHANGE REQUEST

| ⌘ | **23.060** CR **406** | ⌘ **rev** | **1** | ⌘ | Current version: | **5.2.0** | ⌘ |

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

Proposed change affects: UICC apps⌘ ☐   ME ☐ Radio Access Network **X** Core Network **X**

Title:	⌘	Removal of Forward SRNS Context Acknowledge message
Source:	⌘	Nortel Networks

Work item code:	⌘	TEI5		*Date:* ⌘	22/08/2002

Category:	⌘	**A**		*Release:* ⌘	Rel-5

Use <u>one</u> of the following categories:
  F (correction)
  A (corresponds to a correction in an earlier release)
  B (addition of feature),
  C (functional modification of feature)
  D (editorial modification)
Detailed explanations of the above categories can
be found in 3GPP TR 21.900.

Use <u>one</u> of the following releases:
  2   (GSM Phase 2)
  R96   (Release 1996)
  R97   (Release 1997)
  R98   (Release 1998)
  R99   (Release 1999)
  Rel-4 (Release 4)
  Rel-5 (Release 5)
  Rel-6 (Release 6)

Reason for change:	⌘	Section 6.9.2.2.2 of 23.060 incorrectly shows a Forward SRNS Context Acknowledge message from New SGSN to Target RNC. This contradicts 25.413 which specify that the New SGSN should forward the Forward SRNS Context to the Target RNC. No such Forward SRNS Context Acknowledge message is specified over Iu interface

Summary of change:	⌘	Remove Forward SRNS Context Acknowledge message and replace with a Forward SRNS Context message from New SGSN to Target RNC

Consequences if not approved:	⌘	Stage 2 and Stage 3 will not be aligned

Clauses affected:	⌘	6.9.2.2.2

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

Other comments:	⌘	

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm.
Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

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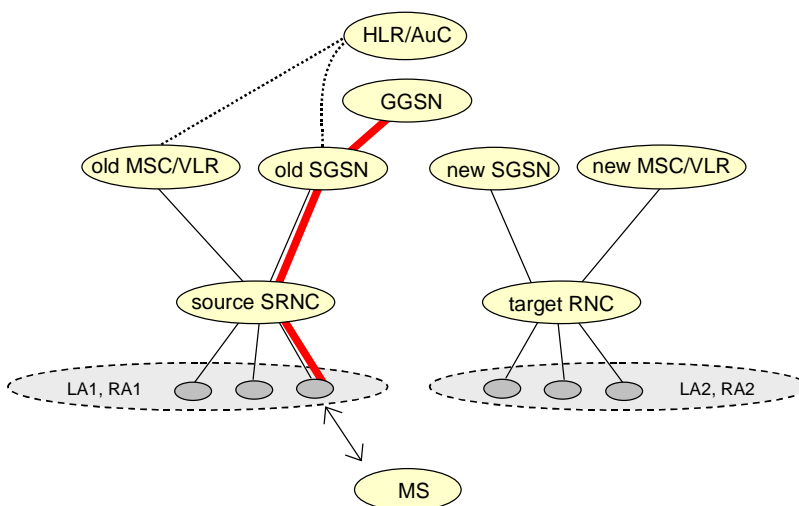
6.9.2.2.2 Combined Hard Handover and SRNS Relocation Procedure

This procedure is only performed for an MS in PMM-CONNECTED state in case the Iur interface is not available. In the context of this specification, the terms RNS or RNC refer also to a GERAN BSS or BSC (respectively) when serving a mobile in Iu mode.

The Combined Hard Handover and SRNS Relocation procedure is used to move the RAN to CN connection point at the RAN side from the source SRNC to the target RNC, while performing a hard handover decided by the RAN. In the procedure, the Iu links are relocated. If the target RNC is connected to the same SGSN as the source SRNC, an Intra-SGSN SRNS Relocation procedure is performed. If the routeing area is changed, this procedure is followed by an Intra-SGSN Routeing Area Update procedure. 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 HLR about the new MS location.

If the target RNC is connected to a different SGSN than the source SRNC, an Inter-SGSN SRNS Relocation procedure is performed. This procedure is followed by an Inter-SGSN Routeing Area Update procedure.

Figure 40 shows the situation before a Combined Hard Handover and SRNS Relocation procedure when source and target RNC are connected to different SGSNs. Figure 41 shows the situation after the Combined Hard Handover and SRNS Relocation procedure and RA update procedure have been completed. In the case described in Figure 40 and Figure 41 the MS is in PMM-CONNECTED state. Both figures are also applicable to BSS to RNS relocation and vice-versa, as well as for BSS to BSS relocation.

Figure 40: Before Combined Hard Handover and SRNS Relocation and Routeing Area Update

Before the SRNS Relocation and Routeing Area Update the MS is registered in the old SGSN and in the old MSC/VLR. The source RNC is acting as serving RNC.

Figure 41: After Combined Hard Handover and SRNS Relocation and Routeing Area Update

After the SRNS relocation and RA update, the MS is registered in the new SGSN and in the new MSC/VLR. The MS is in state PMM-CONNECTED towards the new SGSN and in MM IDLE state towards the new MSC/VLR. The target RNC is acting as serving RNC.

The Combined Hard Handover and SRNS Relocation procedure for the PS domain is illustrated in Figure 42. The sequence is valid for both intra-SGSN SRNS relocation and inter-SGSN SRNS relocation. Furthermore, this signalling flow is also applicable for BSS to RNS relocation and vice-versa, as well as BSS to BSS relocation.

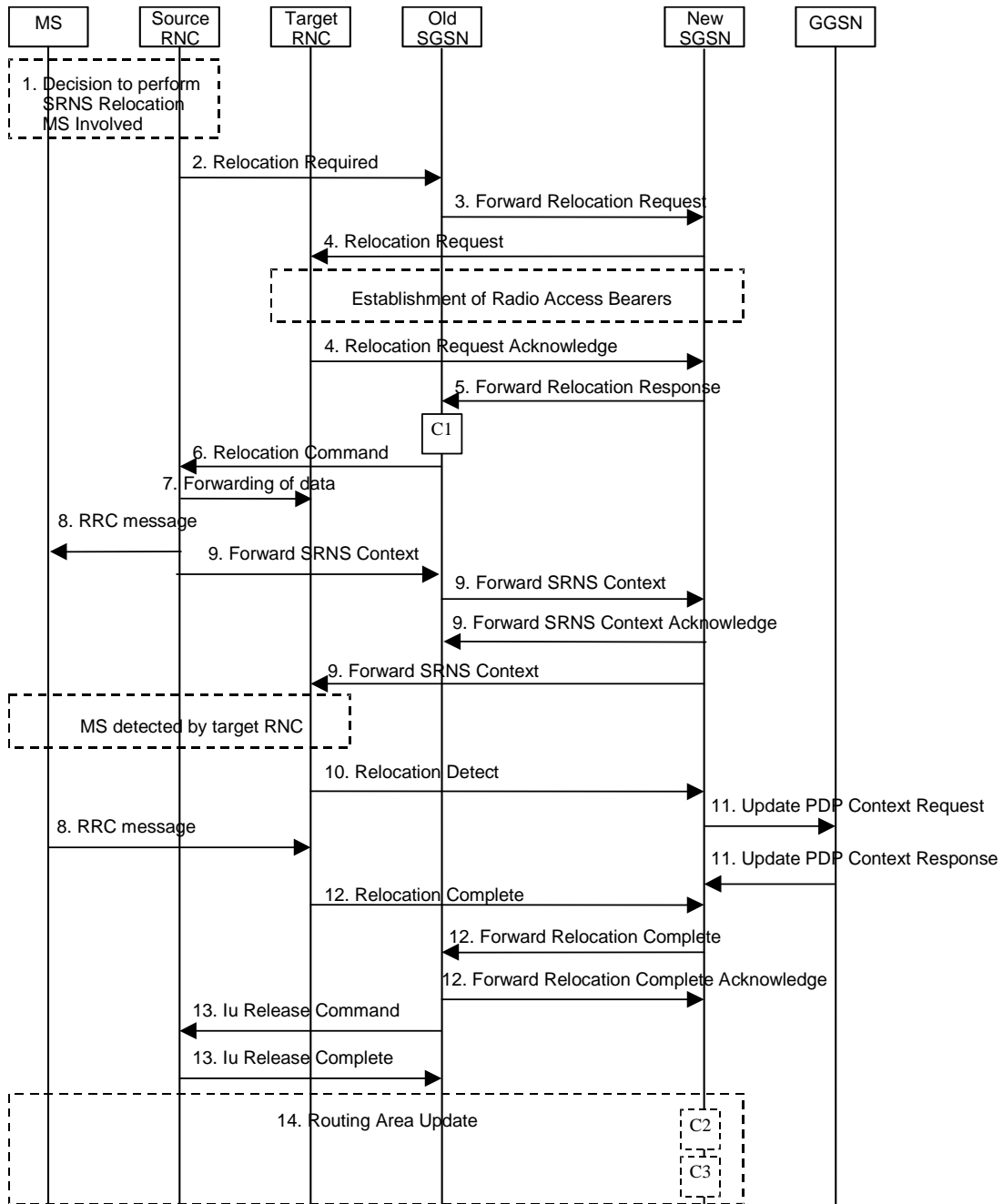**Figure 42: Combined Hard Handover and SRNS Relocation Procedure**

1) Based on measurement results and knowledge of the RAN topology, the source SRNC decides to initiate a combined hard handover and SRNS relocation. At this point both uplink and downlink user data flows via the following tunnel(s): Radio Bearer between the MS and the source SRNC (no drift RNC available); GTP-U tunnel(s) between the source SRNC and the old SGSN; GTP-U tunnel(s) between the old SGSN and the GGSN.

2) The source SRNC sends a Relocation Required message (Relocation Type, Cause, Source ID, Target ID, Source RNC To Target RNC Transparent Container) to the old SGSN. The source SRNC shall set Relocation Type to "UE Involved". Source RNC To Target RNC Transparent Container includes the necessary information for relocation co-ordination, security functionality and RRC protocol context information (including MS Capabilities).

3) The old SGSN determines from the Target ID if the SRNS relocation is intra-SGSN SRNS relocation or inter-SGSN SRNS relocation. In case of inter-SGSN SRNS relocation the old SGSN initiates the relocation resource allocation procedure by sending a Forward Relocation Request message (IMSI, Tunnel Endpoint Identifier Signalling, MM Context, PDP Context, Target Identification, RAN Transparent Container, RANAP Cause) to the new SGSN. For relocation to an area where Intra Domain Connection of RAN Nodes to Multiple CN Nodes is used, the old SGSN may – if it provides Intra Domain Connection of RAN Nodes to Multiple CN Nodes -have multiple target SGSNs for each relocation target in a pool area, in which case the old SGSN will select one of them to become the new SGSN, as specified in 3GPP TS 23.236 [73]. PDP context contains GGSN Address for User Plane and Uplink TEID for Data (to this GGSN Address and Uplink TEID for Data, the old SGSN and the new SGSN send uplink packets). At the same time a timer is started on the MM and PDP contexts in the old SGSN (see Routeing Area Update procedure in subclause "Location Management Procedures (Iu mode)"). The Forward Relocation Request message is applicable only in case of inter-SGSN SRNS relocation.

4) The new SGSN sends a Relocation Request message (Permanent NAS UE Identity, Cause, CN Domain Indicator, Source RNC To Target RNC Transparent Container, RAB To Be Setup) to the target RNC. For each RAB requested to be established, RABs To Be Setup shall contain information such as RAB ID, RAB parameters, Transport Layer Address, and Iu Transport Association. The RAB ID information element contains the NSAPI value, and the RAB parameters information element gives the QoS profile. The Transport Layer Address is the SGSN Address for user data, and the Iu Transport Association corresponds to the uplink Tunnel Endpoint Identifier Data.

After all the necessary resources for accepted RABs including the Iu user plane are successfully allocated, the target RNC shall send the Relocation Request Acknowledge message (Target RNC To Source RNC Transparent Container, RABs Setup, RABs Failed To Setup) to the new SGSN. Each RAB to be setup is defined by a Transport Layer Address, which is the target RNC Address for user data, and the Iu Transport Association, which corresponds to the downlink Tunnel Endpoint Identifier for user data. The transparent container contains all radio-related information that the MS needs for the handover, i.e., a complete RRC message (e.g., Physical Channel Reconfiguration in UTRAN case, or Handover From UTRAN, or Handover Command in GERAN Iu mode case) to be sent transparently via CN and source SRNC to the MS. For each RAB to be set up, the target RNC may receive simultaneously downlink user packets both from the source SRNC and from the new SGSN.

5) When resources for the transmission of user data between target RNC and new SGSN have been allocated and the new SGSN is ready for relocation of SRNS, the Forward Relocation Response (Cause, RAN Transparent Container, RANAP Cause, Target-RNC Information) message is sent from the new SGSN to the old SGSN. This message indicates that the target RNC is ready to receive from source SRNC the forwarded downlink PDUs, i.e., the relocation resource allocation procedure is terminated successfully. RAN transparent container and RANAP Cause are information from the target RNC to be forwarded to the source SRNC. The Target RNC Information, one information element for each RAB to be set up, contains the RNC Tunnel Endpoint Identifier and RNC IP address for data forwarding from the source SRNC to the target RNC. The Forward Relocation Response message is applicable only in case of inter-SGSN SRNS relocation.

6) The old SGSN continues the relocation of SRNS by sending a Relocation Command message (Target RNC To Source RNC Transparent Container, RABs To Be Released, RABs Subject To Data Forwarding) to the source SRNC. The old SGSN decides the RABs to be subject for data forwarding based on QoS, and those RABs shall be contained in RABs subject to data forwarding. For each RAB subject to data forwarding, the information element shall contain RAB ID, Transport Layer Address, and Iu Transport Association. These are the same Transport Layer Address and Iu Transport Association that the target RNC had sent to new SGSN in Relocation Request Acknowledge message, and these are used for forwarding of downlink N-PDU from the source SRNC to the target RNC. The source SRNC is now ready to forward downlink user data directly to the target RNC over the Iu interface. This forwarding is performed for downlink user data only.

7) The source SRNC may, according to the QoS profile, begins the forwarding of data for the RABs to be subject for data forwarding.

NOTE: The order of steps, starting from step 7 onwards, does not necessarily reflect the order of events. For instance, source RNC may start data forwarding (step 7), send the RRC message to MS (step 8) and forward SRNS Context message to the old SGSN (step 9) almost simultaneously.

The data forwarding at SRNS relocation shall be carried out through the Iu interface, meaning that the GTP-PDUs exchanged between the source SRNC and the target RNC are duplicated in the source SRNC and routed at the IP layer towards the target RNC. For each radio bearer which uses lossless PDCP the GTP-PDUs related to transmitted but not yet acknowledged PDCP-PDUs are duplicated and routed at IP layer towards the target RNC together with their related downlink PDCP sequence numbers. The source RNC continues transmitting duplicates of downlink data and receiving uplink data.

Before the serving RNC role is not yet taken over by target RNC and when downlink user plane data starts to arrive to target RNC, the target RNC may buffer or discard arriving downlink GTP-PDUs according to the related QoS profile.

8) Before sending the RRC message the uplink and downlink data transfer shall be suspended in the source SRNC for RABs, which require delivery order. The RRC message is for example Physical Channel Reconfiguration for RNS to RNS relocation, or Intersystem to UTRAN Handover for BSS to RNS relocation, or Handover from UTRAN Command for BSS relocation, or Handover Command for BSS to BSS relocation. When the source SRNC is ready, the source RNC shall trigger the execution of relocation of SRNS by sending to the MS the RRC message provided in the Target RNC to source RNC transparent container, e.g., a Physical Channel Reconfiguration (UE Information Elements, CN Information Elements) message. UE Information Elements include among others new SRNC identity and S-RNTI. CN Information Elements contain among others Location Area Identification and Routeing Area Identification.

When the MS has reconfigured itself, it sends an RRC message e.g., a Physical Channel Reconfiguration Complete message to the target SRNC. If the Forward SRNS Context message with the sequence numbers is received, the exchange of packets with the MS may start. If this message is not yet received, the target RNC may start the packet transfer for all RABs, which do not require maintaining the delivery order.

9) The source SRNC continues the execution of relocation of SRNS by sending a Forward SRNS Context (RAB Contexts) message to the target RNC via the old and the new SGSN. The Forward SRNS Context message, ~~which~~ is acknowledged by a Forward SRNS Context Acknowledge message, from new to old SGSN. The purpose of this procedure is to transfer SRNS contexts from the source RNC to the target RNC, and to move the SRNS role from the source RNC to the target RNC. SRNS contexts are sent for each concerned RAB and contain the sequence numbers of the GTP PDUs next to be transmitted in the uplink and downlink directions and the next PDCP sequence numbers that would have been used to send and receive data from the MS. PDCP sequence numbers are only sent by the source RNC for the radio bearers which used lossless PDCP [57]. The use of lossless PDCP is selected by the RNC when the radio bearer is set up or reconfigured. For PDP context(s) using delivery order not required (QoS profile), the sequence numbers of the GTP-PDUs next to be transmitted are not used by the target RNC.

If delivery order is required (QoS profile), consecutive GTP-PDU sequence numbering shall be maintained throughout the lifetime of the PDP context(s). Therefore, during the entire SRNS relocation procedure for the PDP context(s) using delivery order required (QoS profile), the responsible GTP-U entities (RNCs and GGSN) shall assign consecutive GTP-PDU sequence numbers to user packets belonging to the same PDP context uplink and downlink, respectively.

The target RNC establishes and/or restarts the RLC and exchanges the PDCP sequence numbers (PDCP-SNU, PDCP-SND) between the target RNC and the MS. PDCP-SND is the PDCP sequence number for the next expected in-sequence downlink packet to be received by the MS per radio bearer, which used lossless PDCP in the source RNC. PDCP-SND confirms all mobile terminated packets successfully transferred before the SRNC relocation. If PDCP-SND confirms reception of packets that were forwarded from the source SRNC, then the target SRNC shall discard these packets. PDCP-SNU is the PDCP sequence number for the next expected in-sequence uplink packet to be received in the RNC per radio bearer, which used lossless PDCP in the source RNC. PDCP-SNU confirms all mobile originated packets successfully transferred before the SRNC relocation. If PDCP-SNU confirms reception of packets that were received in the source SRNC, the MS shall discard these packets.

10) The target RNC shall send a Relocation Detect message to the new SGSN when the relocation execution trigger is received. For SRNS relocation type "UE Involved", the relocation execution trigger may be received from the Uu interface; i.e., when target RNC detects the MS on the lower layers. When the Relocation Detect message is sent, the target RNC shall start SRNC operation.

11) Upon reception of the Relocation Detect message, the CN may switch the user plane from the source RNC to the target SRNC. If the SRNS relocation is an inter-SGSN SRNS relocation, the new SGSN sends an Update PDP Context Request (New SGSN Address, SGSN Tunnel Endpoint Identifier, QoS Negotiated) message to the GGSNs concerned. The GGSNs update their PDP context fields and return an Update PDP Context Response (GGSN Tunnel Endpoint Identifier) message.

12) When the target SRNC receives the appropriate RRC message, e.g. Physical Channel Reconfiguration Complete message or the Radio Bearer Release Complete message in UTRAN case, or the Handover To UTRAN Complete message or Handover Complete message in GERAN case, i.e. the new SRNC-ID + S-RNTI are successfully exchanged with the MS by the radio protocols, the target SRNC shall initiate a Relocation Complete procedure by sending the Relocation Complete message to the new SGSN. The purpose of the Relocation Complete procedure is to indicate by the target SRNC the completion of the relocation of the SRNS to the CN. If the user plane has not been switched at Relocation Detect, the CN shall upon reception of Relocation Complete

switch the user plane from source RNC to target SRNC. If the SRNS Relocation is an inter-SGSN SRNS relocation, the new SGSN signals to the old SGSN the completion of the SRNS relocation procedure by sending a Forward Relocation Complete message.

13) Upon receiving the Relocation Complete message or, if it is an inter-SGSN SRNS relocation, the Forward Relocation Complete message, the old SGSN sends an Iu Release Command message to the source RNC. When the RNC data-forwarding timer has expired, the source RNC responds with an Iu Release Complete message.

14) After the MS has finished the reconfiguration procedure and if the new Routeing Area Identification is different from the old one, the MS initiates the Routeing Area Update procedure. See subclause "Location Management Procedures (Iu mode)". Note that it is only a subset of the RA update procedure that is performed, since the MS is in PMM-CONNECTED state.

If the SRNS Relocation is inter-SGSN, then the following CAMEL procedure calls shall be performed (see referenced procedures in 3GPP TS 23.078)

C1) CAMEL_GPRS_PDP_Context_Disconnection and CAMEL_GPRS_Detach

They are called in the following order:

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

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

If the SRNS Relocation is intra-SGSN, then the above mentioned CAMEL procedures calls shall not be performed.

If Routeing Area Update occurs, then the following CAMEL procedure calls shall be performed (see referenced procedures in 3GPP TS 23.078):

C2) CAMEL_GPRS_Routeing_Area_Update_Session.

In Figure 42, the procedure returns as result "Continue".

C3) CAMEL_GPRS_Routeing_Area_Update_Context.

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

For C2 and C3: refer to Routing Area Update procedure description for detailed message flow.

CR-Form-v5.1

CHANGE REQUEST

⌘　　　**23.060** CR **410**　⌘rev　⌘ Current version: **3.12.0** ⌘

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

Title:	⌘	Setting of PDP Context Indentifier after inter-SGSN RAU from GTPv0-only SGSN
Source:	⌘	Nokia
Work item code: ⌘	TEI	***Date:*** ⌘ 21ˢᵗ August 2002

Category: ⌘ **F**　　　　　　　　　　　　　　　　　　　　　***Release:*** ⌘ R99

Use <u>one</u> of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use <u>one</u> 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:	⌘	In case of Inter-SGSN RAU, when the old SGSN supports only GTPv0, the 'PDP Context Identifier' IE is not given to the new SGSN. Therefore the new SGSN would get a set of PDP contexts without PDP IDs. These PDP contexts IDs are needed e.g. in case of subsequent Inter-SGSN RAU to a third SGSN supporting GTP v1.
Summary of change: ⌘		If SGSN does not have a valid value for PDP Context Identifier, it shall use value 255 to indicate this.
Consequences if not approved:	⌘	Problems in SGSN once PDP IDs are missing and Insert the 'Insert Subscriber Data' message is received, which requests certain operations on contexts with certain PDP IDs.

Clauses affected:	⌘	11.1.1

Other specs affected:	⌘	**X**	Other core specifications	⌘　29.060
		☐	Test specifications	
		☐	O&M Specifications	

Other comments:	⌘	CN4#15 has approved respective CRs to R99(N4-021061),Rel4(N4-021062) and Rel5(N4-021063)

11.1.1   Interactions Between GTP v0 (R97) and GTP v1 (R99)

When a first GSN receives a GTP PDU from a second GSN using a version not supported, then the first GSN shall return a "version not supported" error message to the second GSN. The second GSN shall then fall back to the most-recent version supported by the first GSN. A GSN shall use its most-recent GTP version when initiating GTP PDU transmission to a new GSN.

When an SGSN that supports GTP v1 establishes a GTP tunnel to a GGSN that supports GTP v0, the SGSN shall convert a release 99 QoS profile to a release 97 QoS profile before transmitting the QoS profile to the GGSN. If the MS supports the R99 QoS profile, the SGSN shall convert the negotiated R97 QoS profile to an R99 QoS profile before transmitting the QoS profile to the MS.

A GGSN shall be able to fall back to GTP v0 during an Update PDP Context procedure. That is, the GGSN shall accept an Update PDP Context Request of GTP v0 even if the established GTP tunnel is of GTP v1.

When an inter-SGSN RA update procedure is performed from a first SGSN that supports GTP v1 to a second SGSN that supports GTP v0, the first SGSN shall convert the R99 QoS profile to an R97 QoS profile before sending the SGSN Context Response message. Furthermore, it fills the Uplink Flow Label Signalling field in the PDP Context information element of the SGSN Context Response message with the lower two octets of the Uplink TEID Control Plane. If several PDP contexts have been activated for the same APN and PDP address in the first SGSN (secondary PDP context activation), then all PDP contexts except the PDP context with the highest-quality QoS profile are deleted in the MS and in the first SGSN, and the first SGSN shall initiate deletion of these PDP contexts in the GGSN.

MS detects that the new SGSN is supporting only GTPv0 from the Release Indication broadcasted on the GSM radio.

3G TS 23.107 [58] specifies how to determine the highest-quality QoS profile. The second SGSN shall be responsible for updating the remaining PDP context in the GGSN, and the GGSN shall remove the TFT if present when it receives the GTP v0 Update PDP Context Request message.

   NOTE: The conversion between an R99 QoS profile and an R97 QoS profile is defined in 3G TS 23.107.

When an inter-SGSN RA update procedure is performed from a first SGSN that supports GTP v0 to a second SGSN that supports GTP v1, the second SGSN shall convert the R97 QoS profile to the R99 QoS profile, ignore the delivered Uplink Flow Label Signalling and use GTP v1 to send the Update PDP Context Request message to the GGSN. The Update PDP Context Request message shall be sent with a header containing a TEID set to all zeros and with an additional IE containing the IMSI for the PDP context.

A GGSN shall be able to change to GTP v1 during an Update PDP Context procedure. That is, the GGSN shall accept an Update PDP Context Request of GTP v1 with a TEID set to all zeros and containing the IMSI in addition to the NSAPI, even if the established GTP tunnel is of GTP v0.

When a GTP v0 tunnel was established between the old SGSN and the GGSN, and both old and new SGSNs support GTPv1, the respective uplink Flow Label signalling shall be inserted in the two lower octets of the Uplink TEID Control Plane field of the SGSN Context Response message; the upper two octets shall be set to all zeros.

When an inter-SGSN RA update procedure is performed from a first SGSN that supports only GTP v0 to a second SGSN that supports GTP v1, and the second SGSN does not have a valid PDP Context Identifier, it shall use value 255 to indicate this.

CR-Form-v5.1

CHANGE REQUEST

| ⌘ | **23.060** CR **411** | ⌘**rev** | | ⌘ | Current version: | **4.5.0** | ⌘ |

*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:	⌘	Setting of PDP Context Indentifier after inter-SGSN RAU from GTPv0-only SGSN
Source:	⌘	Nokia
Work item code:	⌘ TEI4	*Date:* ⌘ 21st August 2002

Category:	⌘ **A**	*Release:* ⌘ Rel-4

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

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

Reason for change:	⌘	In case of Inter-SGSN RAU, when the old SGSN supports only GTPv0, the 'PDP Context Identifier' IE is not given to the new SGSN. Therefore the new SGSN would get a set of PDP contexts without PDP IDs. These PDP contexts IDs are needed e.g. in case of subsequent Inter-SGSN RAU to a third SGSN supporting GTP v1.
Summary of change:	⌘	If SGSN does not have a valid value for PDP Context Identifier, it shall use value 255 to indicate this.
Consequences if not approved:	⌘	Problems in SGSN once PDP IDs are missing and Insert the 'Insert Subscriber Data' message is received, which requests certain operations on contexts with certain PDP IDs.

Clauses affected:	⌘	11.1.1

Other specs affected:	⌘	**X** Other core specifications	⌘	29.060
		☐ Test specifications		
		☐ O&M Specifications		

Other comments:	⌘	CN4#15 has approved respective CRs to R99(N4-021061),Rel4(N4-021062) and Rel5(N4-021063)

11.1.1   Interactions Between GTP v0 (R97) and GTP v1 (R99)

When a first GSN receives a GTP PDU from a second GSN using a version not supported, then the first GSN shall return a "version not supported" error message to the second GSN. The second GSN shall then fall back to the most-recent version supported by the first GSN. A GSN shall use its most-recent GTP version when initiating GTP PDU transmission to a new GSN.

When an SGSN that supports GTP v1 establishes a GTP tunnel to a GGSN that supports GTP v0, the SGSN shall convert a release 99 QoS profile to a release 97 QoS profile before transmitting the QoS profile to the GGSN. If the MS supports the R99 QoS profile, the SGSN shall convert the negotiated R97 QoS profile to an R99 QoS profile before transmitting the QoS profile to the MS.

A GGSN shall be able to fall back to GTP v0 during an Update PDP Context procedure. That is, the GGSN shall accept an Update PDP Context Request of GTP v0 even if the established GTP tunnel is of GTP v1.

When an inter-SGSN RA update procedure is performed from a first SGSN that supports GTP v1 to a second SGSN that supports GTP v0, the first SGSN shall convert the R99 QoS profile to an R97 QoS profile before sending the SGSN Context Response message. Furthermore, it fills the Uplink Flow Label Signalling field in the PDP Context information element of the SGSN Context Response message with the lower two octets of the Uplink TEID Control Plane. If several PDP contexts have been activated for the same APN and PDP address in the first SGSN (secondary PDP context activation), then all PDP contexts except the PDP context with the highest-quality QoS profile are deleted in the MS and in the first SGSN, and the first SGSN shall initiate deletion of these PDP contexts in the GGSN.

The MS detects that the new SGSN is supporting only GTPv0 from the Release Indication broadcasted on the GSM radio.

3GPP TS 23.107 [58] specifies how to determine the highest-quality QoS profile. The second SGSN shall be responsible for updating the remaining PDP context in the GGSN, and the GGSN shall remove the TFT if present when it receives the GTP v0 Update PDP Context Request message.

NOTE: The conversion between an R99 QoS profile and an R97 QoS profile is defined in 3GPP TS 23.107.

When an inter-SGSN RA update procedure is performed from a first SGSN that supports GTP v0 to a second SGSN that supports GTP v1, the second SGSN shall convert the R97 QoS profile to the R99 QoS profile, ignore the delivered Uplink Flow Label Signalling and use GTP v1 to send the Update PDP Context Request message to the GGSN. The Update PDP Context Request message shall be sent with a header containing a TEID set to all zeros and with an additional IE containing the IMSI for the PDP context.

A GGSN shall be able to change to GTP v1 during an Update PDP Context procedure. That is, the GGSN shall accept an Update PDP Context Request of GTP v1 with a TEID set to all zeros and containing the IMSI in addition to the NSAPI, even if the established GTP tunnel is of GTP v0.

When a GTP v0 tunnel was established between the old SGSN and the GGSN, and both old and new SGSNs support GTPv1 the respective uplink Flow Label signalling shall be inserted in the two lower octets of the Uplink TEID Control Plane field of the SGSN Context Response message; the upper two octets shall be set to all zeros.

When an inter-SGSN RA update procedure is performed from a first SGSN that supports only GTP v0 to a second SGSN that supports GTP v1, and the second SGSN does not have a valid PDP Context Identifier, it shall use value 255 to indicate this.

CR-Form-v5.1

CHANGE REQUEST

| ⌘ | **23.060** CR **412** | ⌘ rev | | ⌘ | Current version: | **5.2.0** | ⌘ |

*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:	⌘	Setting of PDP Context Indentifier after inter-SGSN RAU from GTPv0-only SGSN
Source:	⌘	Nokia

Work item code:	⌘ TEI5		*Date:* ⌘	21ˢᵗ August 2002

Category:	⌘ **A**		*Release:* ⌘	Rel-5

Use one of the following categories:	*Use one of the following releases:*
***F** (correction)*	*2 (GSM Phase 2)*
***A** (corresponds to a correction in an earlier release)*	*R96 (Release 1996)*
***B** (addition of feature),*	*R97 (Release 1997)*
***C** (functional modification of feature)*	*R98 (Release 1998)*
***D** (editorial modification)*	*R99 (Release 1999)*
Detailed explanations of the above categories can	*REL-4 (Release 4)*
be found in 3GPP TR 21.900.	*REL-5 (Release 5)*

Reason for change:	⌘	In case of Inter-SGSN RAU, when the old SGSN supports only GTPv0, the 'PDP Context Identifier' IE is not given to the new SGSN. Therefore the new SGSN would get a set of PDP contexts without PDP IDs. These PDP contexts IDs are needed e.g. in case of subsequent Inter-SGSN RAU to a third SGSN supporting GTP v1.
Summary of change:	⌘	If SGSN does not have a valid value for PDP Context Identifier, it shall use value 255 to indicate this.
Consequences if not approved:	⌘	Problems in SGSN once PDP IDs are missing and Insert the 'Insert Subscriber Data' message is received, which requests certain operations on contexts with certain PDP IDs.

Clauses affected:	⌘	11.1.1

Other specs affected:	⌘	**X** Other core specifications	⌘	29.060
		☐ Test specifications		
		☐ O&M Specifications		

Other comments:	⌘	CN4#15 has approved respective CRs to R99(N4-021061),Rel4(N4-021062) and Rel5(N4-021063)

11.1.1   Interactions Between GTP v0 (R97) and GTP v1 (R99)

When a first GSN receives a GTP PDU from a second GSN using a version not supported, then the first GSN shall return a "version not supported" error message to the second GSN. The second GSN shall then fall back to the most-recent version supported by the first GSN. A GSN shall use its most-recent GTP version when initiating GTP PDU transmission to a new GSN.

When an SGSN that supports GTP v1 establishes a GTP tunnel to a GGSN that supports GTP v0, the SGSN shall convert a release 99 QoS profile to a release 97 QoS profile before transmitting the QoS profile to the GGSN. If the MS supports the R99 QoS profile, the SGSN shall convert the negotiated R97 QoS profile to an R99 QoS profile before transmitting the QoS profile to the MS.

A GGSN shall be able to fall back to GTP v0 during an Update PDP Context procedure. That is, the GGSN shall accept an Update PDP Context Request of GTP v0 even if the established GTP tunnel is of GTP v1.

When an inter-SGSN RA update procedure is performed from a first SGSN that supports GTP v1 to a second SGSN that supports GTP v0, the first SGSN shall convert the R99 QoS profile to an R97 QoS profile before sending the SGSN Context Response message. Furthermore, it fills the Uplink Flow Label Signalling field in the PDP Context information element of the SGSN Context Response message with the lower two octets of the Uplink TEID Control Plane. If several PDP contexts have been activated for the same APN and PDP address in the first SGSN (secondary PDP context activation), then all PDP contexts except the PDP context with the highest-quality QoS profile are deleted in the MS and in the first SGSN, and the first SGSN shall initiate deletion of these PDP contexts in the GGSN.

The MS detects that the new SGSN is supporting only GTPv0 from the Release Indication broadcasted by the RAN.

3GPP TS 23.107 [58] specifies how to determine the highest-quality QoS profile. The second SGSN shall be responsible for updating the remaining PDP context in the GGSN, and the GGSN shall remove the TFT if present when it receives the GTP v0 Update PDP Context Request message.

   NOTE: The conversion between an R99 QoS profile and an R97 QoS profile is defined in 3GPP TS 23.107.

When an inter-SGSN RA update procedure is performed from a first SGSN that supports GTP v0 to a second SGSN that supports GTP v1, the second SGSN shall convert the R97 QoS profile to the R99 QoS profile, ignore the delivered Uplink Flow Label Signalling and use GTP v1 to send the Update PDP Context Request message to the GGSN. The Update PDP Context Request message shall be sent with a header containing a TEID set to all zeros and with an additional IE containing the IMSI for the PDP context.

A GGSN shall be able to change to GTP v1 during an Update PDP Context procedure. That is, the GGSN shall accept an Update PDP Context Request of GTP v1 with a TEID set to all zeros and containing the IMSI in addition to the NSAPI, even if the established GTP tunnel is of GTP v0.

When a GTP v0 tunnel was established between the old SGSN and the GGSN, and both old and new SGSNs support GTPv1 the respective uplink Flow Label signalling shall be inserted in the two lower octets of the Uplink TEID Control Plane field of the SGSN Context Response message; the upper two octets shall be set to all zeros.

When an inter-SGSN RA update procedure is performed from a first SGSN that supports only GTP v0 to a second SGSN that supports GTP v1, and the second SGSN does not have a valid PDP Context Identifier, it shall use value 255 to indicate this.