Technical Specification Group Services and System Aspects ***TSGS#17(02)0606***

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

Source: **TSG SA WG2**
Title: **Revised CRs on 23.060 and 03.60**
Agenda Item: **7.2.3**

During the presentation of SP-020604 at SA#17 containing the CRs against TS 23.060 and TS 03.60, concerns were raised against the following CRs on 23.060: 407, 408, 409, 400, 401 and 402.

CRs 400, 401 and 402 are not going to be revised at this plenary and a revised version might be submitted to TSG SA#18. This document proposes a revised version of CR 407, 408 and 409 (rev2) for second attempt of approval at TSG SA#17.

CRs on 03.60 and 23.060:

Tdoc #	**Title**	**Spec**	**CR #**	**cat**	**Version in**	**WI**	**S2 meeting**
S2-022586	No MT calls after resumption of GPRS when using NMO=1	23.060	407 r2	A	R99	TEI	26
S2-022587	No MT calls after resumption of GPRS when using NMO=1	23.060	408 r2	A	4	TEI4	26
S2-022588	No MT calls after resumption of GPRS when using NMO=1	23.060	409 r2	A	5	TEI5	26

3GPP TSG-SA WG2 Meeting #26 ***Tdoc* S2-022586**
Toronto, Canada, 19th – 23rd Aug 2002

CR-Form-v7

CHANGE REQUEST

⌘ **23.060** **CR** **407** ⌘ **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:	⌘	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.

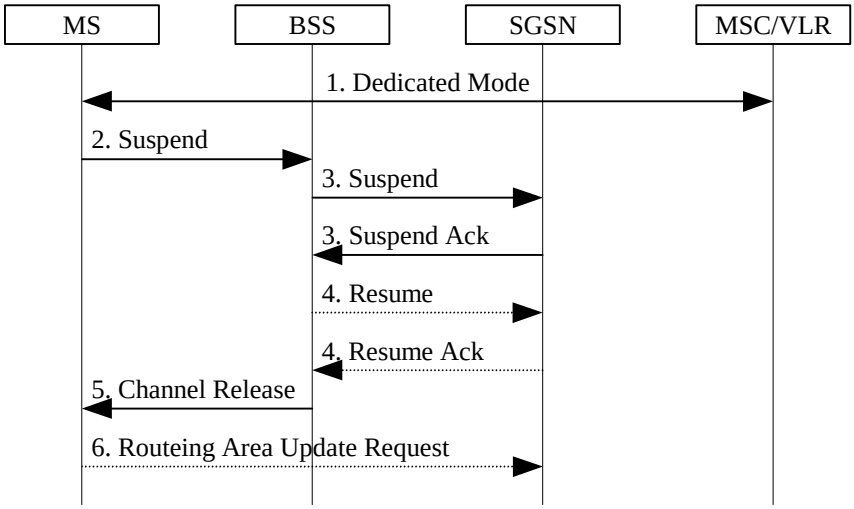

Figure 1: Suspend and Resume Procedure for intra SGSN

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.

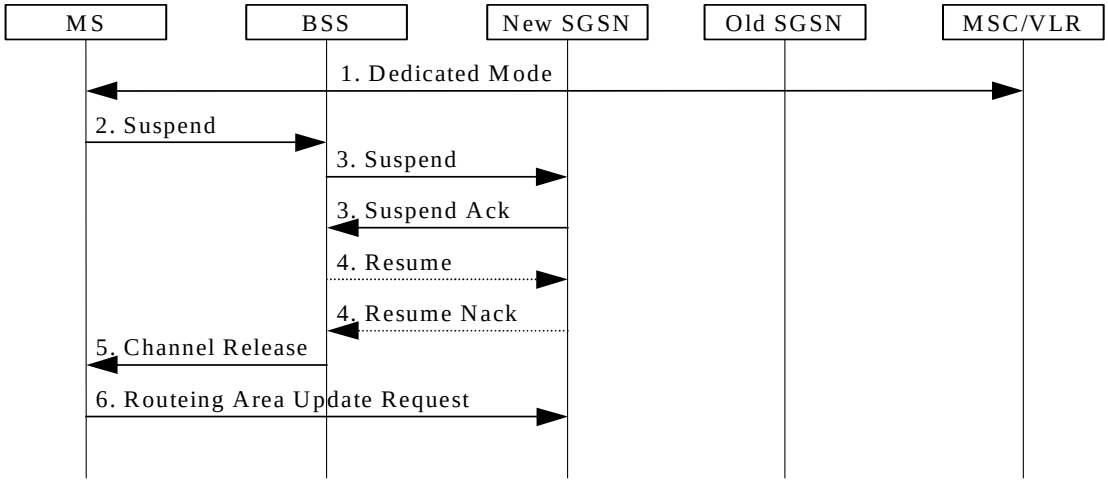

Figure 2: Suspend and Resume Procedure for inter-SGSN

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.

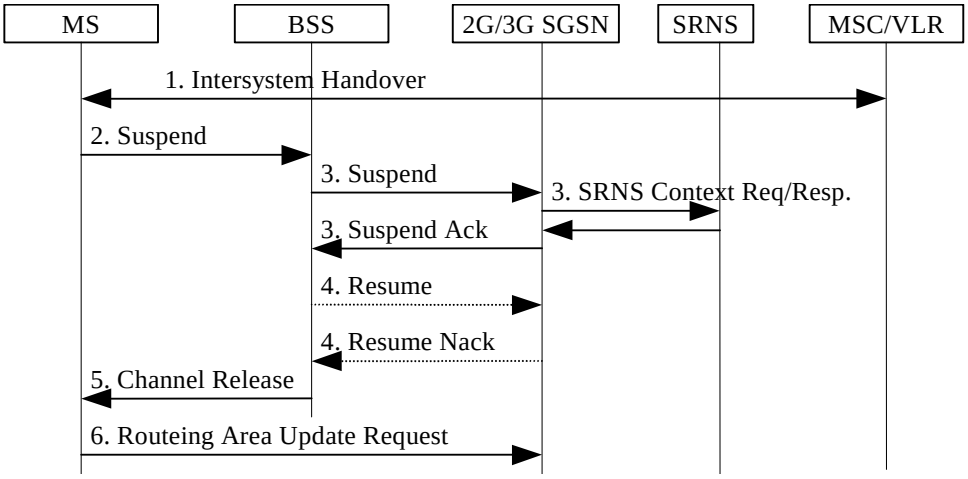

Figure 3: Suspend and Resume Procedure for intra-SGSN

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.

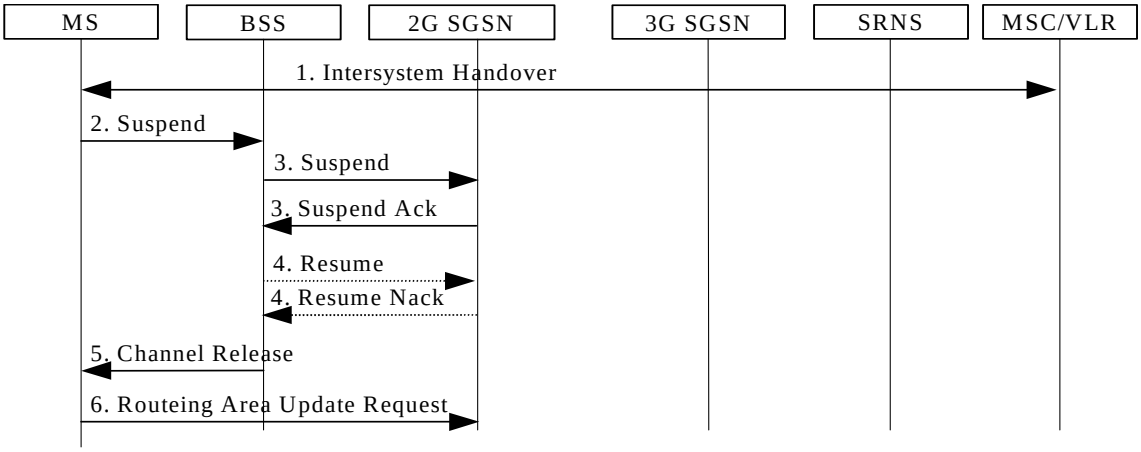

Figure 4: Suspend and Resume Procedure for inter-SGSN

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.

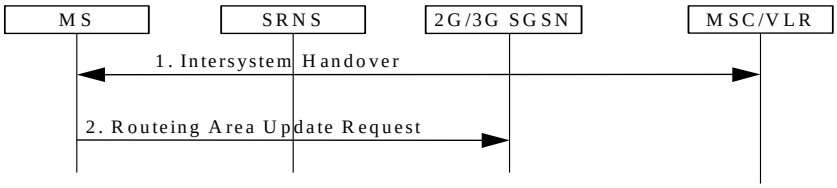

Figure 5: Resume of GPRS traffic at intra SGSN

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, 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.

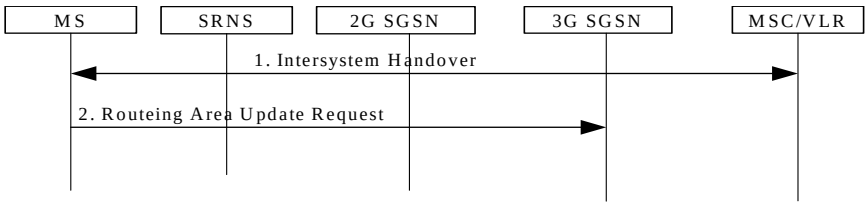

Figure 6: Resume of GPRS traffic at inter SGSN

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, as described in subclause " Inter System Change Procedure"÷

3GPP TSG-SA WG2 Meeting #26 ***Tdoc* S2-022587**
Toronto, Canada, 19th – 23rd Aug 2002

CR-Form-v7

CHANGE REQUEST

⌘ **23.060** **CR** **408** ⌘ **rev** **2** ⌘ 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:	⌘	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

		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.

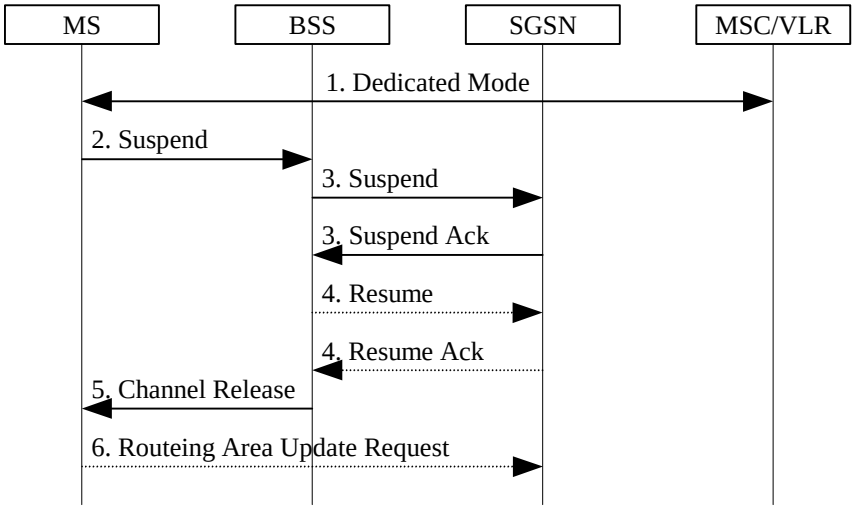

Figure 99: Suspend and Resume Procedure for intra SGSN

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.

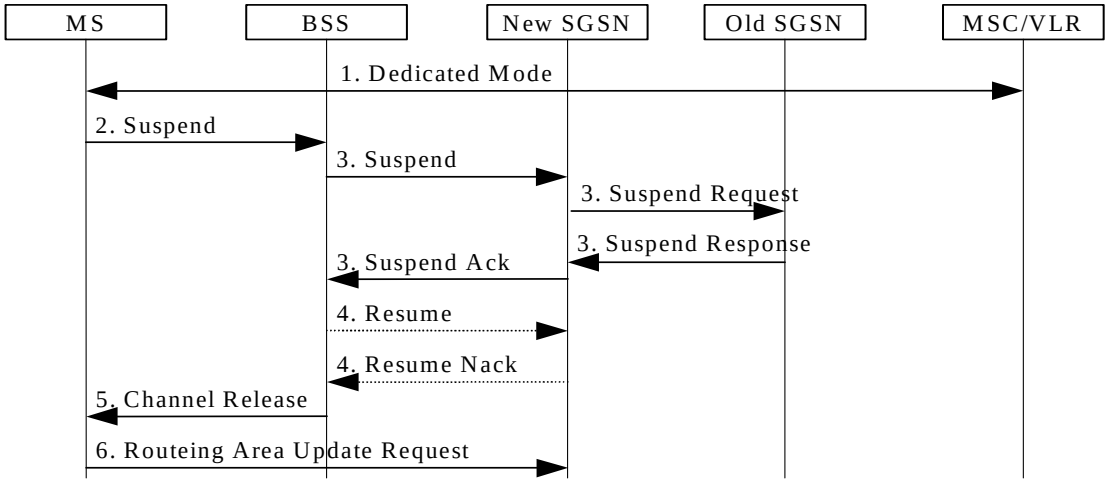

Figure 100: Suspend and Resume Procedure for inter-SGSN

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.

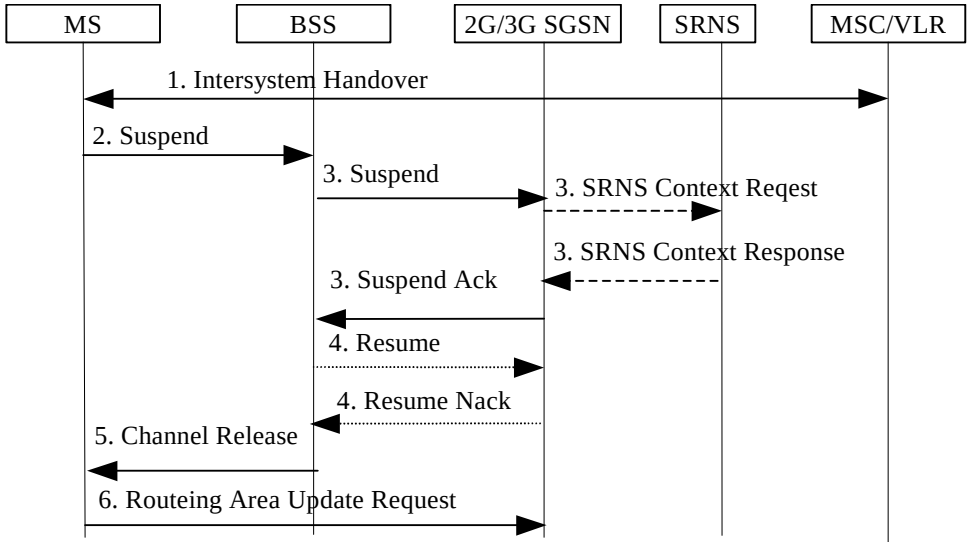

Figure 101: Suspend and Resume Procedure for intra-SGSN

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.

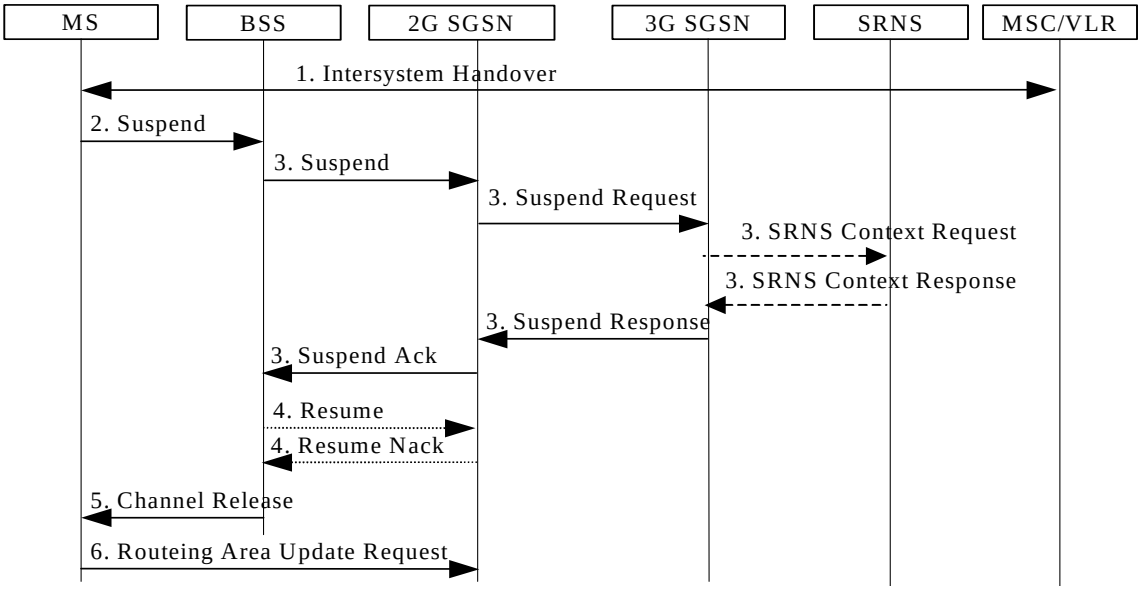

Figure 102: Suspend and Resume Procedure for inter-SGSN

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.

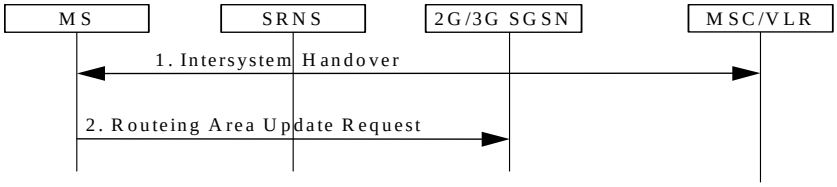

Figure 103: Resume of GPRS traffic at intra SGSN

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, 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.

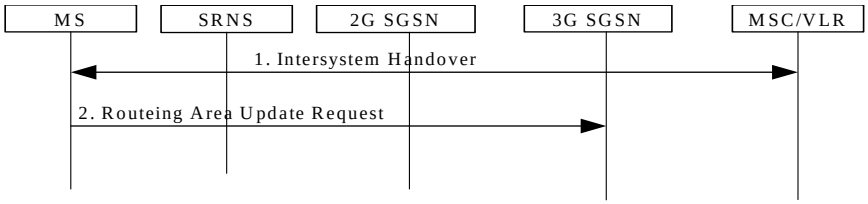

Figure 104: Resume of GPRS traffic at inter SGSN

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, as described in clause " Inter System Change Procedure".

3GPP TSG-SA WG2 Meeting #26 **Tdoc S2-022588**
Toronto, Canada, 19th – 23rd Aug 2002

CR-Form-v7

CHANGE REQUEST

⌘ **23.060** **CR** **409** ⌘ **rev** **2** ⌘ 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 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 (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.

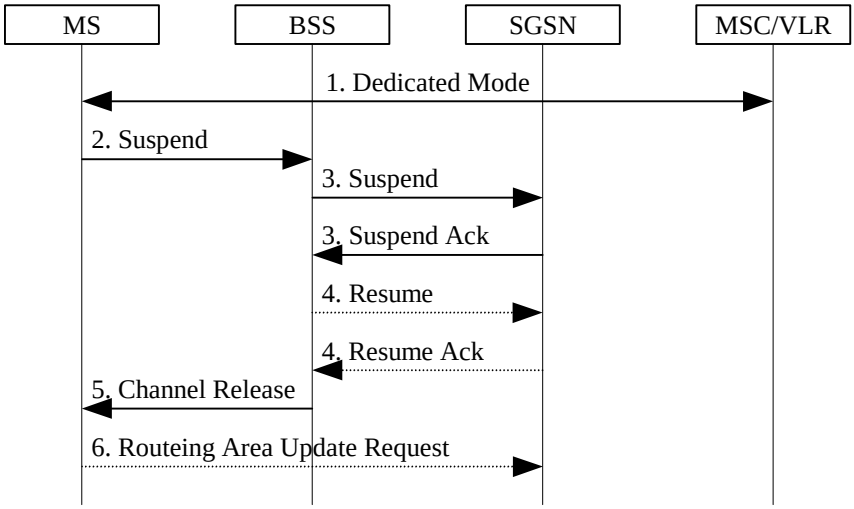

Figure 99: Suspend and Resume Procedure for intra SGSN

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.

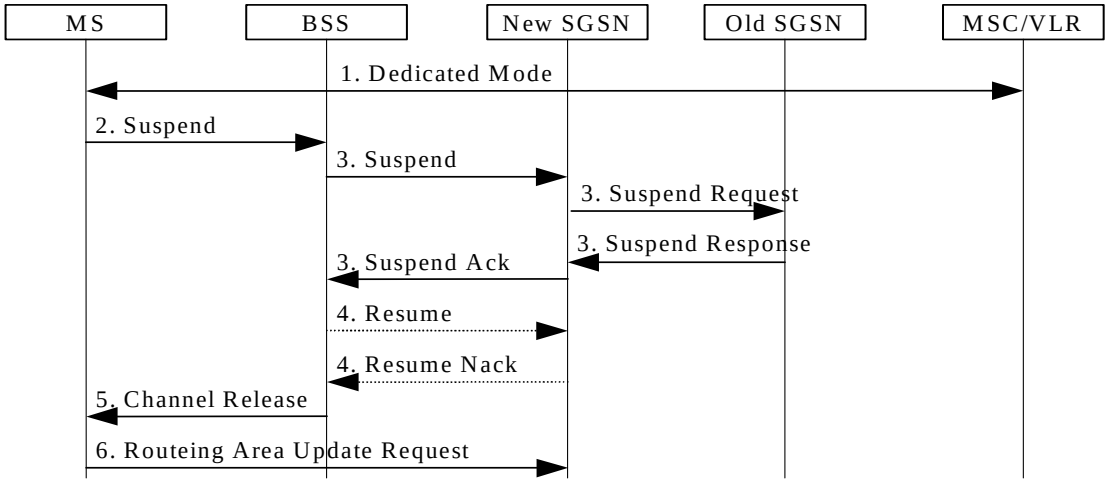

Figure 100: Suspend and Resume Procedure for inter-SGSN

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.

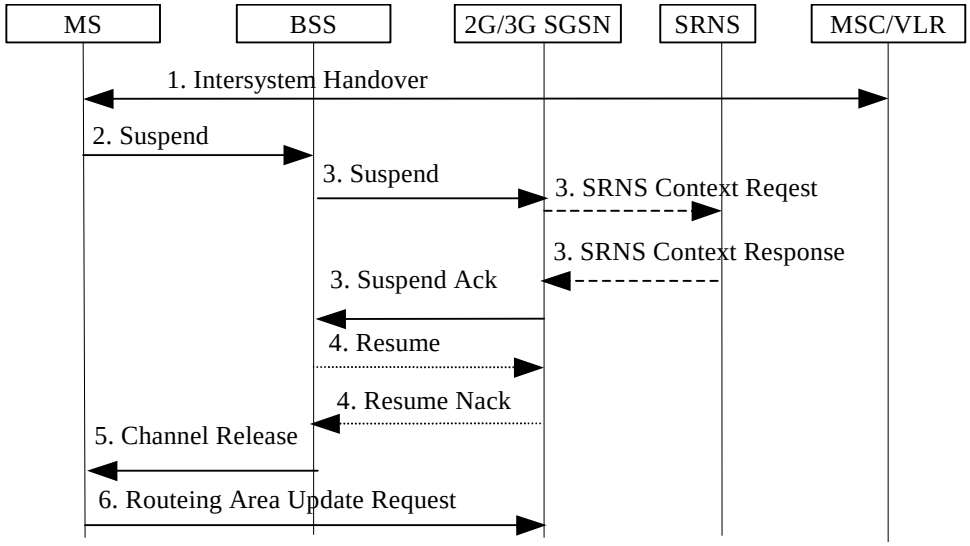

Figure 101: Suspend and Resume Procedure for intra-SGSN

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.

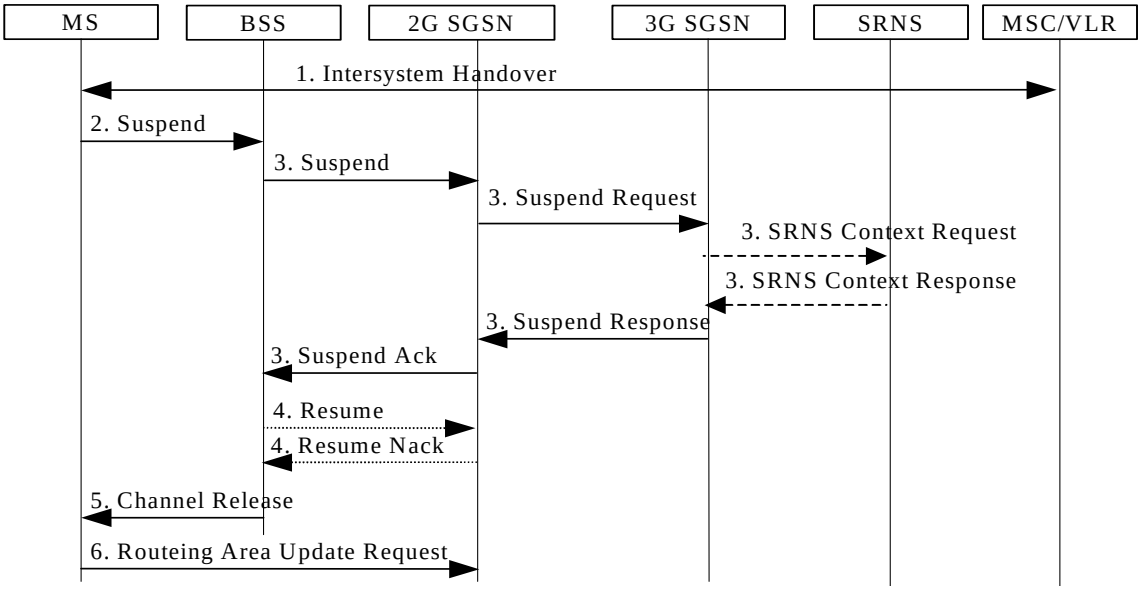

Figure 102: Suspend and Resume Procedure for inter-SGSN

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.

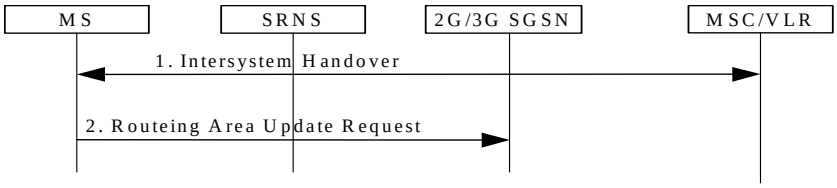

Figure 103: Resume of GPRS traffic at intra SGSN

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, 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.

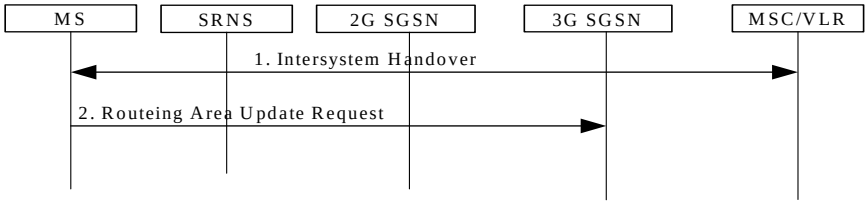

Figure 104: Resume of GPRS traffic at inter SGSN

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 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, as described in clause " Inter System Change Procedure".