
Source: **TSG SA WG2**
Title: **Three more CRs on 23.060 v 3.2.1**
Agenda Item: **5.2.3**

In addition to all the 23.060 CRs presented in SP-000086, the three following Change Requests (CRs) have been approved by TSG SA WG2 and are requested to be approved by TSG SA plenary #7.
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.

spec	CR #	Title	release	cat	S2 TDoc #
23.060	065r5	Radio bearer release and PDP context interaction	R99	B	S2-000609
23.060	102r3	Classmark handling	R99	F	S2-000621
23.060	143	Clarification of inter-SGSN inter-system change to UMTS	R99	F	S2-000478

3GPP TSG SA WG2 Meeting #12
Tokyo, 6– 9 March 2000

***Document* S2-000609**
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

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23.060	CR	065r5	Current Version:	3.2.1

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

For submission to: SA#7	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑	for information		non-strategic		

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

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

Source: Nokia **Date:** 16/02/00

Subject: Radio bearer release and PDP context interaction

Work item:

Category: *(only one category shall be marked with an X)*			**Release:**	
F	Correction	X	Phase 2	
A	Corresponds to a correction in an earlier release		Release 96	
B	Addition of feature		Release 97	
C	Functional modification of feature		Release 98	
D	Editorial modification		Release 99	X
			Release 00	

Reason for change: The purpose of the change is to provide the procedures needed to the PDP Contexts when Iu Release is performed.

Clauses affected: 9.2.3 and 12.8.3

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

Other comments:

9.2.3 Modification Procedures

An MS or GGSN can request, ~~or~~ an SGSN can decide, possibly triggered by the HLR as explained in subclause "Insert Subscriber Data Procedure" or after Iu releasing initiated by the RNC an MS and SGSN shall according to predefined rules start, to modify parameters that were negotiated during an activation procedure for one or several PDP contexts.The following parameters can be modified:

- QoS Negotiated;
- Radio Priority;
- Packet Flow Id;
- PDP Address (in case of the GGSN-initiated modification procedure); and
- TFT (in case of MS-initiated modification procedure).

The SGSN can request the modification of parameters by sending a Modify PDP Context Request message to the MS.

A GGSN can request the modification of parameters by sending an Update PDP Context Request message to the SGSN.

An MS can request the modification of parameters by sending a Modify PDP Context Request message to the SGSN.

An RNC can request the release of the Iu by sending an Iu Release Request message to the SGSN. After Iu releasing the MS and SGSN shall modify the PDP contexts according to rules defined in the chapter 9.2.3.4.

A trace may be activated while a PDP context is active. To enable trace activation in a GGSN, the SGSN shall send an Update PDP Context Request message to the GGSN. If PDP context modification is performed only to activate a trace, then the SGSN shall not send a Modify PDP Context Request message to the MS.

9.2.3.1 SGSN-Initiated PDP Context Modification Procedure

The SGSN-Initiated PDP Context Modification procedure is illustrated in Figure 1. Each step is explained in the following list.

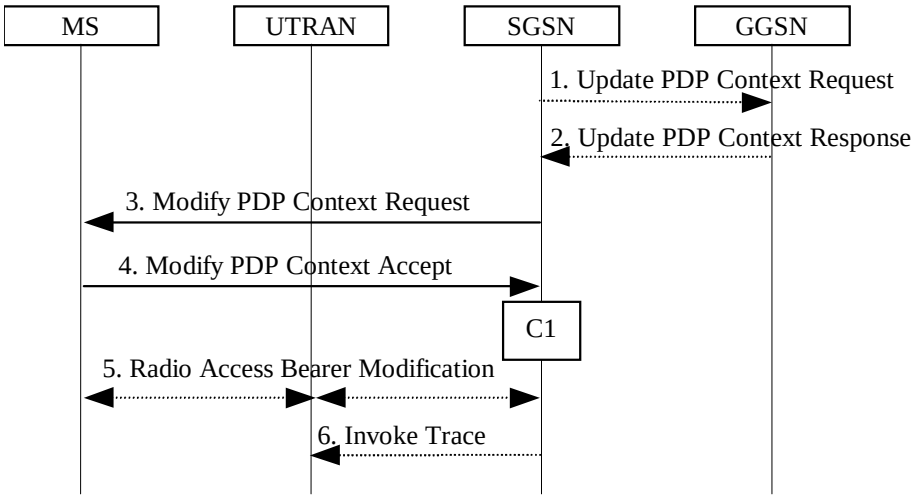

Figure 1: SGSN-Initiated PDP Context Modification Procedure

1) The SGSN may send an Update PDP Context Request (TEID, QoS Negotiated, Trace Reference, Trace Type, Trigger Id, Initiating OMC Identity, OMC Identity) message to the GGSN. If QoS Negotiated received from the SGSN is incompatible with the PDP context being modified (e.g., the reliability class is insufficient to support the PDP type), then the GGSN rejects the Update PDP Context Request. The compatible QoS profiles are configured by the GGSN operator. The SGSN shall include Trace Reference, Trace Type, Trigger Id, Initiating OMC Identity, and OMC Identity in the message if GGSN trace is activated while the PDP context is active. The SGSN shall copy Trace Reference, Trace Type, and Initiating OMC Identity from the trace information received from the HLR or OMC.

2) The GGSN may restrict QoS Negotiated given its capabilities and the current load. The GGSN stores QoS Negotiated and returns an Update PDP Context Response (TEID, QoS Negotiated, Cause) message.

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

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

5) For UMTS, the radio access bearer modification procedure may be executed.

6) If BSS trace is activated while the PDP context is active, then the SGSN shall send an Invoke Trace (Trace Reference, Trace Type, Trigger Id, Initiating OMC Identity, OMC Identity) message to the BSS or UTRAN. Trace Reference, Trace Type, and Initiating OMC Identity are copied from the trace information received from the HLR or OMC.

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

C1) CAMEL-GPRS-Modify-PDP-Context.

9.2.3.2 GGSN-Initiated PDP Context Modification Procedure

The GGSN-Initiated PDP Context Modification procedure is illustrated in Figure 2. Each step is explained in the following list.

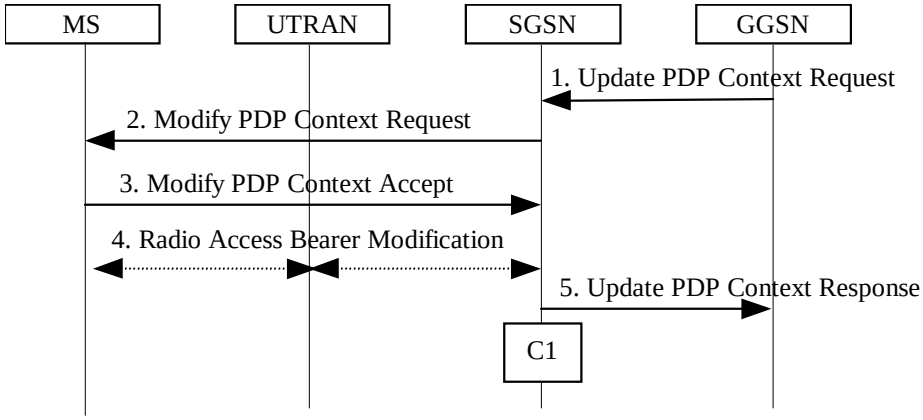

Figure 2: GGSN-Initiated PDP Context Modification Procedure

1) The GGSN sends an Update PDP Context Request (TEID, PDP Address, QoS Requested) message to the SGSN. QoS Requested indicates the desired QoS profile. PDP Address is optional.

2) The SGSN may restrict the desired QoS profile given its capabilities, the current load, the current QoS profile, and the subscribed QoS profile. The SGSN selects Radio Priority and Packet Flow Id based on QoS Negotiated, and sends a Modify PDP Context Request (TI, PDP Address, QoS Negotiated, Radio Priority, Packet Flow Id) message to the MS. PDP Address is optional.

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

4) For UMTS, the radio access bearer modification procedure may be executed.

5) Upon receipt of the Modify PDP Context Accept message, or upon completion of the RAB modification procedure, the SGSN returns an Update PDP Context Response (TEID, QoS Negotiated) message to the GGSN. If the SGSN receives a Deactivate PDP Context Request message, it shall instead follow the PDP Context Deactivation Initiated by MS procedure.

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

C1) CAMEL-GPRS-Modify-PDP-Context.

9.2.3.3 MS-Initiated PDP Context Modification Procedure

The MS-Initiated PDP Context Modification procedure is illustrated in Figure 3. Each step is explained in the following list.

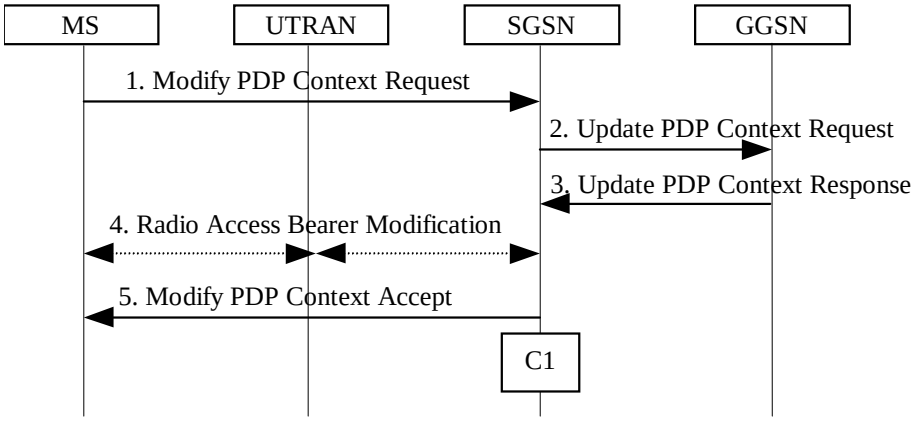

Figure 3: MS-Initiated PDP Context Modification Procedure

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, 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., the reliability class is insufficient to support the PDP type or TFT contains inconsistent packet filters), then the GGSN rejects the Update PDP Context Request. The compatible QoS profiles are configured by the GGSN operator.

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) For UMTS, the radio access bearer modification procedure may be executed.

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.

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

C1) CAMEL-GPRS-Modify-PDP-Context.

9.2.3.4 RNC-Initiated PDP Context Modification Procedure

The RNC can request the release of Iu connection (see the chapter 12.8.3) e.g. due to a break of the radio connection or user inactivity. After Iu Release the PDP Contexts are modified as follows:~~.~~

- In SGSN, for a PDP context using background or interactive traffic class, the PDP Context is preserved with no modifications.
- In 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 Radio Access Bearer (RAB) is released. The SGSN sends an Update PDP Context Request (TEID, QoS Negotiated) message to the GGSN and sets the maximum bit rate to 0 kbit/s in the GGSN. The value of 0 kbit/s for the guaranteed bit rate indicates the GGSN to stop sending packets to the SGSN on this PDP Context.

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

- In MS, for a PDP context using background or interactive traffic class, the PDP Context is preserved even if RRC re-establishment procedures have failed.
- In MS, 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 RRC re-establishment procedure has failed. After coverage is regained 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 to re-establish the RAB.

**** Next Modified Section ****

12.8.3 Iu Release Procedure

This procedure is used to release the Iu interface. This procedure also triggers the release of all the Iu connections and changes the 3G-SGSN PMM state to PMM-IDLE. Both RNC-initiated and SGSN-initiated Iu release procedures are showed in the figure below.

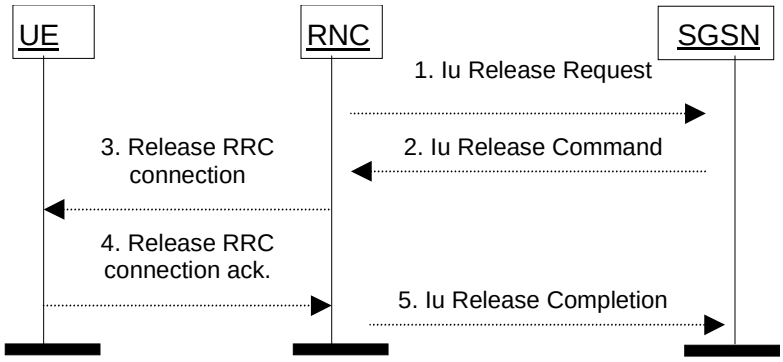

Figure 4: Iu Release Procedure

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

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

1) The RNC notices that the RRC connection has been released or detects a need to release the radio resources. It sends an Iu Release Request (Cause) message to the SGSN. Cause indicates the reason for the release (O&M Intervention, Equipment Failure, Implicit Release, or Resource Optimisation). Implicit Release means that the periodic URA update timer expired. Resource Optimisation means that RNC decided to release an MS with only a non real-time bearer established to optimise the radio usage after the RRC-Connection-Release timer expired.

2) The SGSN releases the Iu by sending the Iu Release Command (Cause) message to the RNC. This message may be triggered either by an Iu Release Request message, or by another SGSN event (e.g., authentication failure or detach). It is optional for the SGSN to send the Iu Release Command message after an Iu Release Request message with Cause set to Resource Optimisation is received from the RNC.

3) If the RRC connection is not already released (Cause = Resource Optimisation), then the RNC sends a Release RRC Connection message to the MS. [Cause "Detach" or "Authentication failure are FFS]

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

5) The RNC confirms the Iu release by returning an Iu Release Completion message to the SGSN.

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

After Iu release, the MS and SGSN shall modify PDP context(s) using streaming or conversational traffic class according to predefined rules (see chapter 9.2.3.4).

3GPP TSG SA2 Meeting #12
Tokyo, Japan, 6-9 March 2000

***Document* S2-000621**
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

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23.060	CR	102 rev3	Current Version:	3.2.1

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

For submission to:	SA #7	for approval	X	Strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic		

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

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

Source: Ericsson **Date:** 2000-03-08

Subject: Classmark handling

Work item: Release 99

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

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

Reason for change: Adding UE Capability and MS Network Capability for UMTS

Clauses affected: 6.14

Other specs affected:

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

Other comments:

help.doc

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

6.14 Classmark Handling

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

In order to allow introduction of new radio access technologies in the future, the MS classmark is split into two distinct and independent information elements, the radio access classmark, and the MS network capability~~SGSN classmark~~.

6.14.1 Radio Access Classmark

6.14.1.1 MS Radio Access Capability (GSM only)

The MS radio access capability~~lassmark~~ information element contains the GSM radio capabilities of the MS (e.g., multislot capability, power class), and more generally all the information that should be known by the BSS in order to handle radio resources for that MS.

The MS radio access capability~~lassmark~~ is a container for a multiplicity of radio access technology-dependent information, i.e., within the MS radio access capability~~lassmark~~ there are independent sub-fields for various technologies such as GSM 900, GSM 1800~~, Satellite, UMTS, etc~~. The coding shall allow a BSS to extract only the sub-fields relevant to it without interpreting the other sub-fields. This ensures that the MS radio access capability~~lassmark~~ does not need to be interpreted by the NSS, and the full MS radio access capability~~lassmark~~ is always sent by the MS to the SGSN, and thereafter provided to the BSS irrespective of the actual BSS capabilities.

The SGSN shall provide the MS radio access capability~~lassmark~~ as an information element on the Gb interface. It is the responsibility of the SGSN to provide the BSS with the most recent ~~classmark~~MS Radio Access Capability received from the MS. The ~~classmark~~MS Radio Access Capability information element can be included in a downlink transfer request, or be sent in a specific message that updates the ~~radio classmark~~MS Radio Access Capability information in the BSS. The BSS may at any time request the MS radio access capability~~lassmark~~ for a given MS to be transmitted from the SGSN to the BSS.

A specific optimisation allows the BSS to receive a reduced MS radio access capability~~lassmark~~ at initial access directly from the MS. This enables the BSS not to wait for the full MS radio access capability~~lassmark~~ to be provided by the SGSN, and is therefore quicker for the initial MS-originated transmission. The reduced ~~classmark~~MS Radio Access Capability can be carried i~~n~~ several RR messages depending on the access method, e.g., in the initial random access message, or in the first uplink radio block. Details are provided in ~~GSM 0~~ 3G TS 24.008 and GSM 04.60.

At inter system change (UMTS to GSM) the MS Radio Access Capability is sent to the SGSN in the Routing Area Update Request message. The SGSN then provides the BSS with the GSM radio capabilities.

6.14.1.2 UE Capability (UMTS only)

The UE Capability information element contains all the UMTS radio capabilities of the MS (power control, code resource, UE mode, ciphering, PDCP capabilities etc.) that the RNC has to know in order to handle radio resources for that MS.

The MS sends the UE Capability information to the serving RNC at RRC connection establishment and the RNC stores it. This is done before the Attach Request or Routing Area Update Request is sent. Note that in UMTS it is only the RNC that is handling the radio capabilities.

At SRNC relocation the source RNC sends the UE Capability transparently through the core network to the target RNC. If the RNC has not received the UE Capability information it can enquire the MS to send the information.

At inter system change (GSM to UMTS) the UE Capability is transferred from the MS to the serving RNC on RRC connection establishment before the Routing Area Update Request message is sent.

Details are provided in 3G TS 25.331 and 3G TS 25.413.

6.14.2 MS network capability~~SGSN Classmark~~

The MS network capability~~SGSN classmark~~ contains non radio-related capabilities, e.g., the GSM GPRS ciphering, UMTS authentication and TI extension capabilities~~y~~. In the coding of the Information Element certain capabilities may be grouped together in a single indicator. The SGSN stores the MS network capability~~SGSN classmark~~ which is used both locally by the SGSN and for transfer to the new SGSN at all types of inter SGSN RA update.

13.2 SGSN

SGSN maintains MM context and PDP context information for MSs in the STANDBY, READY, PMM-IDLE, and PMM-CONNECTED states. Table 1 shows the context fields for one MS.

Table 1: SGSN MM and PDP Contexts

Field	Description	GSM~~P~~ ~~RS~~	UMTS
IMSI	IMSI is the main reference key.	X	X
MM State	Mobility management state, IDLE, STANDBY, READY, PMM-DETACHED, PMM-IDLE, or PMM-CONNECTED.	X	X
P-TMSI	Packet Temporary Mobile Subscriber Identity.	X	X
P-TMSI Signature	A signature used for identification checking purposes.	X	X
IMEI	International Mobile Equipment Identity	X	X
MSISDN	The basic MSISDN of the MS.	X	X
Routeing Area	Current routeing area.	X	X
Cell Identity	Current cell in READY state, last known cell in STANDBY or IDLE state.	X	
Cell Identity Age	Time elapsed since the last LLC PDU was received from the MS at the SGSN.	X	
Service Area Code	Last known SAC when initial UE message was received or Location Reporting procedure was executed.		X
Service Area Code Age	Time elapsed since the last SAC was received at the 3G-SGSN.		X
VLR Number	The VLR number of the MSC/VLR currently serving this MS.	X	X
New SGSN Address	The IP address of the new SGSN where buffered and not sent N-PDUs should be forwarded to.	X	X
Authentication Triplets	Authentication and ciphering parameters.	X	X
Authentication Vectors	Authentication and ciphering parameters for UMTS.		X
Kc	Currently used ciphering key.	X	
CKSN	Ciphering key sequence number of Kc.	X	
Ciphering algorithm	Selected ciphering algorithm.	X	
CK	Currently used ciphering key.		X
IK	Currently used integrity key.		X
KSI	Key Set Identifier.		X
~~Radio Access Classmark~~MS Radio Access Capability	MS radio access capabilities.	X	
~~SGSN Classmark~~MS Network Capability	MS network capabilities.	X	X
DRX Parameters	Discontinuous reception parameters.	X	
MNRG	Indicates whether activity from the MS shall be reported to the HLR.	X	X
NGAF	Indicates whether activity from the MS shall be reported to the MSC/VLR.	X	X
PPF	Indicates whether paging for PS and CS services can be initiated.	X	X
Subscribed Charging Characteristics	The charging characteristics for the MS, e.g., normal, prepaid, flat-rate, and/or hot billing subscription.	X	X
Trace Reference	Identifies a record or a collection of records for a particular trace.	X	X
Trace Type	Indicates the type of trace.	X	X
Trigger Id	Identifies the entity that initiated the trace.	X	X
Initiating OMC Identity	Indicates the identity of the initiating OMC.	X	X
OMC Identity	Identifies the OMC that shall receive the trace record(s).	X	X
SMS Parameters	SMS-related parameters, e.g., operator-determined barring.	X	X
Recovery	Indicates if HLR or VLR is performing database recovery.	X	X
Radio Priority SMS	The RLC/MAC radio priority level for uplink SMS transmission.	X	
GPRS-CSI	Optional GPRS CAMEL subscription information, see 3G TS 23.016	X	X
Each MM context contains zero or more of the following PDP contexts:			
PDP Context Identifier	Index of the PDP context.	X	X
PDP State	Packet data protocol state, INACTIVE or ACTIVE.	X	X
PDP Type	PDP type, e.g., X.25, PPP, or IP.	X	X
PDP Address	PDP address, e.g., an X.121 address.	X	X
APN Subscribed	The APN received from the HLR.	X	X
APN in Use	The APN currently used.	X	X
NSAPI	Network layer Service Access Point Identifier.	X	X
TI	Transaction Identifier.	X	X
TEID for Gn/Gp	Tunnel Endpoint Identifier for the Gn and Gp interfaces.	X	X

TEID for Iu	Tunnel Endpoint Identifier for the Iu interface.		X
GGSN Address in Use	The IP address of the GGSN currently used.	X	X
VPLMN Address Allowed	Specifies whether the MS is allowed to use the APN in the domain of the HPLMN only, or additionally the APN in the domain of the VPLMN.	X	X
QoS Profile Subscribed	The quality of service profile subscribed.	X	X
QoS Profile Requested	The quality of service profile requested.	X	X
QoS Profile Negotiated	The quality of service profile negotiated.	X	X
Radio Priority	The RLC/MAC radio priority level for uplink user data transmission.	X	
Packet Flow Id	Packet flow identifier.	X	
Send N-PDU Number	SNDCP sequence number of the next downlink N-PDU to be sent to the MS.	X	
Receive N-PDU Number	SNDCP sequence number of the next uplink N-PDU expected from the MS.	X	
GTP-SND	GTP-U sequence number of the next downlink N-PDU to be sent to the MS.	X	X
GTP-SNU	GTP-U sequence number of the next uplink N-PDU to be sent to the GGSN.	X	X
RLC-SND	The next in-sequence RLC sequence number to be sent to the MS.		X
RLC-SNU	The next in-sequence RLC sequence number expected from the MS.		X
Charging Id	Charging identifier, identifies charging records generated by SGSN and GGSN.	X	X
RNC Address in Use	The IP address of the RNC currently used.		X

In case of anonymous access (GPRS only) the SGSN maintains the MM context and PDP context information for MSs in READY state. Table 2 shows the context fields for one MS.

Table 2: SGSN MM and PDP Contexts for Anonymous Access

Field	Description
A-TLLI	Auxiliary Temporary Logical Link Identity.
AA-TEID	Anonymous Access Tunnel Endpoint Identifier.
Routeing Area	Current routeing area.
Cell Identity	Current cell.
PDP Type	PDP type, e.g., X.25, PPP, or IP.
PDP Address	PDP address, e.g., an X.121 address.
APN in Use	The APN currently used.
NSAPI	Network layer Service Access Point Identifier.
TI	Transaction Identifier.
GGSN Address in Use	The IP address of the GGSN currently used.
QoS Profile Requested	The quality of service profile requested.
QoS Profile Negotiated	The quality of service profile negotiated.
Radio Priority	The RLC/MAC radio priority level for uplink user data transmission.
Packet Flow Id	Packet flow identifier.
Send N-PDU Number	SNDCP sequence number of the next downlink N-PDU to be sent to the MS.
Receive N-PDU Number	SNDCP sequence number of the next uplink N-PDU expected from the MS.
GTP-SND	GTP sequence number of the next downlink N-PDU to be sent to the MS.
GTP-SNU	GTP sequence number of the next uplink N-PDU to be sent to the GGSN.
Charging Id	Charging identifier, identifies charging records generated by SGSN and GGSN.

13.4 MS

Each packet domain MS maintains MM and PDP context information in IDLE, STANDBY, READY, PMM-DETACHED, PMM-IDLE, and PMM-CONNECTED states. The information may be contained in the MS and the TE. Table 3 shows the MS context fields.

Table 3: MS MM and PDP Contexts

Field	SIM	Description	GSM~~P~~ ~~RS~~	UMTS
IMSI	G, U	International Mobile Subscriber Identity.	X	X
MM State		Mobility management state, IDLE, STANDBY, READY, PMM-DETACHED, PMM-IDLE, or PMM-CONNECTED.	X	X
P-TMSI	G, U	Packet Temporary Mobile Subscriber Identity.	X	X
P-TMSI Signature	G, U	A signature used for identification checking purposes.	X	X
Routeing Area	G, U	Current routeing area.	X	X
Cell Identity		Current cell.	X	
Kc	G	Current GPRS ciphering key.	X	
CKSN / KSI	G, U	Key Set Identifier for IK Next, CK Next, and Kc.	X	X
Ciphering algorithm		Selected ciphering algorithm.	X	X
CK		Currently used ciphering key.		X
CK Next	U	UMTS ciphering key to be used after the next security mode command.		X
IK		Currently used integrity key.		X
IK Next	U	Integrity key to be used after the next security mode command.		X
MS Radio Access Capability		MS Radio Capabilities.	X	
UE Capability		UE Capabilities.		X
~~Classmark~~MS Netw Capabilty		~~MS Classmark.~~MS network capabilities.	X	X
DRX Parameters		Discontinuous reception parameters.	X	X
Radio Priority SMS		The RLC/MAC radio priority level for uplink SMS transmission.	X	
Each MM context contains zero or more of the following PDP contexts:				
PDP Type		PDP type, e.g., X.25, PPP, or IP.	X	X
PDP Address		PDP address, e.g., an X.121 address.	X	X
PDP State		Packet data protocol state, INACTIVE or ACTIVE.	X	X
Dynamic Address Allowed		Specifies whether the MS is allowed to use a dynamic address.	X	X
APN Requested		The APN requested.	X	X
NSAPI		Network layer Service Access Point Identifier.	X	X
TI		Transaction Identifier.	X	X
QoS Profile Requested		The quality of service profile requested.	X	X
QoS Profile Negotiated		The quality of service profile negotiated.	X	X
TFT		Traffic flow template.	X	X
Radio Priority		The RLC/MAC radio priority level for uplink user data transmission.	X	
Packet Flow Id		Packet flow identifier.	X	
Send N-PDU Number		SNDCP sequence number of the next uplink N-PDU to be sent to the SGSN.	X	X
Receive N-PDU Number		SNDCP sequence number of the next downlink N-PDU expected from the SGSN.	X	X
RLC-SND		The next in-sequence RLC sequence number expected from the RNC.		X
RLC-SNU		The next in-sequence RLC sequence number to be sent to the RNC.		X

The information marked with a "U" in Table 3 shall be stored in the USIM.

The information marked with a "G" in Table 3:

- shall be stored in the GSIM if the connected SIM is PS-aware; and
- may be stored in the ME after PS detach if the connected GSIM is not PS-aware.

If the GSIM is packet domain service-aware, then the IMSI, P-TMSI, P-TMSI Signature, Routeing Area, Kc, and CKSN stored in the GSIM shall be used for packet domain services.

If the GSIM is not packet domain service-aware, then the P-TMSI, P-TMSI Signature, Routeing Area, Kc, and CKSN stored in the ME shall be used if and only if the IMSI stored in the GSIM is identical to the IMSI image maintained in the ME. If the IMSI stored in the GSIM is different from the IMSI image in the ME, then the IMSI image in the ME shall not be used, and the MS shall identify itself with the IMSI stored in the SIM when performing a PS attach. IMSI, P-TMSI, P-TMSI Signature, Routeing Area, Kc, and CKSN may be stored in the ME after the PS attach has been successfully performed.

When using a USIM, the IMSI, P-TMSI, P-TMSI Signature, Routeing Area, Kc, CK Next, IK Next, and CKSN / KSI stored in the USIM, and the CK and IK stored in the ME, shall be used for packet domain services.

For anonymous access (GPRS only) each GPRS MS maintains MM and PDP context information in READY state. The information may be contained in the ME and the TE. Table 4 shows the MS context fields.

Table 4: MS MM and PDP Contexts for Anonymous Access

Field	Description
A-TLLI	Auxiliary Temporary Logical Link Identity.
Routeing Area	Current routeing area.
Cell Identity	Current cell.
PDP Type	PDP type, e.g., X.25, PPP, or IP.
PDP Address	PDP address, e.g., an X.121 address.
NSAPI	Network layer Service Access Point Identifier.
TI	Transaction Identifier.
APN Requested	The APN requested.
QoS Profile Requested	The quality of service profile requested.
QoS Profile Negotiated	The quality of service profile negotiated.
Radio Priority	The RLC/MAC radio priority level for uplink user data transmission.
Packet Flow Id	Packet flow identifier.
Send N-PDU Number	SNDCP sequence number of the next uplink N-PDU to be sent to the SGSN.
Receive N-PDU Number	SNDCP sequence number of the next downlink N-PDU expected from the SGSN.

13.5 MSC/VLR

The MSC/VLR may store the SGSN number of PS-attached MSs that are also CS-attached. Table 5 shows the MSC/VLR association for one MS.

Table 5: MSC/VLR Association

Field	Description	GSM~~P RS~~	UMTS
IMSI	IMSI is the main reference key.	X	X
SGSN Number	The SGSN number of the SGSN currently serving this MS.	X	X

13.6 BSS for GPRS

Table 6 shows the BSS context fields for one MS.

Table 6: BSS Context

Field	Description
IMSI	IMSI is the main reference key.
TLLI	Temporary Logical Link Identity.
Trace Reference	Identifies a record or a collection of records for a particular trace.
Trace Type	Indicates the type of trace.
Trigger Id	Identifies the entity that initiated the trace.
Initiating OMC Identity	Indicates the identity of the initiating OMC.
OMC Identity	Identifies the OMC that shall receive the trace record(s).
Each BSS context contains one or more BSS Packet Flow contexts:	
Packet Flow Id	Packet flow identifier.
Aggregate BSS QoS Profile Negotiated	The aggregate BSS quality of service profile negotiated for this packet flow.
BSS Packet Flow Timer	BSS packet flow context inactivity timer.

The BSS may store BSS contexts also in the anonymous access case. Table 7 shows the BSS context fields for one MS.

Table 7: BSS Context for Anonymous Access

Field	Description
A-TLLI	Auxiliary Temporary Logical Link Identity.
Packet Flow Id	Packet flow identifier.
Aggregate BSS QoS Profile Negotiated	The aggregate BSS quality of service profile negotiated for this packet flow.
BSS Packet Flow Timer	BSS packet flow context inactivity timer.

13.7 RNC for UMTS

RNC maintains RNC Context for CN-related information in PMM-CONNECTED state. RNC also contains RNC RAB contexts for activated RABs. Table 8 shows the context fields for one MS.

Table 8: RNC Context

Field	Description
IMSI	IMSI is the main reference key.
UE Capability	UE Capabilities
Trace Reference	Identifies a record or a collection of records for a particular trace.
Trace Type	Indicates the type of trace.
Trigger Id	Identifies the entity that initiated the trace.
Initiating OMC Identity	Indicates the identity of the initiating OMC.
OMC Identity	Identifies the OMC that shall receive the trace record(s).
Each RNC context contains zero or more RNC RAB contexts:	
NSAPI	Network layer Service Access Point Identifier.
TEID	Tunnel Endpoint Identifier
GGSN Address in Use	The IP address of the SGSN currently used.
QoS Profile Negotiated	The quality of service profile negotiated for this RAB.
GTP-SND	GTP-U sequence number of the next downlink in-sequence N-PDU to be sent to the MS.
GTP-SNU	GTP-U sequence number of the next uplink in-sequence N-PDU to be sent to the GGSN.
RLC-SND	The next in-sequence RLC Sequence number to be sent to the MS
RLC-SNU	The next in-sequence RLC Sequence Number expected from the MS

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***Document* S2-000478**
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

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

23.060	CR	143	Current Version:	3.2.1

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

For submission to:	SA #7	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic		

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

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

Source: Siemens **Date:** 2000-03-06

Subject: Clarification of inter SGSN intersystem change to UMTS

Work item: Release 99

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

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

Reason for change: The conditions described for GPRS to UMTS intersystem change are not precise. The establishment of the RABs is only needed if the MS was in GPRS state READY. Therefore, the RAB establishment should be triggered by the Service Request procedure if needed.
The procedure is adapted accordingly.

Clauses affected: 6.13.2.2

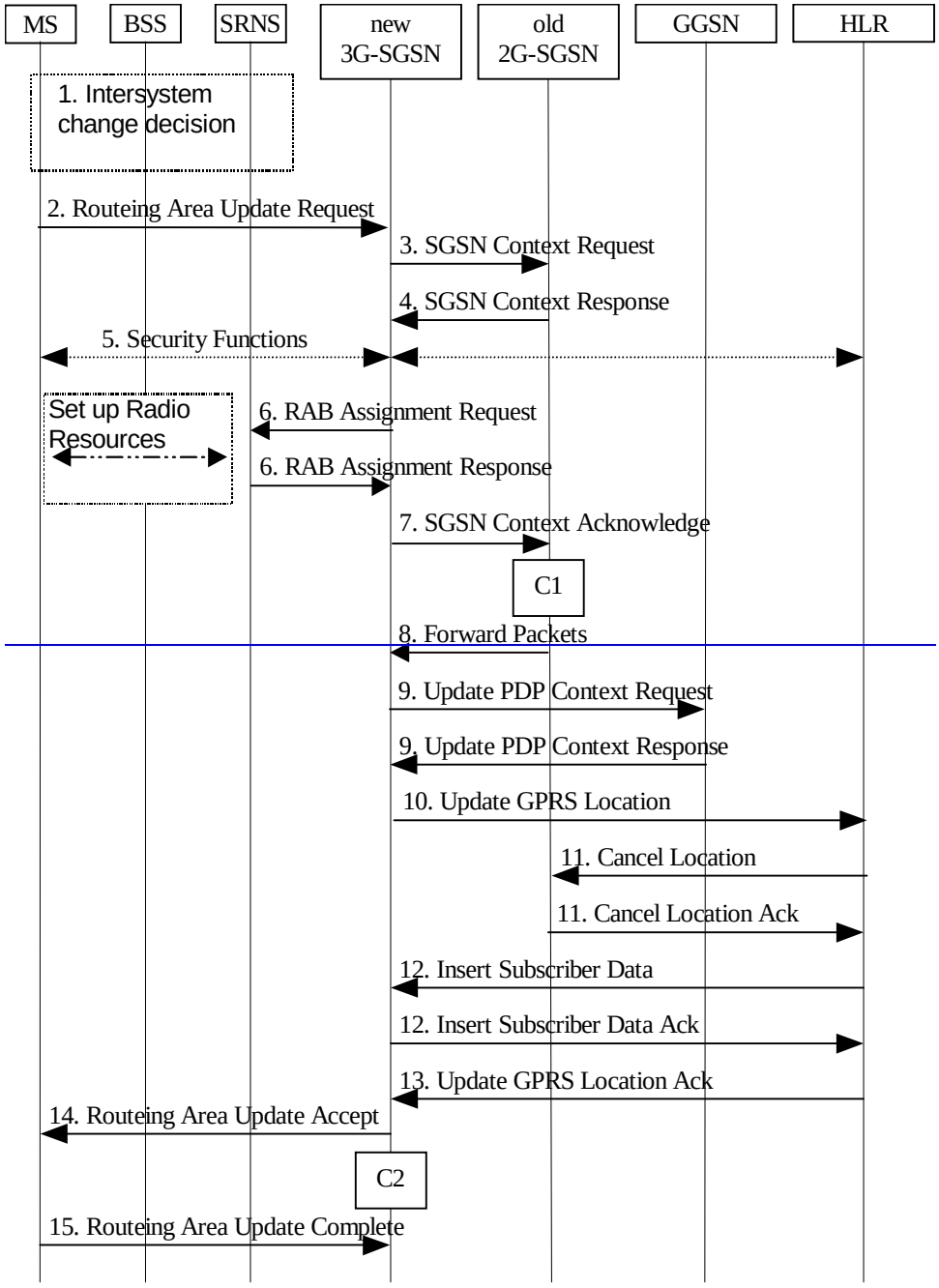
Other specs affected:

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

Other comments:

6.13.2.2 GPRS to UMTS Inter SGSN Change

The intersystem change from GPRS to UMTS takes place when a PS-attached MS changes from GSM radio access to UTRAN and the UTRAN node serving the MS is served by a different SGSN.~~moves to a new UMTS cell.~~ In this case the RA changes. Therefore, the MS shall initiate a UMTS RA update procedure by establishing a RRC connection and initiating the RA update procedure. The sequence applied for this~~e~~ inter SGSN RA update case is shown in the following figure z.


MS
BSS
SRNS
new 3G-SGSN
old 2G-SGSN
GGSN
HLR
1. Intersystem change decision
2. Routeing Area Update Request
3. SGSN Context Request
4. SGSN Context Response
5. Security Functions
Set up Radio Resources
6. RAB Assignment Request
6. RAB Assignment Response
7. SGSN Context Acknowledge
C1
8. Forward Packets
9. Update PDP Context Request
9. Update PDP Context Response
10. Update GPRS Location
11. Cancel Location
11. Cancel Location Ack
12. Insert Subscriber Data
12. Insert Subscriber Data Ack
13. Update GPRS Location Ack
14. Routeing Area Update Accept
C2
15. Routeing Area Update Complete

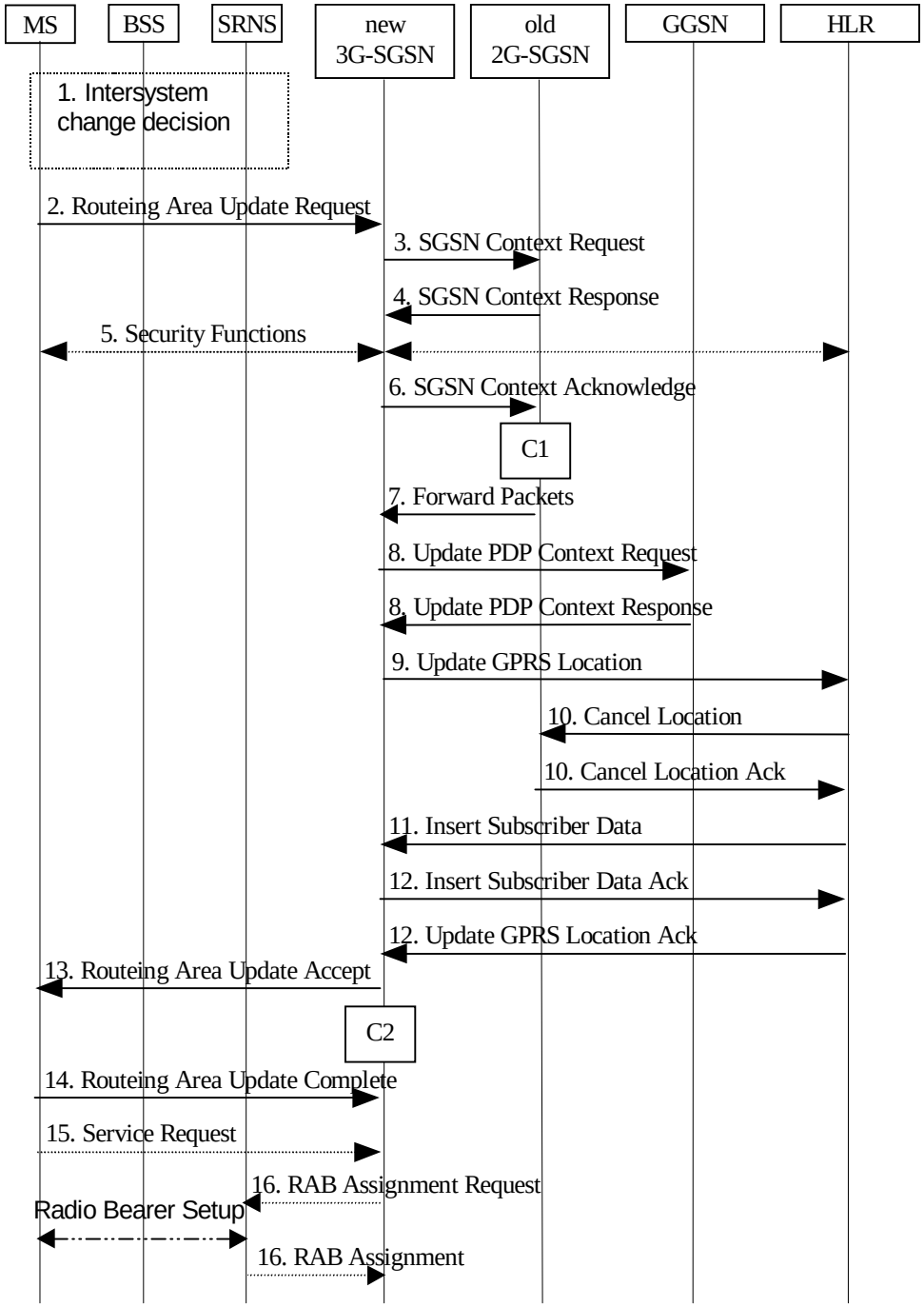


Figure 1: GPRS to UMTS Inter SGSN Change

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

2) The MS sends a Routeing Area Update Request (P-TMSI, old RAI, old P-TMSI Signature, Update Type, CM) message to the new 3G-SGSN. The SRNS shall add the cell [FFS] of the area where the message was received before passing the message to the 3G-SGSN.

3) The new 3G-SGSN uses the old RAI received from the MS to derive the old 2G-SGSN address, and sends an SGSN Context Request (old RAI, old P-TMSI, New SGSN Address) message to the 2G-SGSN to get the MM and PDP contexts for the MS. The old 2G-SGSN starts a timer and stops the transmission of N-PDUs to the MS.

4) The old 2G-SGSN responds with an SGSN Context Response (MM Context, PDP Contexts) message. Each PDP Context includes the GTP sequence number for the next downlink N-PDU to be sent to the MS

and the GTP sequence number for the next uplink N-PDU to be tunnelled to the GGSN. Each PDP Context also includes the SNDCP Send N-PDU Number for the next downlink N-PDU to be sent in acknowledged mode to the MS and the SNDCP Receive N-PDU Number for the next uplink N-PDU to be received in acknowledged mode from the MS. The new 3G-SGSN shall use the GTP sequence numbers for in-sequence delivery over the Iu interface. The new 3G-SGSN converts the SNDCP sequence numbers to RLC sequence numbers by shifting them left 4 times.

5) ~~5)~~ Security functions may be executed.

~~6) The new 3G-SGSN requests the SRNS to establish a radio access bearer by sending a RAB Assignment Request (GTP-SNDs, GTP-SNUs, RLC-SNDs, RLC-SNUs) message to the SRNS. The SRNS sends a Radio Bearer Setup Request (RLC-SNUs) message to the MS. The MS responds with a Radio Bearer Setup Complete (RLC-SNDs) message. The SRNS responds with a RAB Assignment Response message. The SRNS shall discard all N-PDUs tunnelled from the SGSN with N-PDU sequence numbers older than the RLC-SNDs received from the MS. If this is not the case the N-PDU shall be transmitted to the MS. The MS shall discard all N-PDUs with sequence numbers older than the RLC-SNUs received from the SRNS. If this is not the case, the N-PDU shall be transmitted to the SRNS.~~

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

7) ~~8)~~ The old 2G-SGSN duplicates the buffered N-PDUs and starts tunnelling them to the new 3G-SGSN. Additional N-PDUs received from the GGSN before the timer described in step 3 expires are also duplicated and tunnelled to the new 3G-SGSN. No N-PDUs shall be forwarded to the new 3G-SGSN after expiry of the timer described in step 3.

8) ~~9)~~ The new 3G-SGSN sends an Update PDP Context Request (new SGSN Address, TEID, QoS Negotiated) message to each GGSN concerned. Each GGSN updates its PDP context fields and return an Update PDP Context Response (TEID) message.

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

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

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

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

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

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

15) If the MS was in GPRS MM state READY it sends a Service Request (P-TMSI, P-TMSI Signature, 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.

16) If the MS has send the Service Request the new 3G-SGSN requests the SRNS to establish a radio access bearer by sending a RAB Assignment Request (GTP-SNDs, GTP-SNUs, RLC-SNDs, RLC-SNUs)

message to the SRNS. The SRNS sends a Radio Bearer Setup Request (RLC-SNUs) message to the MS. The MS responds with a Radio Bearer Setup Complete (RLC-SNDs) message. The SRNS responds with a RAB Assignment Response message. The SRNS shall discard all N-PDUs tunnelled from the SGSN with N-PDU sequence numbers older than the RLC-SNDs received from the MS. If this is not the case the N-PDU shall be transmitted to the MS. The MS shall discard all N-PDUs with sequence numbers older than the RLC-SNUs received from the SRNS. If this is not the case, the N-PDU shall be transmitted to the SRNS.

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

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

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