3GPP TSG CN Plenary **Tdoc NP-010125**
Meeting #11, Palm Springs, U.S.A
14th - 16th March 2001

Source: **TSG CN WG1**

Title: **CRs to R97 on Work Item GPRS**

Agenda item: **7.13**

Document for: **APPROVAL**

Introduction:

This document contains **4** CRs on **R97** Work Item **"GPRS"**, that have been agreed by **TSG CN WG1**, and are forwarded to TSG CN Plenary meeting #11 for approval.

Spec	CR	Re	Doc-2nd-Level	Phase	Subject	Cat	Ver_C
04.08	A1077		N1-010134	R97	Using RAU procedure for MS RAC IE update	F	6.13.0
04.08	A1079		N1-010135	R98	Using RAU procedure for MS RAC IE update	A	7.10.0
24.008	357		N1-010136	R99	Using RAU procedure for MS RAC IE update	A	3.6.0
24.008	358		N1-010137	Rel-4	Using RAU procedure for MS RAC IE update	A	4.1.1

3GPP TSG CN1#15
Beijing, China 15-19 January, 2001

Document N1-010134
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

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04.08	CR	A1077	Current Version:	6.13.0

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

For submission to:	TSGN #11	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic	X	

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

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

Source: Nokia **Date:** 8.1.2001

Subject: Using RAU procedure for MS RAC IE update

Work item: GPRS

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	X
	C	Functional modification of feature			Release 98	
	D	Editorial modification			Release 99	
					Release 00	

Reason for change:

During the GPRS connection (i.e. when GPRS attached), there might be need to update the network with new MS Radio Access Capability IE information e.g., change of multislot class or power class. However, there is not defined any MS RAC change procedure for GPRS similar to the circuit-switched classmark change procedure. Without MS RAC change procedure between MS and SGSN, the MS has to make GPRS Detach and GPRS Attach (with PDP context deactivation and activation) in order to update the SGSN with new MS RAC.

It has been mentioned in 3GPP 03.60 (see below) that the SGSN has to provide the BSS with **the most recent** MS RAC received from the MS. This implicates that the SGSN has to cope with the situation when the MS sends new changed MS RAC IE during the GPRS connection.

3GPP 03.60 v.6.7.0:

"6.11.1 Radio Access Classmark

The radio access classmark contains the 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 radio access classmark is a container for a multiplicity of radio access technology-dependent information, i.e. within the radio access classmark 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 radio classmark does not need to be interpreted by the NSS, and the full radio classmark 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 radio access classmark as an information element on the Gb interface. **It is the responsibility of the SGSN to provide the BSS with the most recent classmark received from the MS.** The classmark information element can be included in a downlink transfer request, or be sent in a specific message that updates the radio classmark information in the BSS. The BSS may at any time request the radio classmark for a given MS to

be transmitted from the SGSN to the BSS.

A specific optimisation allows the BSS to receive a reduced radio access classmark at initial access directly from the MS. This enables the BSS not to wait for the full radio access classmark to be provided by the SGSN, and is therefore quicker for the initial MS-originated transmission. The reduced classmark can be carried is 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 04.08 and GSM 04.60. "

MS RAC is sent to the SGSN in GPRS Attach and Routing Area Update procedures and to the BSS in second phase of two phase access procedure. Since it is not defined shall the MS send same RAC information in the two phase access procedure as was sent in GPRS Attach or RAU, the two phase access procedure could be used to update the MS RAC information to the BSS. However, there is not any MS RAC update procedure from the BSS to the SGSN. Therefore, BSS and SGSN could have different MS RAC IE for same mobile and radio resource allocation would not be possible.

It is proposed that the MS can use the existing Routing Area Update procedure to send the new MS RAC IE to the SGSN also when Routing Area Update procedure would not be normally needed. SGSN shall convey that information to BSS using already existing procedures i.e. including MS RAC into BSSGP DL Data PDU or sending the RA_Capability_PDU to the BSS. RA_Capability_PDU is already existing procedure used to update the BSS with new MS RAC information.

There is no need to define new "Update Type" in Routing Area Update Request message but the "Normal Routing Area Update" update type can be used.

Clauses affected: 4.7.5, 4.7.5.1, 4.7.5.2.1

Other specs affected:			
	Other 3G core specifications		→ List of CRs:
	OtherGSM 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:

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

4.7.5 Routing area updating procedure

This procedure is used for:

- normal routing area updating to update the registration of the actual routing area of an MS in the network. This procedure is used by GPRS MSs in MS operation mode C and by GPRS MSs in MS operation modes A or B that are IMSI attached for GPRS and non-GPRS services if the network operates in network operation mode II or III;

- combined routing area updating to update the registration of the actual routing and location area of an MS in the network. This procedure is used by GPRS MSs in MS operation modes A or B that are IMSI attached for GPRS and non-GPRS services provided that the network operates in network operation mode I; or

- periodic routing area updating. This procedure is used by GPRS MSs in MS operation mode C and by GPRS MSs in MS operation modes A or B that are IMSI attached for GPRS or for GPRS and non-GPRS services independent of the network operation mode;

- IMSI attach for non-GPRS services when the MS is IMSI attached for GPRS services. This procedure is used by GPRS MSs in MS operation modes A or B, if the network operates in network operation mode I.

- —resuming GPRS services when the RR sublayer indicated a resumption failure after dedicated mode was left, see section 3.4.13.1.1.

- updating the network with the new MS Radio Access Capability IE when the content of the IE has changed. Normal or combined routing area updating procedure is used.

Section 4.7.5.1 describes the routing area updating procedures for updating the routing area only. The combined routing area updating procedure used to update both the routing and location area is described in section 4.7.5.2.

The routing area updating procedure is always initiated by the MS. It is only invoked in state GMM-REGISTERED.

To limit the number of subsequently rejected routing area update attempts, a routing area updating attempt counter is introduced. The routing area updating attempt counter shall be incremented as specified in section 4.7.5.1.5. Depending on the value of the routing area updating attempt counter, specific actions shall be performed. The routing area updating attempt counter shall be reset when:

- a GPRS attach procedure is successfully completed; or

- a routing area updating procedure is successfully completed;

and additionally when the MS is in substate ATTEMPTING-TO-UPDATE:

- a new routing area is entered;

- expiry of timer T3302; or

- at request from registration function.

The mobile equipment shall contain a list of “forbidden location areas for roaming”, as well as a list of “forbidden location areas for regional provision of service”. The handling of these lists is described in section 4.4.1.

User data transmission in the MS shall be suspended during the routing area updating procedure; user data reception shall be possible. User data transmission in the network shall be suspended during the routing area updating procedure, if a new P-TMSI is assigned.

4.7.5.1 Normal and periodic routing area updating procedure

Periodic routing area updating is used to periodically notify the availability of the MS to the network. The value of the update type IE in the ROUTING AREA UPDATE REQUEST message shall indicate “periodic updating”. The procedure is controlled in the MS by timer T3312. When timer T3312 expires, the periodic routing area updating procedure is started. Start and reset of timer T3312 is described in section 4.7.2.2.

The normal routing area updating procedure is initiated when the MS detects a change of the routing area in state GMM-REGISTERED, or when the MS determines that GPRS resumption shall be performed or when the MS needs to update the network with the new MS Radio Access Capability IE. The ROUTING AREA UPDATE REQUEST message shall always be the first data sent by the MS when a routing area border is crossed. The routing area

identification is broadcast on the broadcast channel(s). A normal routing area updating shall abort any ongoing GMM procedure. Aborted GMM procedures shall be repeated after the normal routing area updating procedure has been successfully performed. The value of the update type IE included in the message shall indicate “normal routing area updating”.

********** Next modified section **********

4.7.5.2 Combined routing area updating procedure

Within a combined routing area updating procedure the messages ROUTING AREA UPDATE ACCEPT and ROUTING AREA UPDATE COMPLETE carry information for the routing area updating and the location area updating.

4.7.5.2.1 Combined routing area updating procedure initiation

The combined routing area updating procedure is initiated only by a GPRS MS operating in MS operation modes A or B, if the MS is in state GMM-REGISTERED and if the network operates in network operation mode I:

- when a GPRS MS that is IMSI attached for GPRS and non-GPRS services detects a change of the routing area in state GMM-REGISTERED and MM-IDLE;
- when a GPRS MS that is IMSI attached for GPRS services wants to perform an IMSI attach for non-GPRS services;
- after termination of a non-GPRS service via non-GPRS channels to update the association if the MS has changed the LA during that non-GPRS service transaction;~~ or~~
- ~~—~~after a CM SERVICE REJECT message with cause value #4 is received by the mobile station (see section 4.5.1.1), in which case the update type IE shall be set to "Combined RA/LA updating with IMSI attach"~~.~~; or
- when a GPRS MS needs to update the network with the new MS Radio Access Capability IE.

The routing and location area identification are broadcast on the broadcast channel(s). A combined routing area updating procedure shall abort any ongoing GMM procedure. Aborted GMM procedures shall be repeated after the combined routing area updating procedure has been successfully performed. The ROUTING AREA UPDATE REQUEST message shall always be the first message sent from the MS in the new routing area after routing area change.

To initiate a combined routing area updating procedure the MS sends the message ROUTING AREA UPDATE REQUEST to the network, starts timer T3330 and changes to state GMM-ROUTING-UPDATING-INITIATED and MM LOCATION UPDATING PENDING. The value of the update type IE in the message shall indicate “combined RA/LA updating”. If for the last attempt to update the registration of the location area a MM specific procedure was performed, the value of the update type IE in the ROUTING AREA UPDATE REQUEST message shall indicate “combined RA/LA updating with IMSI attach”. Furthermore the MS shall include the TMSI status IE if no valid TMSI is available.A GPRS MS in MS operation modes A or B that is in an ongoing circuit-switched transaction, shall initiate the combined routing area updating procedure after the circuit-switched transaction has been released, if the MS has changed the RA during the circuit-switched transaction and if the network operates in network operation mode I.

A GPRS MS in MS operation mode A shall initiate the combined routing area updating procedure with IMSI attach after the circuit-switched transaction has been released if a GPRS attach was performed during the circuit-switched transaction and provided that the network operates in network operation mode I.

A GPRS MS in MS operation mode A shall perform the normal routing area update procedure during an ongoing circuit-switched transaction.

********** Next section attached for information **********

9.4.14 Routing area update request

This message is sent by the MS to the network either to request an update of its location file or to request an IMSI

attach for non-GPRS services. See table 9.4.14/GSM 04.08.

Message type: ROUTING AREA UPDATE REQUEST

Significance: dual

Direction: MS to network

Table 9.4.14/GSM 04.08: ROUTING AREA UPDATE REQUEST message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	½
	Skip indicator	Skip indicator 10.3.1	M	V	½
	Routing area update request message identity	Message type 10.4	M	V	1
	Update type	Update type 10.5.5.18	M	V	½
	GPRS ciphering key sequence number	Ciphering key sequence number 10.5.1.2	M	V	½
	Old routing area identification	Routing area identification 10.5.5.15	M	V	6
	MS Radio Access capability	MS Radio Access capability 10.5.5.12a	M	LV	6 – 13
19	Old P-TMSI signature	P-TMSI signature 10.5.5.8	O	TV	4
17	Requested READY timer value	GPRS Timer 10.5.7.3	O	TV	2
27	DRX parameter	DRX parameter 10.5.5.6	O	TV	3
9-	TMSI status	TMSI status 10.5.5.4	O	TV	1
31	MS network capability	MS network capability 10.5.5.12	O	TLV	3-4

9.4.14.1 Old P-TMSI signature

This IE is included by the MS if it was received from the network in an ATTACH ACCEPT or ROUTING AREA UPDATE ACCEPT message.

9.4.14.2 Requested READY timer value

This IE may be included if the MS wants to indicate a preferred value for the READY timer.

9.4.14.3 DRX parameter

This IE may be included if the MS wants to indicate new DRX parameters.

9.4.14.4 TMSI status

This IE shall be included if the MS performs a combined routing area update and no valid TMSI is available.

9.4.14.15 MS network capability

This IE shall be included by the MS to indicate it's capabilities to the network, if the MS supports in addition to GEA/1 at least one of the GPRS Encryption Algorithm GEA/2 to GEA/7.

********** Next section attached for information **********

10.5.5.12a MS Radio Access capability

The purpose of the *MS RA capability* information element is to provide the radio part of the network with information concerning radio aspects of the mobile station. The contents might affect the manner in which the network handles the operation of the mobile station.

The *MS RA capability* is a type 4 information element, with a minimum length of 6 octets and a maximum length of 14 octets.

The value part of a *MS RA capability* information element is coded a shown table 10.5.146/GSM 04.08.

- SEMANTIC RULE : Among the three Access Type Technologies GSM 900-P, GSM 900-E and GSM 900-R only one shall be present.
- Error handling : If a received Access Technology Type is unknown to the receiver, it shall ignore all the corresponding fields;
- If within a known Access Technology Type a receiver recognizes an unknown field it shall ignore it.
- See more details about error handling of MS radio access capability in TS GSM 08.18.

Table 10.5.146/GSM 04.08: *Mobile Station Radio Access Capability* Information Element

< MS Radio Access capability IE > ::=
<**MS Radio Access capability IEI** : 00100100 >
<**Length of MS RA capability**: <octet>> -- *length in octets of MS RA capability value part and spare bits*
<**MS RA capability value part** : < MS RA capability value part struct >>
<spare bits>**; -- *may be used for future enhancements*

<MS RA capability value part struct >::= --*recursive structure allows any number of Access technologies*
< **Access Technology Type**: bit (4) >
< **Access capabilities** : <Access capabilities struct> >
{ 0 | 1 <MS RA capability value part struct> } ;

< Access capabilities struct > ::=
< **Length** : bit (7) > -- length in bits of Content and spare bits
<Access capabilities : <Content>>
<spare bits>** ; -- expands to the indicated length
-- may be used for future enhancements

< Content > ::=
< **RF Power Capability** : bit (3) >
{ 0 | 1 <**A5 bits** : <A5 bits> > } -- *zero means that the same values apply for parameters as in the immediately preceeding Access capabilities field within this IE*
-- *The presence of the A5 bits is mandatory in the 1st Access capabilies struct within this IE.*
< **ES IND** : bit >
< **PS** : bit >
< **VGCS** : bit >
< **VBS** : bit >
{ 0 | 1 < **Multislot capability** : Multislot capability struct > } ; -- *zero means that the same values apply for multislot parameters as in the immediately preceeding Access capabilities field within this IE.*
-- *The presence of the Multislot capability struct is mandatory in the 1st Access capabilies struct within this IE.*

< Multislot capability struct > ::=
{ 0 | 1 < **HSCSD multislot class** : bit (5) > }
{ 0 | 1 < **GPRS multislot class** : bit (5) > < **GPRS Extended Dynamic Allocation Capability** : bit > }
{ 0 | 1 < **SMS_VALUE** : bit (4) > < **SM_VALUE** : bit (4) > } ;

<A5 bits> ::= < A5/1 : bit> <A5/2 : bit> <A5/3 : bit> <A5/4 : bit> <A5/5 : bit> <A5/6 : bit> <A5/7 : bit>; -- bits for circuit mode ciphering algorithms

Table 10.5.146/GSM 04.08 (continued): *Mobile Station Radio Access Capability* Information Element

Access Technology Type
This field indicates the access technology type to be associated with the following access capabilities.

Bits
4 3 2 1
0 0 0 0 GSM P
0 0 0 1 GSM E *--note that GSM E covers GSM P*
0 0 1 0 GSM R *--note that GSM R covers GSM E and GSM P*
0 0 1 1 GSM 1800
All other values are treated as unknown by the receiver.

RF Power Capability
This field is coded as radio capability in Classmark 3 for the indicated band: it contains the binary coding of he power class associated (see GSM 05.05 paragraph 4.1 output power and paragraph 4.1.1 Mobile Station).

A5/1
0 encryption algorithm A5/1 not available
1 encryption algorithm A5/1 available
A5/2
0 encryption algorithm A5/2 not available
1 encryption algorithm A5/2 available
A5/3
0 encryption algorithm A5/3 not available
1 encryption algorithm A5/3 available
A5/4
0 encryption algorithm A5/4 not available
1 encryption algorithm A5/4 available
A5/5
0 encryption algorithm A5/5 not available
1 encryption algorithm A5/5 available
A5/6
0 encryption algorithm A5/6 not available
1 encryption algorithm A5/6 available
A5/7
0 encryption algorithm A5/7 not available
1 encryption algorithm A5/7 available

.

ES IND – (Controlled early Classmark Sending)
0 "controlled early Classmark Sending" option is not implemented
1 "controlled early Classmark Sending" option is implemented

PS – (Pseudo Synchronisation)
0 PS capability not present
1 PS capability present

VGCS – (Voice Group Call Service)
0 no VGCS capability or no notifications wanted
1 VGCS capability and notifications wanted

VBS – (Voice Broadcast Service)
0 no VBS capability or no notifications wanted
1 VBS capability and notifications wanted

Table 10.5.146/GSM 04.08 (concluded): *Mobile Station Radio Access Capability* Information Element

HSCSD Multi Slot Class
The Multi Slot Class field is coded as the binary representation of the multislot class defined in TS GSM 05.02. Range 1 to 18, all other values are reserved.

GPRS Multi Slot Class
The GPRS Multi Slot Class field is coded as the binary representation of the multislot class defined in TS GSM 05.02.

GPRS Extended Dynamic Allocation Capability
0 Extended Dynamic Allocation Capability for GPRS is not implemented
1 Extended Dynamic Allocation Capability for GPRS is implemented

< MS Measurement capability > ::=

< **SMS_VALUE** : bit (4) >

< **SM_VALUE** : bit (4) > ;

SMS_VALUE (Switch-Measure-Switch) (4 bit field)
The SMS field indicates the time needed for the mobile station to switch from one radio channel to another, perform a neighbor cell power measurement, and the switch from that radio channel to another radio channel.

Bits
4 3 2 1

0 0 0 0 1/4 timeslot (~144 microseconds)
0 0 0 1 2/4 timeslot (~288 microseconds)
0 0 1 0 3/4 timeslot (~433 microseconds)
. . .
1 1 1 1 16/4 timeslot (~2307 microseconds)

(SM_VALUE) Switch-Measure (4 bit field)
The SM field indicates the time needed for the mobile station to switch from one radio channel to another and perform a neighbor cell power measurement.

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

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04.08	CR	A1079	Current Version:	7.10.0

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

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list expected approval meeting # here ↑		for information		non-strategic	X	

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

Source:	Nokia
Date:	8.1.2001
Subject:	Using RAU procedure for MS RAC IE update
Work item:	GPRS

Category: *(only one category shall be marked with an X)*				**Release:**		
F	Correction			Phase 2	
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There is no need to define new "Update Type" in Routing Area Update Request message but the "Normal Routing Area Update" update type can be used.

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- a routing area updating procedure is successfully completed;

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- a new routing area is entered;

- expiry of timer T3302; or

- at request from registration function.

The mobile equipment shall contain a list of “forbidden location areas for roaming”, as well as a list of “forbidden location areas for regional provision of service”. The handling of these lists is described in section 4.4.1.

User data transmission in the MS shall be suspended during the routing area updating procedure; user data reception shall be possible. User data transmission in the network shall be suspended during the routing area updating procedure, if a new P-TMSI is assigned.

4.7.5.1 Normal and periodic routing area updating procedure

Periodic routing area updating is used to periodically notify the availability of the MS to the network. The value of the update type IE in the ROUTING AREA UPDATE REQUEST message shall indicate “periodic updating”. The procedure is controlled in the MS by timer T3312. When timer T3312 expires, the periodic routing area updating procedure is started. Start and reset of timer T3312 is described in section 4.7.2.2.

The normal routing area updating procedure is initiated when the MS detects a change of the routing area in state GMM-REGISTERED or when the MS determines that GPRS resumption shall be performed or when the MS needs to update the network with the new MS Radio Access Capability IE. The ROUTING AREA UPDATE REQUEST message shall always be the first data sent by the MS when a routing area border is crossed. The routing area

identification is broadcast on the broadcast channel(s). A normal routing area updating shall abort any ongoing GMM procedure. Aborted GMM procedures shall be repeated after the normal routing area updating procedure has been successfully performed. The value of the update type IE included in the message shall indicate “normal routing area updating”.

********** Next modified section **********

4.7.5.2 Combined routing area updating procedure

Within a combined routing area updating procedure the messages ROUTING AREA UPDATE ACCEPT and ROUTING AREA UPDATE COMPLETE carry information for the routing area updating and the location area updating.

4.7.5.2.1 Combined routing area updating procedure initiation

The combined routing area updating procedure is initiated only by a GPRS MS operating in MS operation modes A or B, if the MS is in state GMM-REGISTERED and if the network operates in network operation mode I:

- when a GPRS MS that is IMSI attached for GPRS and non-GPRS services detects a change of the routing area in state GMM-REGISTERED and MM-IDLE;
- when a GPRS MS that is IMSI attached for GPRS services wants to perform an IMSI attach for non-GPRS services;
- after termination of a non-GPRS service via non-GPRS channels to update the association if the MS has changed the LA during that non-GPRS service transaction; ~~or~~
- ~~—~~after a CM SERVICE REJECT message with cause value #4 is received by the mobile station (see section 4.5.1.1), in which case the update type IE shall be set to "Combined RA/LA updating with IMSI attach"; or~~.~~
- when a GPRS MS needs to update the network with the new MS Radio Access Capability IE.

The routing and location area identification are broadcast on the broadcast channel(s). A combined routing area updating procedure shall abort any ongoing GMM procedure. Aborted GMM procedures shall be repeated after the combined routing area updating procedure has been successfully performed. The ROUTING AREA UPDATE REQUEST message shall always be the first message sent from the MS in the new routing area after routing area change.

To initiate a combined routing area updating procedure the MS sends the message ROUTING AREA UPDATE REQUEST to the network, starts timer T3330 and changes to state GMM-ROUTING-UPDATING-INITIATED and MM LOCATION UPDATING PENDING. The value of the update type IE in the message shall indicate “combined RA/LA updating”. If for the last attempt to update the registration of the location area a MM specific procedure was performed, the value of the update type IE in the ROUTING AREA UPDATE REQUEST message shall indicate “combined RA/LA updating with IMSI attach”. Furthermore the MS shall include the TMSI status IE if no valid TMSI is available.

A GPRS MS in MS operation modes A or B that is in an ongoing circuit-switched transaction, shall initiate the combined routing area updating procedure after the circuit-switched transaction has been released, if the MS has changed the RA during the circuit-switched transaction and if the network operates in network operation mode I.

A GPRS MS in MS operation mode A shall initiate the combined routing area updating procedure with IMSI attach after the circuit-switched transaction has been released if a GPRS attach was performed during the circuit-switched transaction and provided that the network operates in network operation mode I.

A GPRS MS in MS operation mode A shall perform the normal routing area update procedure during an ongoing circuit-switched transaction.

3GPP TSG-CN1 Meeting #15
15-19 January 2001, Beijing, China

Tdoc N1-010137

CR-Form-v3

CHANGE REQUEST

⌘ **24.008** **CR** **358** ⌘ rev ⌘ Current version: **4.1.1** ⌘

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

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

Title:	⌘	Using RAU procedure for MS RAC IE update
Source:	⌘	Nokia
Work item code:	⌘	GPRS
Date:	⌘	14.1.2001
Category:	⌘	**A**
Release:	⌘	Rel-4

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

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

Reason for change: ⌘ During the GPRS connection (i.e. when GPRS attached), there might be need to update the network with new MS Radio Access Capability IE information e.g., change of multislot class or power class. However, there is not defined any MS RAC change procedure for GPRS similar to the circuit-switched classmark change procedure. Without MS RAC change procedure between MS and SGSN, the MS has to make GPRS Detach and GPRS Attach (with PDP context deactivation and activation) in order to update the SGSN with new MS RAC.

It has been mentioned in 3GPP 03.60 (see below) that the SGSN has to provide the BSS with **the most recent** MS RAC received from the MS. This implicates that the SGSN has to cope with the situation when the MS sends new changed MS RAC IE during the GPRS connection.

3GPP 03.60 v.6.7.0:

"6.11.1 Radio Access Classmark

The radio access classmark contains the 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 radio access classmark is a container for a multiplicity of radio access technology-dependent information, i.e. within the radio access classmark 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 radio classmark does not need to be interpreted by the NSS, and the full radio classmark 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 radio access classmark as an information element on the Gb interface. **It is the responsibility of the SGSN to provide the BSS with the most recent classmark received from the MS.** The classmark information element can be included in a downlink transfer request, or be sent in a specific message that updates the radio

	classmark information in the BSS. The BSS may at any time request the radio classmark for a given MS to be transmitted from the SGSN to the BSS. A specific optimisation allows the BSS to receive a reduced radio access classmark at initial access directly from the MS. This enables the BSS not to wait for the full radio access classmark to be provided by the SGSN, and is therefore quicker for the initial MS-originated transmission. The reduced classmark can be carried is 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 04.08 and GSM 04.60. " MS RAC is sent to the SGSN in GPRS Attach and Routing Area Update procedures and to the BSS in second phase of two phase access procedure. Since it is not defined shall the MS send same RAC information in the two phase access procedure as was sent in GPRS Attach or RAU, the two phase access procedure could be used to update the MS RAC information to the BSS. However, there is not any MS RAC update procedure from the BSS to the SGSN. Therefore, BSS and SGSN could have different MS RAC IE for same mobile and radio resource allocation would not be possible. It is proposed that the MS can use the existing Routing Area Update procedure to send the new MS RAC IE to the SGSN also when Routing Area Update procedure would not be normally needed. SGSN shall convey that information to BSS using already existing procedures i.e. including MS RAC into BSSGP DL Data PDU or sending the RA_Capability_PDU to the BSS. RA_Capability_PDU is already existing procedure used to update the BSS with new MS RAC information. There is no need to define new "Update Type" in Routing Area Update Request message but the "Normal Routing Area Update" update type can be used.
Summary of change: ⌘	The usage of RAU procedure is extended to MS RAC information updating.
Consequences if not approved: ⌘	There is no stage 3 procedure to update the MS PS domain capabilities dynamically.

Clauses affected:	⌘	4.7.5, 4.7.5.1, 4.7.5.2.1		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	
Other comments:	⌘			

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://www.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 TSG meetings.

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

4.7.5 Routing area updating procedure

This procedure is used for:

- normal routing area updating to update the registration of the actual routing area of an MS in the network. This procedure is used by GPRS MSs in MS operation mode C and by GPRS MSs in MS operation modes A or B that are IMSI attached for GPRS and non-GPRS services if the network operates in network operation mode II or III;

- combined routing area updating to update the registration of the actual routing and location area of an MS in the network. This procedure is used by GPRS MSs in MS operation modes A or B that are IMSI attached for GPRS and non-GPRS services provided that the network operates in network operation mode I; or

- periodic routing area updating. This procedure is used by GPRS MSs in MS operation mode C and by GPRS MSs in MS operation modes A or B that are IMSI attached for GPRS or for GPRS and non-GPRS services independent of the network operation mode;

- IMSI attach for non-GPRS services when the MS is IMSI attached for GPRS services. This procedure is used by GPRS MSs in MS operation modes A or B, if the network operates in network operation mode I.

- —in GSM, resuming GPRS services when the RR sublayer indicated a resumption failure after dedicated mode was left, see GSM 04.18.

- in GSM, updating the network with the new MS Radio Access Capability IE when the content of the IE has changed. Normal or combined routing area updating procedure is used.

- UMTS to GSM and for GSM to UMTS intersystem change, see section 4.7.1.7.

Section 4.7.5.1 describes the routing area updating procedures for updating the routing area only. The combined routing area updating procedure used to update both the routing and location area is described in section 4.7.5.2.

The routing area updating procedure is always initiated by the MS. It is only invoked in state GMM-REGISTERED.

To limit the number of subsequently rejected routing area update attempts, a routing area updating attempt counter is introduced. The routing area updating attempt counter shall be incremented as specified in section 4.7.5.1.5. Depending on the value of the routing area updating attempt counter, specific actions shall be performed. The routing area updating attempt counter shall be reset when:

- a GPRS attach procedure is successfully completed; or

- a routing area updating procedure is successfully completed;

and additionally when the MS is in substate ATTEMPTING-TO-UPDATE:

- a new routing area is entered;

- expiry of timer T3302; or

- at request from registration function.

The mobile equipment shall contain a list of "forbidden location areas for roaming", as well as a list of "forbidden location areas for regional provision of service". The handling of these lists is described in section 4.4.1.

In, GSM, user data transmission in the MS shall be suspended during the routing area updating procedure; user data reception shall be possible. User data transmission in the network shall be suspended during the routing area updating procedure, if a new P-TMSI is assigned.

In UMTS, user data transmission and reception in the MS shall not be suspended during the routing area updating procedure. User data transmission in the network shall not be suspended during the routing area updating procedure.

4.7.5.1 Normal and periodic routing area updating procedure

Periodic routing area updating is used to periodically notify the availability of the MS to the network. The value of the update type IE in the ROUTING AREA UPDATE REQUEST message shall indicate "periodic updating". The procedure is controlled in the MS by timer T3312. When timer T3312 expires, the periodic routing area updating procedure is started. Start and reset of timer T3312 is described in section 4.7.2.2.

In GSM, the normal routing area updating procedure is initiated when the MS detects a change of the routing area in state GMM-REGISTERED, or when the MS determines that GPRS resumption shall be performed or when the MS needs to update the network with the new MS Radio Access Capability IE. The ROUTING AREA UPDATE REQUEST message shall always be the first data sent by the MS when a routing area border is crossed. The routing area identification is broadcast on the broadcast channel(s).

In UMTS, the normal routing area updating procedure is initiated when the MS detects a change of the routing area in state GMM-REGISTERED. The ROUTING AREA UPDATE REQUEST message shall always be the first GMM message sent by the MS when a routing area border is crossed.

A normal routing area updating shall abort any ongoing GMM procedure. Aborted GMM procedures may be repeated after the normal routing area updating procedure has been successfully performed. The value of the update type IE included in the message shall indicate "normal routing area updating".

********** Next modified section ********

4.7.5.2 Combined routing area updating procedure

Within a combined routing area updating procedure the messages ROUTING AREA UPDATE ACCEPT and ROUTING AREA UPDATE COMPLETE carry information for the routing area updating and the location area updating.

4.7.5.2.1 Combined routing area updating procedure initiation

The combined routing area updating procedure is initiated only by a GPRS MS operating in MS operation modes A or B, if the MS is in state GMM-REGISTERED and if the network operates in network operation mode I:

- when a GPRS MS that is IMSI attached for GPRS and non-GPRS services detects a change of the routing area in state GMM-REGISTERED and MM-IDLE;

- when a GPRS MS that is IMSI attached for GPRS services wants to perform an IMSI attach for non-GPRS services;

- after termination of a non-GPRS service via non-GPRS channels to update the association if the MS has changed the LA during that non-GPRS service transaction; ~~or.~~

- —after a CM SERVICE REJECT message with cause value #4 is received by the mobile station (see section 4.5.1.1), in which case the update type IE shall be set to "Combined RA/LA updating with IMSI attach"~~.~~; or

- when a GPRS MS needs to update the network with the new MS Radio Access Capability IE.

In GSM, the routing and location area identification are broadcast on the broadcast channel(s). A combined routing area updating procedure shall abort any ongoing GMM procedure. Aborted GMM procedures shall be repeated after the combined routing area updating procedure has been successfully performed. The ROUTING AREA UPDATE REQUEST message shall always be the first message sent from the MS in the new routing area after routing area change.

In UMTS, the routing and location area identification are broadcast on the broadcast channel(s) or sent to the MS via the PS signaling connection. A combined routing area updating procedure shall abort any ongoing GMM procedure. Aborted GMM procedures may be repeated after the combined routing area updating procedure has been successfully performed. The ROUTING AREA UPDATE REQUEST message shall always be the first GMM message sent from the MS in the new routing area after routing area change.

To initiate a combined routing area updating procedure the MS sends the message ROUTING AREA UPDATE REQUEST to the network, starts timer T3330 and changes to state GMM-ROUTING-UPDATING-INITIATED and MM LOCATION UPDATING PENDING. The value of the update type IE in the message shall indicate "combined RA/LA updating". If for the last attempt to update the registration of the location area a MM specific procedure was performed, the value of the update type IE in the ROUTING AREA UPDATE REQUEST message shall indicate "combined RA/LA updating with IMSI attach". Furthermore the MS shall include the TMSI status IE if no valid TMSI is available.

A GPRS MS in MS operation modes A or B that is in an ongoing circuit-switched transaction, shall initiate the combined routing area updating procedure after the circuit-switched transaction has been released, if the MS has

changed the RA during the circuit-switched transaction and if the network operates in network operation mode I.

A GPRS MS in MS operation mode A shall initiate the combined routing area updating procedure with IMSI attach after the circuit-switched transaction has been released if a GPRS attach was performed during the circuit-switched transaction and provided that the network operates in network operation mode I.

A GPRS MS in MS operation mode A shall perform the normal routing area update procedure during an ongoing circuit-switched transaction.

In UMTS, if the MS wishes to prolong the established PS signalling connection after the normal routing area updating procedure when it is served under UMTS area, it may set a follow-on request pending indicator on.

3GPP TSG CN1#15
Beijing, China 15-19 January, 2001

Document N1-010136
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.

24.008	CR	357	Current Version:	3.6.0

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

For submission to:	TSGN #11	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic	X	

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

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

Source:	Nokia	**Date:** 8.1.2001
Subject:	Using RAU procedure for MS RAC IE update	
Work item:	GPRS	

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

F	Correction		**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release	X		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:

During the GPRS connection (i.e. when GPRS attached), there might be need to update the network with new MS Radio Access Capability IE information e.g., change of multislot class or power class. However, there is not defined any MS RAC change procedure for GPRS similar to the circuit-switched classmark change procedure. Without MS RAC change procedure between MS and SGSN, the MS has to make GPRS Detach and GPRS Attach (with PDP context deactivation and activation) in order to update the SGSN with new MS RAC.

It has been mentioned in 3GPP 03.60 (see below) that the SGSN has to provide the BSS with **the most recent** MS RAC received from the MS. This implicates that the SGSN has to cope with the situation when the MS sends new changed MS RAC IE during the GPRS connection.

3GPP 03.60 v.6.7.0:

"6.11.1 Radio Access Classmark

The radio access classmark contains the 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 radio access classmark is a container for a multiplicity of radio access technology-dependent information, i.e. within the radio access classmark 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 radio classmark does not need to be interpreted by the NSS, and the full radio classmark 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 radio access classmark as an information element on the Gb interface. **It is the responsibility of the SGSN to provide the BSS with the most recent classmark received from the MS.** The classmark information element can be included in a downlink transfer request, or be sent in a specific message that updates the radio classmark information in the BSS. The BSS may at any time request the radio classmark for a given MS to

be transmitted from the SGSN to the BSS.

A specific optimisation allows the BSS to receive a reduced radio access classmark at initial access directly from the MS. This enables the BSS not to wait for the full radio access classmark to be provided by the SGSN, and is therefore quicker for the initial MS-originated transmission. The reduced classmark can be carried is 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 04.08 and GSM 04.60. "

MS RAC is sent to the SGSN in GPRS Attach and Routing Area Update procedures and to the BSS in second phase of two phase access procedure. Since it is not defined shall the MS send same RAC information in the two phase access procedure as was sent in GPRS Attach or RAU, the two phase access procedure could be used to update the MS RAC information to the BSS. However, there is not any MS RAC update procedure from the BSS to the SGSN. Therefore, BSS and SGSN could have different MS RAC IE for same mobile and radio resource allocation would not be possible.

It is proposed that the MS can use the existing Routing Area Update procedure to send the new MS RAC IE to the SGSN also when Routing Area Update procedure would not be normally needed. SGSN shall convey that information to BSS using already existing procedures i.e. including MS RAC into BSSGP DL Data PDU or sending the RA_Capability_PDU to the BSS. RA_Capability_PDU is already existing procedure used to update the BSS with new MS RAC information.

There is no need to define new "Update Type" in Routing Area Update Request message but the "Normal Routing Area Update" update type can be used.

Clauses affected: 4.7.5, 4.7.5.1, 4.7.5.2.1

Other specs affected:			
	Other 3G core specifications		→ List of CRs:
	OtherGSM 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:

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

4.7.5 Routing area updating procedure

This procedure is used for:

- normal routing area updating to update the registration of the actual routing area of an MS in the network. This procedure is used by GPRS MSs in MS operation mode C and by GPRS MSs in MS operation modes A or B that are IMSI attached for GPRS and non-GPRS services if the network operates in network operation mode II or III;

- combined routing area updating to update the registration of the actual routing and location area of an MS in the network. This procedure is used by GPRS MSs in MS operation modes A or B that are IMSI attached for GPRS and non-GPRS services provided that the network operates in network operation mode I; or

- periodic routing area updating. This procedure is used by GPRS MSs in MS operation mode C and by GPRS MSs in MS operation modes A or B that are IMSI attached for GPRS or for GPRS and non-GPRS services independent of the network operation mode;

- IMSI attach for non-GPRS services when the MS is IMSI attached for GPRS services. This procedure is used by GPRS MSs in MS operation modes A or B, if the network operates in network operation mode I.

- —in GSM, resuming GPRS services when the RR sublayer indicated a resumption failure after dedicated mode was left, see GSM 04.18.

- in GSM, updating the network with the new MS Radio Access Capability IE when the content of the IE has changed. Normal or combined routing area updating procedure is used.

- UMTS to GSM and for GSM to UMTS intersystem change, see section 4.7.1.7.

Section 4.7.5.1 describes the routing area updating procedures for updating the routing area only. The combined routing area updating procedure used to update both the routing and location area is described in section 4.7.5.2.

The routing area updating procedure is always initiated by the MS. It is only invoked in state GMM-REGISTERED.

To limit the number of subsequently rejected routing area update attempts, a routing area updating attempt counter is introduced. The routing area updating attempt counter shall be incremented as specified in section 4.7.5.1.5. Depending on the value of the routing area updating attempt counter, specific actions shall be performed. The routing area updating attempt counter shall be reset when:

- a GPRS attach procedure is successfully completed; or

- a routing area updating procedure is successfully completed;

and additionally when the MS is in substate ATTEMPTING-TO-UPDATE:

- a new routing area is entered;

- expiry of timer T3302; or

- at request from registration function.

The mobile equipment shall contain a list of "forbidden location areas for roaming", as well as a list of "forbidden location areas for regional provision of service". The handling of these lists is described in section 4.4.1.

In, GSM, user data transmission in the MS shall be suspended during the routing area updating procedure; user data reception shall be possible. User data transmission in the network shall be suspended during the routing area updating procedure, if a new P-TMSI is assigned.

In UMTS, user data transmission and reception in the MS shall not be suspended during the routing area updating procedure. User data transmission in the network shall not be suspended during the routing area updating procedure.

4.7.5.1 Normal and periodic routing area updating procedure

Periodic routing area updating is used to periodically notify the availability of the MS to the network. The value of the update type IE in the ROUTING AREA UPDATE REQUEST message shall indicate "periodic updating". The procedure is controlled in the MS by timer T3312. When timer T3312 expires, the periodic routing area updating procedure is started. Start and reset of timer T3312 is described in section 4.7.2.2.

In GSM, the normal routing area updating procedure is initiated when the MS detects a change of the routing area in state GMM-REGISTERED, or when the MS determines that GPRS resumption shall be performed or when the MS needs to update the network with the new MS Radio Access Capability IE. The ROUTING AREA UPDATE REQUEST message shall always be the first data sent by the MS when a routing area border is crossed. The routing area identification is broadcast on the broadcast channel(s).

In UMTS, the normal routing area updating procedure is initiated when the MS detects a change of the routing area in state GMM-REGISTERED. The ROUTING AREA UPDATE REQUEST message shall always be the first GMM message sent by the MS when a routing area border is crossed.

A normal routing area updating shall abort any ongoing GMM procedure. Aborted GMM procedures may be repeated after the normal routing area updating procedure has been successfully performed. The value of the update type IE included in the message shall indicate "normal routing area updating".

********** Next modified section **********

4.7.5.2 Combined routing area updating procedure

Within a combined routing area updating procedure the messages ROUTING AREA UPDATE ACCEPT and ROUTING AREA UPDATE COMPLETE carry information for the routing area updating and the location area updating.

4.7.5.2.1 Combined routing area updating procedure initiation

The combined routing area updating procedure is initiated only by a GPRS MS operating in MS operation modes A or B, if the MS is in state GMM-REGISTERED and if the network operates in network operation mode I:

- when a GPRS MS that is IMSI attached for GPRS and non-GPRS services detects a change of the routing area in state GMM-REGISTERED and MM-IDLE;

- when a GPRS MS that is IMSI attached for GPRS services wants to perform an IMSI attach for non-GPRS services;

- after termination of a non-GPRS service via non-GPRS channels to update the association if the MS has changed the LA during that non-GPRS service transaction; ~~or.~~

- —after a CM SERVICE REJECT message with cause value #4 is received by the mobile station (see section 4.5.1.1), in which case the update type IE shall be set to "Combined RA/LA updating with IMSI attach"; or~~.~~

- when a GPRS MS needs to update the network with the new MS Radio Access Capability IE.

In GSM, the routing and location area identification are broadcast on the broadcast channel(s). A combined routing area updating procedure shall abort any ongoing GMM procedure. Aborted GMM procedures shall be repeated after the combined routing area updating procedure has been successfully performed. The ROUTING AREA UPDATE REQUEST message shall always be the first message sent from the MS in the new routing area after routing area change.

In UMTS, the routing and location area identification are broadcast on the broadcast channel(s) or sent to the MS via the PS signaling connection. A combined routing area updating procedure shall abort any ongoing GMM procedure. Aborted GMM procedures may be repeated after the combined routing area updating procedure has been successfully performed. The ROUTING AREA UPDATE REQUEST message shall always be the first GMM message sent from the MS in the new routing area after routing area change.

To initiate a combined routing area updating procedure the MS sends the message ROUTING AREA UPDATE REQUEST to the network, starts timer T3330 and changes to state GMM-ROUTING-UPDATING-INITIATED and MM LOCATION UPDATING PENDING. The value of the update type IE in the message shall indicate "combined RA/LA updating". If for the last attempt to update the registration of the location area a MM specific procedure was performed, the value of the update type IE in the ROUTING AREA UPDATE REQUEST message shall indicate "combined RA/LA updating with IMSI attach". Furthermore the MS shall include the TMSI status IE if no valid TMSI is available.

A GPRS MS in MS operation modes A or B that is in an ongoing circuit-switched transaction, shall initiate the combined routing area updating procedure after the circuit-switched transaction has been released, if the MS has

changed the RA during the circuit-switched transaction and if the network operates in network operation mode I.

A GPRS MS in MS operation mode A shall initiate the combined routing area updating procedure with IMSI attach after the circuit-switched transaction has been released if a GPRS attach was performed during the circuit-switched transaction and provided that the network operates in network operation mode I.

A GPRS MS in MS operation mode A shall perform the normal routing area update procedure during an ongoing circuit-switched transaction.

In UMTS, if the MS wishes to prolong the established PS signalling connection after the normal routing area updating procedure when it is served under UMTS area, it may set a follow-on request pending indicator on.

4.7.5 Routing area updating procedure

This procedure is used for:

- normal routing area updating to update the registration of the actual routing area of an MS in the network. This procedure is used by GPRS MSs in MS operation mode C and by GPRS MSs in MS operation modes A or B that are IMSI attached for GPRS and non-GPRS services if the network operates in network operation mode II or III;

- combined routing area updating to update the registration of the actual routing and location area of an MS in the network. This procedure is used by GPRS MSs in MS operation modes A or B that are IMSI attached for GPRS and non-GPRS services provided that the network operates in network operation mode I; or

- periodic routing area updating. This procedure is used by GPRS MSs in MS operation mode C and by GPRS MSs in MS operation modes A or B that are IMSI attached for GPRS or for GPRS and non-GPRS services independent of the network operation mode;

- IMSI attach for non-GPRS services when the MS is IMSI attached for GPRS services. This procedure is used by GPRS MSs in MS operation modes A or B, if the network operates in network operation mode I.

- —resuming GPRS services when the RR sublayer indicated a resumption failure after dedicated mode was left, see section 3.4.13.1.1.

- updating the network with the new MS Radio Access Capability IE when the content of the IE has changed. Normal or combined routing area updating procedure is used.

Section 4.7.5.1 describes the routing area updating procedures for updating the routing area only. The combined routing area updating procedure used to update both the routing and location area is described in section 4.7.5.2.

The routing area updating procedure is always initiated by the MS. It is only invoked in state GMM-REGISTERED.

To limit the number of subsequently rejected routing area update attempts, a routing area updating attempt counter is introduced. The routing area updating attempt counter shall be incremented as specified in section 4.7.5.1.5. Depending on the value of the routing area updating attempt counter, specific actions shall be performed. The routing area updating attempt counter shall be reset when:

- a GPRS attach procedure is successfully completed; or

- a routing area updating procedure is successfully completed;

and additionally when the MS is in substate ATTEMPTING-TO-UPDATE:

- a new routing area is entered;

- expiry of timer T3302; or

- at request from registration function.

The mobile equipment shall contain a list of “forbidden location areas for roaming”, as well as a list of “forbidden location areas for regional provision of service”. The handling of these lists is described in section 4.4.1.

User data transmission in the MS shall be suspended during the routing area updating procedure; user data reception

shall be possible. User data transmission in the network shall be suspended during the routing area updating procedure, if a new P-TMSI is assigned.

4.7.5.1 Normal and periodic routing area updating procedure

Periodic routing area updating is used to periodically notify the availability of the MS to the network. The value of the update type IE in the ROUTING AREA UPDATE REQUEST message shall indicate “periodic updating”. The procedure is controlled in the MS by timer T3312. When timer T3312 expires, the periodic routing area updating procedure is started. Start and reset of timer T3312 is described in section 4.7.2.2.

The normal routing area updating procedure is initiated when the MS detects a change of the routing area in state GMM-REGISTERED or when the MS determines that GPRS resumption shall be performed or when the MS needs to update the network with the new MS Radio Access Capability IE. The ROUTING AREA UPDATE REQUEST message shall always be the first data sent by the MS when a routing area border is crossed. The routing area identification is broadcast on the broadcast channel(s). A normal routing area updating shall abort any ongoing GMM procedure. Aborted GMM procedures shall be repeated after the normal routing area updating procedure has been successfully performed. The value of the update type IE included in the message shall indicate “normal routing area updating”.

********** Next modified section **********

4.7.5.2 Combined routing area updating procedure

Within a combined routing area updating procedure the messages ROUTING AREA UPDATE ACCEPT and ROUTING AREA UPDATE COMPLETE carry information for the routing area updating and the location area updating.

4.7.5.2.1 Combined routing area updating procedure initiation

The combined routing area updating procedure is initiated only by a GPRS MS operating in MS operation modes A or B, if the MS is in state GMM-REGISTERED and if the network operates in network operation mode I:

- when a GPRS MS that is IMSI attached for GPRS and non-GPRS services detects a change of the routing area in state GMM-REGISTERED and MM-IDLE;
- when a GPRS MS that is IMSI attached for GPRS services wants to perform an IMSI attach for non-GPRS services;
- after termination of a non-GPRS service via non-GPRS channels to update the association if the MS has changed the LA during that non-GPRS service transaction; or
- after a CM SERVICE REJECT message with cause value #4 is received by the mobile station (see section 4.5.1.1), in which case the update type IE shall be set to "Combined RA/LA updating with IMSI attach"; or.
- when a GPRS MS needs to update the network with the new MS Radio Access Capability IE.

The routing and location area identification are broadcast on the broadcast channel(s). A combined routing area updating procedure shall abort any ongoing GMM procedure. Aborted GMM procedures shall be repeated after the combined routing area updating procedure has been successfully performed. The ROUTING AREA UPDATE REQUEST message shall always be the first message sent from the MS in the new routing area after routing area change.

To initiate a combined routing area updating procedure the MS sends the message ROUTING AREA UPDATE REQUEST to the network, starts timer T3330 and changes to state GMM-ROUTING-UPDATING-INITIATED and MM LOCATION UPDATING PENDING. The value of the update type IE in the message shall indicate “combined RA/LA updating”. If for the last attempt to update the registration of the location area a MM specific procedure was performed, the value of the update type IE in the ROUTING AREA UPDATE REQUEST message shall indicate “combined RA/LA updating with IMSI attach”. Furthermore the MS shall include the TMSI status IE if no valid TMSI is available.

A GPRS MS in MS operation modes A or B that is in an ongoing circuit-switched transaction, shall initiate the combined routing area updating procedure after the circuit-switched transaction has been released, if the MS has

changed the RA during the circuit-switched transaction and if the network operates in network operation mode I.

A GPRS MS in MS operation mode A shall initiate the combined routing area updating procedure with IMSI attach after the circuit-switched transaction has been released if a GPRS attach was performed during the circuit-switched transaction and provided that the network operates in network operation mode I.

A GPRS MS in MS operation mode A shall perform the normal routing area update procedure during an ongoing circuit-switched transaction.