3GPP TSG_CN#6 **NP-99445**
ETSI SMG3 Plenary Meeting #6,
Nice, France
13th – 15th December 1999

Agenda item: **5.1.3**

Source: **TSG_N WG1**

Title: **CRs on Work Item GSM-UMTS interworking**

Introduction:

This document contains **"20"** CRs agreed by **TSG_N WG1** and forwarded to **TSG_N Plenary** meeting **#6** for approval.

Tdoc	Spec	CR	Rev	CAT	Rel.	Old Ver	New Ver	Subject
N1-99F53	24.011	001	6	B	R99	3.0.0	3.1.0	Using MM sublayer for PS-SMS message transfer
N1-99F03	24.007	003	5	B	R99	3.1.0	3.2.0	Using MM sublayer for PS-SMS message transfer
N1-99D14	24.007	004	1	C	R99	3.1.0	3.2.0	Uplink L3 sequence numbering
N1-99D15	24.008	041	1	C	R99	3.1.0	3.2.0	Uplink L3 sequence numbering
N1-99E89	24.008	069	1	F	R99	3.1.0	3.2.0	24.008 Vocabulary
N1-99F01	24.008	081	1	B	R99	3.1.0	3.2.0	Alignment of MM for R99
N1-99F07	24.008	082	1	B	R99	3.1.0	3.2.0	Attach procedure for R99
N1-99F35	24.008	060	1	B	R99	3.1.0	3.2.0	Change of network mode of operation
N1-99E37	24.008	058	1	B	R99	3.1.0	3.2.0	Detach procedure
N1-99E44	24.008	080		B	R99	3.1.0	3.2.0	Identity procedure
N1-99E40	24.008	061	1	B	R99	3.1.0	3.2.0	MS modes of operation in UMTS
N1-99E62	24.008	085		B	R99	3.1.0	3.2.0	Paging for R99
N1-99E35	24.008	056	1	B	R99	3.1.0	3.2.0	Periodic RA Update Timer function and Mobile Reachable Timer function forUMTS and clarification that the substate SUSPENDED is applicable for GSMonly
N1-99E65	24.008	057	1	B	R99	3.1.0	3.2.0	P-TMSI reallocation procedure
N1-99F34	24.008	054	3	B	R99	3.1.0	3.2.0	READY timer not applicable for UMTS
N1-99F08	24.008	083	1	B	R99	3.1.0	3.2.0	Routing Area updating procedure for R99
N1-99F52	24.008	089	1	C	R99	3.1.0	3.2.0	Transaction Identifier Extension
N1-99F36	24.008	059	2	B	R99	3.1.0	3.2.0	UMTS <--> GPRS Intersystem change (handover)
N1-99F05	24.008	033	5	C	R99	3.1.0	3.2.0	Updating Session Management (SM) for R99
N1-99F00	24.008	053	2	B	R99	3.1.0	3.2.0	GMM State Model for UMTS

3GPP/SMG Meeting #9
Bad Aibling, Germany, 30 Nov- 3 Dec. 1999

***Document* N1-99F53**
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.

24.011	CR	001r6	Current Version:	3.0.0

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

For submission to:	CN#6	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic		

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

Proposed change affects: *(at least one should be marked with an X)*

(U)SIM		ME	X	UTRAN / Radio		Core Network	X

Source: NTT Communicationware **Date:** 3.12.99

Subject: Using MM sublayer for PS-SMS message transfer

Work item: GSM/UMTS Interworking

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

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

Reason for change:

In GSM, LLC is used for PS-SMS message transfer. However, It is agreed that the GMM shall be used for PS-SMS transfer in UMTS system which is described in TS 23.121.

This CR proposes the new SMC-GP functionality that uses GMM to transfer SMS messages for 3G PS-SMS and mainly introduces new information flows for UMTS PS-SMS message transfer and modification of SMC-GP SDL in order to adopt both GSM packet data and UMTS packet data.

Clauses affected:

1.1; 1.2;
2; 2.1; 2.2;2.4 and new subclause in chapter 2
5.1; 5.3.1; 5.3.1.2; 5.3.4; 5.4
Annex A,B

Other specs affected:

Other 3G core specifications	X	→ List of CRs:	24.007 CR003r5
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:


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

1.1 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

[1] GSM 01.04: "Digital cellular telecommunications system (Phase 2+); Abbreviations and acronyms".

[2] ~~GSM 03.40~~TS 23.040: "~~Digital cellular telecommunications system (Phase 2+);~~ Technical realization of the Short Message Service (SMS) Point-to-Point (PP)".

[3a] ~~GSM 03.60~~TS 23.060: "~~Digital cellular telecommunications system (Phase 2+);~~ General Packet Radio Service (GPRS); Service description; Stage 2".

[3] GSM 04.06: "Digital cellular telecommunications system (Phase 2+); Mobile Station - Base Station System (MS - BSS) interface Data Link (DL) layer specification".

[4] ~~GSM 04.07~~TS 24.007: "~~Digital cellular telecommunications system (Phase 2+);~~ Mobile radio interface signalling layer 3; General aspects".

[5] ~~GSM 04.08~~TS 24.008: "~~Digital cellular telecommunications system (Phase 2+);~~ Mobile radio interface layer 3 specification".

[6a] GSM 04.64: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Logical Link Control (LLC)".

[6] ISO 7498: "Information processing systems - Open Systems Interconnection - Basic Reference Model".

1.2 Abbreviations

Abbreviations used in this TS are listed in GSM 01.04 except below:

- **RR connection:** A RR connection is a dedicated physical circuit switched domain connection used by the two RR or RRC peer entities to support the upper layers' exchange of information flows.
- **PS signalling connection** is a peer to peer UMTS connection between MS and CN packet domain node.
- **GPRS:** Packet Services for GSM and UMTS system.
- The label **(GSM only)** indicates this section or paragraph applies only to GSM system. For multi system case this is determined by the current serving radio access network.
- The label **(UMTS only)** indicates this section or paragraph applies only to UMTS system. For multi system case this is determined by the current serving radio access network.
- **In GSM,...** Indicates this paragraph applies only to GSM System. For multi system case this is determined by the current serving radio access network.
- **In UMTS,...** Indicates this paragraph applies only to UMTS System. For multi system case this is determined by the current serving radio access network.
- **SIM,** Subscriber Identity Module (see TS GSM 02.17). This specification makes no distinction between SIM and USIM.
- **MS,** Mobile Station. This specification makes no distinction between MS and UE.

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2 Overview of Short Message Service (SMS) support

The purpose of the Short Message Service is to provide the means to transfer messages between a GSM PLMN Mobile Station (MS) and a Short Message Entity via a Service Centre, as described in ~~GSM 03.40~~TS 23.040. The terms "MO" - Mobile Originating - and "MT" - Mobile Terminating - are used to indicate the direction in which the short message is sent.

This ~~ETS~~ TS describes the procedures necessary to support the Short Message Service between the MS and the MSC or SGSN and vice versa, as described in ~~GSM 03.40~~TS 23.040.

The procedures are based on services provided by the Mobility Management sublayer as described in ~~GSM 04.07~~TS24.007/~~04.08~~24.008 for GSM CS and UMTS CS/PS services and the Logical Link Control layer described in GSM 04.64 for GPRS services.

2.1 Protocols and protocol architecture

The hierarchical model in Figure 2.1a shows the layer structure of the MSC and the MS.

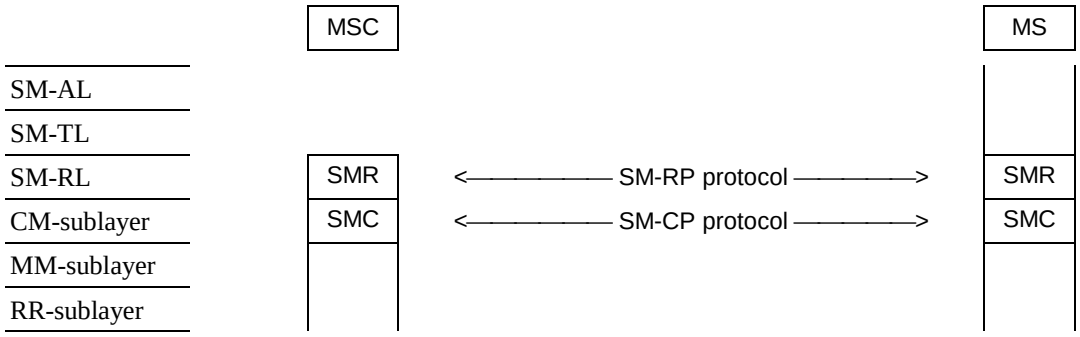


Figure 2.1a/~~GSM 04.11~~TS 24.011: Protocol hierarchy for circuit switched service

The hierarchical model in Figure 2.1b shows the layer structure of the SGSN and the MS in GSM. The hierarchical model in Figure 2.1c shows the layer structure of the SGSN and the MS in UMTS.

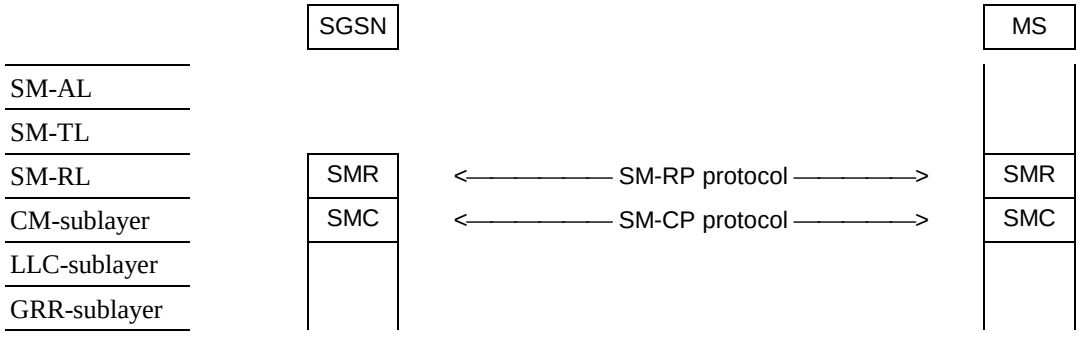
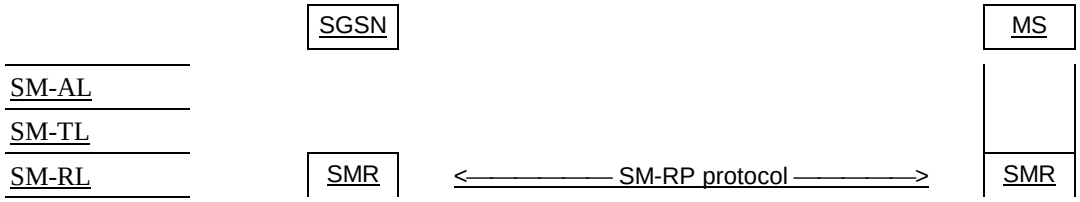


Figure 2.1b/~~GSM 04.11~~TS 24.011: Protocol hierarchy for GPRS in GSM



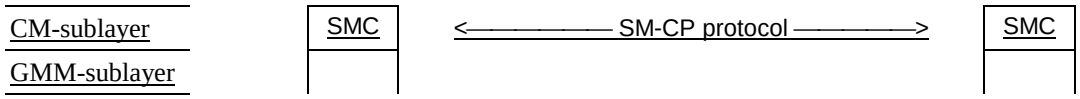


Figure 2.1c/24.011: Protocol hierarchy for packet switched service in UMTS

The CM-sublayer, in terms of the Short Message Service Support, provides services to the Short Message Relay Layer.

On the MS-side the Short Message Relay Layer provides services to the Short Message Transfer Layer. The Short Message Relay Layer is the upper layer on the network side (MSC or SGSN), and the SM-user information elements are mapped to TCAP/MAP.

The peer protocol between two SMC entities is denoted SM-CP, and between two SMR entities, SM-RP.

Abbreviations:

SM-AL	Short Message Application Layer
SM-TL	Short Message Transfer Layer
SM-RL	Short Message Relay Layer
SM-RP	Short Message Relay Protocol
SMR	Short Message Relay (entity)
CM-sub	Connection Management sublayer
SM-CP	Short Message Control Protocol
SMC	Short Message Control (entity)
MM-sub:	Mobility Management sublayer
GMM-sub:	GPRS Mobility Management sublayer
RR-sub:	Radio Resource Management sublayer
LLC-sub	Logical Link Control sublayer
GRR-sub	GPRS Radio Resource sublayer in GSM

2.2 Use of channels (GSM only)

*** NEXT MODIFICATION ***

2.4 Layer 2 (LLC) GPRS support (GSM only)

*** NEXT MODIFICATION ***

2.X GSMS entity in UMTS

It shall be possible for a PS-attached MS of any mode of operation to send and receive short messages over UMTS radio channels.

A description of the different mode of operation UMTS MS can be found in 23.060, and a brief overview is given below:-

- CS/PS mode of operation MSs may be able to send and receive short messages using either the MM sublayer or the GMM sublayer.

- PS mode of operation MSs may be able to send and receive short messages using only GMM sublayer.

The GSMS entity for CS/PS mode of operation MS is shown in Figure X. The GSMS shall communicate with the MM entity via the GMMSMS-SAP for UMTS CS/PS mode of operation MO SMS, in order to ascertain which transport service to use.

The delivery path for MO SMS is selected by the MS.

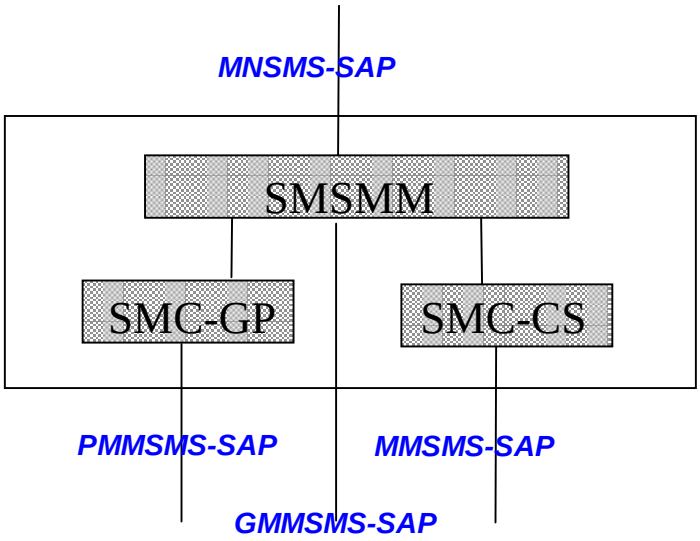


Figure X/24.011: GSMS entity for CS/PS mode of operation MS in UMTS

5 CM-procedures

5.1 General

This clause describes the procedures used by the SMC entity on the Connection Management sublayer. An SMC entity communicates with a corresponding peer entity using an MM-connection for CS GSM/UMTS or the LLC layer for GPRS in GSM or the GMM-connection in for PS in UMTS.

Multiple MM-connections may be established at the same time, allowing parallel transactions. The description of the procedures is related to one single transaction.

For circuit switched ~~GSM~~service, the CM-procedures described can only be performed if an MM-connection has been established between the mobile station and the network.

For GPRS, no ~~MM~~ connection has to be established, and thus the CM procedures for GPRS reflect this. Detailed SDL diagrams for SMC entities are contained in annex B.

5.2 Short Message Control states

The state transition diagrams for the MO and MT SMC entities on both the MS side and network side are contained in annex B.

5.2.2 SMC-GP states at the MS side of the radio interface

5.2.2.1 Mobile Originating Case

The states described in this clause are for an SMC-GP entity in a GPRS MS handling mobile originating short message transfer and notification to the network that the mobile has memory available to receive one or more short messages (referred to below as "notification").

5.2.2.1.1 MO-Idle (State 0)

This state exists when the MO-SMC entity is in idle mode, or when an MO short message transfer or notification ends in a normal or abnormal way.

5.2.1.1.2 MO-GMM-connection pending (State 1) (UMTS only)

This state exists when the MO-SMC has requested the establishment of an PS signalling connection.

5.2.2.1.32 MO-Wait for CP-ACK (State 21)

This state exists after the MO-SMC has initiated the transfer of a CP-DATA message.

5.2.2.1.43 MO-Wait for CP-Data (State 32)

This state exists when the MO-SMC has received the acknowledgement, CP-ACK.

5.2.2.2 Mobile Terminating case

The states described in this subclause are for an SMC-GP entity in an GPRS MS handling mobile terminating short message transfer.

5.2.2.2.1 MT-Idle (State 0)

This state exists when the MT-SMC entity is in idle mode, or when a short message transfer ends in a normal or abnormal way.

5.2.2.2.2 MT-Wait for RP-ACK (State 1)

This state exists after the MT-SMC has received the message CP-DATA (including sending of the associated CP-ACK)

5.2.2.2.3 MT-Wait for CP-ACK (State 2)

This state exists when the MT-SMC has initiated the transfer of the CP DATA message.

5.2.4 SMC-GP states at the network side of the radio interface

5.2.4.1 Mobile Originating Case

The states described in this subclause are for an SMC-GP entity in an SGSN handling both mobile originating short message transfer and notification to the network that the mobile has memory available to receive one or more short messages (referred to below as "notification").

5.2.4.1.1 MO-Idle (State 0)

This state exists when the MO-SMC entity is in idle mode, or when a short message transfer or notification ends in a normal or abnormal way.

5.2.4.1.2 MO-Wait for RP-ACK (State 1)

This state exists after the MO-SMC has received the message CP-DATA (including sending of the associated CP-ACK).

5.2.4.1.3 MO-Wait for CP-ACK(State 2)

This state exists when the SMC hasreceived the RP acknowledgement, RP-ACK

5.2.4.2 Mobile Terminating Case

The states described in this subclause are for an SMC-GP entity in an SGSN handling mobile terminating short message transfer.

5.2.4.2.1 MT-Idle (State 0)

This state exists when the MT-SMC entity is in idle mode, or when a short message transfer ends in a normal or abnormal way.

5.2.4.2.2 MT-Wait for CP-ACK (State 1)

This state exists after the SMC has initiated the transfer of a CP-DATA message.

5.2.4.2.3 MT-Wait for CP DATA (State 2)

This state exists when the SMC has received the acknowledgement, CP-ACK.

5.3 Short Message Control procedures

5.3.1 MM-connection establishment for circuit switched ~~GSM~~ service

When an SMC entity is in the Idle state and transfer of an RPDU is requested, the peer to peer connection between the MM-sublayers in the MS and the network (MSC) has to be established.

The SMC entity on the originating side requests the MM-sublayer to establish an MM-connection, and enters the MM-Connection Pending state.

After completion of the MM-connection establishment, a confirmation is given to the originating side to indicate that the MM sublayer is ready for RPDU transfer.

The MM-connection establishment is indicated to the SMC entity at the destination side when the CP-DATA message has been received by the MM-sublayer (in line with ~~GSM 04.08~~TS 24.008). The destination side SMC entity then sends a CP-ACK and enters the MM-Connection Established state.

5.3.2.1 RPDU transfer for circuit switched ~~GSM~~service

5.3.2.2 RPDU transfer for GPRS

In GSM, ~~When~~ when an SMC-GP entity is in the Idle state and transfer of an RPDU is requested, the SMC-GP entity on the originating side forwards the CP-DATA message to the LLC sublayer. This contains the RPDU, and also the SMC-GP entity sets the timer TC1* and enters the Wait for CP-ACK state.

In UMTS, when an SMC-GP entity in the MS side is in the Idle state and transfer of an RPDU is requested, the SMC-GP entity on the originating side requests the MM-sublayer to establish an PS signalling connection, and enters the GMM-Connection Pending state.

In UMTS, in the MS, after completion of the PS signalling connection establishment, a confirmation is given to the originating side to indicate that the MM sublayer is ready for RPDU transfer.

In UMTS, in the MS, after confirmation of the PS signalling connection establishment, , the SMC-GP entity on the originating side forwards the CP-DATA message to the GMM sublayer. This contains the RPDU, and also the SMC-GP entity sets the timer TC1* and enters the Wait for CP-ACK state~~.~~

In UMTS, when an SMC-GP entity in the network side is in Idle state and transfer of an RPDU is requested, the SMC-GP entity on the originating side forwards the CP-DATA message to the GMM sublayer. This contains the RPDU, and also the SMC-GP entity sets the timer TC1* and enters the Wait for CP-ACK state.

The value of TC1* may vary with the length of the CP-DATA. However, the value of TC1* shall be sufficiently great to allow the lower layers to transmit the CP-DATA and CP-ACK messages and to allow for some re-transmissions of layer 2 frames.

If an SMC entity in the Wait for CP-ACK state gets an indication that the CP-DATA message has probably been lost then, as an implementation option, that SMC-GP entity may reduce the time until expiry of TC1*.

If the timer TC1* expires in the Wait for CP-ACK state, the CP-DATA message is retransmitted and the state Wait for CP-ACK is re-entered. The maximum number of CP-DATA message re-transmissions is an implementation option but shall be either 1, 2 or 3. If the timer TC1* expires after the maximum number of retransmission attempts, an error indication is passed to SM-RL. The Idle state is then entered.

On receipt of the CP-ACK message in response to the CP-DATA (RP DATA) message in the Wait for CP-ACK state, the SMC-GP resets the timer TC1* and enters the Wait for CP DATA state.

On receipt of the CP-ACK message in response to the CP-DATA (RP ACK) message in the Wait for CP-ACK state, the SMC-GP resets the timer TC1* and enters the Idle State.

In GSM, ~~When~~ when receiving a CP-DATA message form the LLC sublayer, the SMC-GP entity checks the parameters relevant to the CP protocol. If these are valid, the RPDU is passed to the SM-RL, the CP-ACK message is sent.

In UMTS, when receiving a CP-DATA message fro~~or~~m the GMM sublayer, the SMC-GP entity checks the parameters relevant to the CP protocol. If these are valid, the RPDU is passed to the SM-RL, the CP-ACK message is sent.

If an SMC entity in the Idle state is unable to accept a CP-DATA message, it sends a CP-ERROR message and then enters the Idle state. .

5.3.4 Abnormal cases

Abnormal cases that shall be handled by the SMC entity in any state can be classified into five cases:

- Upper Layer Abort: Errors occurring in the SM-RL may cause the SM-RL to send an MNSMS-ABORT Request to the SMC entity.
- CP-Layer Abort: Errors occurring within the SMC entity itself may require termination of all activities related to that transaction identifier.
- Lower Layer Abort: Errors occurring within the layers beneath the CP-layer may cause an MMSM-ERROR Indication or a GMMSMS-ERROR Indication to be sent to the SMC entity.
- CP-Layer Protocol Errors: Errors occurring within the protocol exchange between the SMC entities may result in the sending of a CP-ERROR message between the entities.
- Lower Layer Release: Events occurring within the layers beneath the CP layer may cause an MMSM-REL Indication to be sent to the SMC entity.

When the CM-sublayer in the network receives an Upper Layer Abort, it may form and send the CP-ERROR message to release the connection. Irrespective of whether or not the CP-ERROR message was sent, an MM-connection release request, without indication of release cause, is passed to the MM-sublayer. The SMC entity in the network then enters the Idle state.

When the CM-sublayer in the MS receives an Upper Layer Abort and if the MM connection exists, it shall form and send the CP-ERROR message. Irrespective of whether or not the CP-ERROR message was sent, an MM-connection release request, without indication of release cause, is passed to the MM-sublayer. The SMC entity in the mobile station then enters the Idle state.

In the case of a CP-Layer Abort, an error indication is passed to SM-RL. If possible, a CP-ERROR message is sent to the partner SMC entity to indicate the error situation. Then the SMC entity enters the Idle state.

In the case of a Lower Layer Abort, the SMC entity passes an error indication to SM_RL, an MM-connection release request is passed to the MM-sublayer, and the SMC entity immediately enters the Idle state.

In the case of the reception of a CP-ERROR message from the partner SMC entity, an error indication is passed to SM-RL, an MM-connection release request, without indication of release cause, is passed to the MM-sublayer, and the SMC entity enters the Idle state.

In the case of a lower layer release, the SMC entity passes an MNSMS-ERROR Indication to SM-RL and then enters the Idle state.

In all cases, if the timer TC1* is running, it is reset.

~~Due to structure of message flow on SAPI 0 and 3 it~~ It is possible that the CP-ACK of a short message transfer might not be received (e.g. due to hand over). If the first CP-ACK (acknowledging the CP-DATA that carried the first RPDU) is not received the reception of CP-DATA may be interpreted as the reception of the awaited CP-ACK and CP-DATA message.

5.4 Concatenating short message or notification transfers

If an entity has more than one short message or notification to send, then it is useful to maintain the Radio Resource (RR) connection in between transfers for circuit switched ~~GSM~~ service . For mobile terminated short messages this is simple because the network decides when, and whether, to release the RR connection. However, for mobile originated transfers, the network does not know whether or not the mobile has more messages to transfer.

If another short message or a memory available notification is to be sent, an originating SMR entity in the MS may choose to continue to use the same RR connection. When the MS chooses to use the same RR connection, then:

- the MS shall transmit a CM SERVICE REQUEST for the new CM connection before the final CP-ACK (e.g. the one that acknowledges the CP-DATA that carried the RP-ACK) for the old MM connection is transmitted;
- before transmission of the first CP-DATA on the new MM connection, the MS shall transmit the CP-ACK for the old MM connection;
- the Transaction Identifier used on the new MM connection shall be different to that used on the old MM connection; and
- the MS shall not initiate establishment of the new MM connection before the final CP-DATA (e.g. the one carrying the RP-ACK) has been received.

NOTE: When an MS sends successive memory available notifications and/or mobile originated short messages on different RR connections, the MS is strongly recommended to use different Transaction Identifiers for the old and new MM connections.

~~Due to the structure of message flow on SAPIs 0 and 3 it~~ It is possible that the final CP-ACK of a short message transfer may not be received (e.g. due to transmission errors and/or hand overs). For mobile terminated transfers, if the CP-ACK is lost, the reception of a CP-DATA with a different transaction identifier and carrying an RPDU shall be interpreted as the implicit reception of the awaited CP-ACK followed by the reception of the new CP-DATA message. For mobile originated transfers, if the CP-ACK is lost, the reception of a CM SERVICE REQUEST followed by a CP-DATA with a different transaction identifier and carrying an RPDU shall be interpreted as the implicit reception of the awaited CP-ACK followed by the reception of the new CP-DATA message.

Annex A (informative): Arrow diagrams

Arrow diagram A1:

The diagram shows CS ~~GSM~~ MO-message transfer by means of interlayer service primitives and the actual messages being transferred between the layer entities

Arrow diagram A2:

The diagram shows CS ~~GSM~~ MT-messaging by means of interlayer service primitives and the actual messages being transferred between the layer entities

Arrow diagram A5:

The diagram shows GPRS MO-message transfer by means of interlayer service primitives and the actual messages being transferred between the layer entities in GSM.

- MNSMS-primitives indicate services provided by CM to SM-RL.
- LLSMS-primitives indicate services provided by LLC to CM.
- CP-DATA is the CM-message carrying SM-RP data units.
- CP-ACK acknowledge CP-DATA reception on CM.

Arrow diagram A6:

The diagram shows GPRS MT-message transfer by means of interlayer service primitives and the actual messages being transferred between the layer entities in GSM.

- MNSMS-primitives indicate services provided by CM to SM-RL.
- LLSMS-primitives indicate services provided by LLC to CM.
- CP-DATA is the CM-message carrying SM-RP data units.
- CP-ACK acknowledge CP-DATA reception on CM.

Arrow diagram A7:

The diagram shows UMTS PS MO-message transfer by means of interlayer service primitives and the actual messages being transferred between the layer entities

- MNSMS-primitives indicate services provided by CM to SM-RL.
- PMMSMS-primitives indicate services provided by GMM to CM.
- CP-DATA is the CM-message carrying SM-RP data units.
- CP-ACK acknowledge CP-DATA reception on CM.

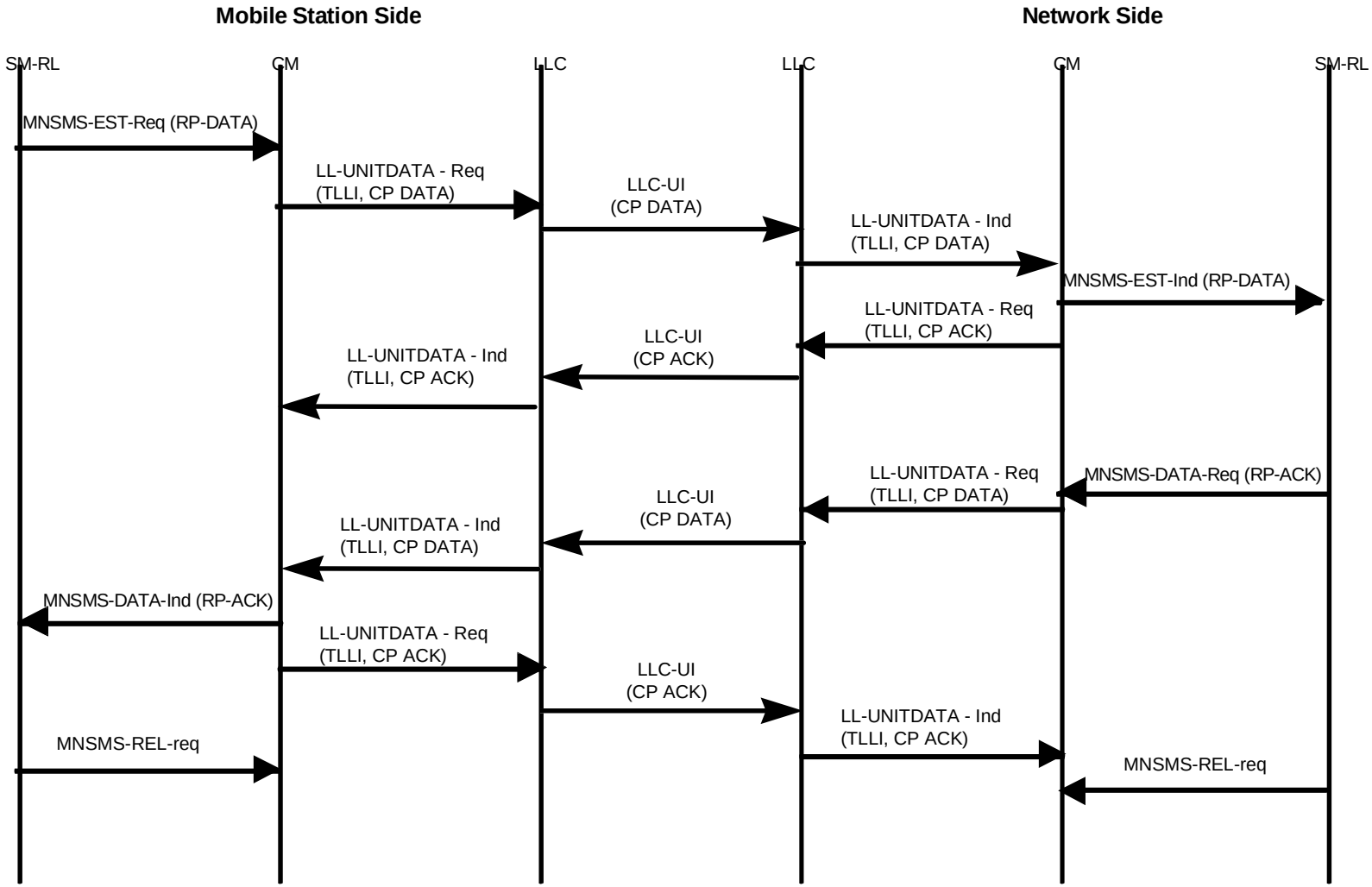
Arrow diagram A8:

The diagram shows UMTS PS MT-messaging by means of interlayer service primitives and the actual messages being transferred between the layer entities

- MNSMS-primitives indicate services provided by CM to SM-RL.
- PMMSMS-primitives indicate services provided by GMM to CM.
- CP-DATA is the CM-message carrying SM-RP data units.

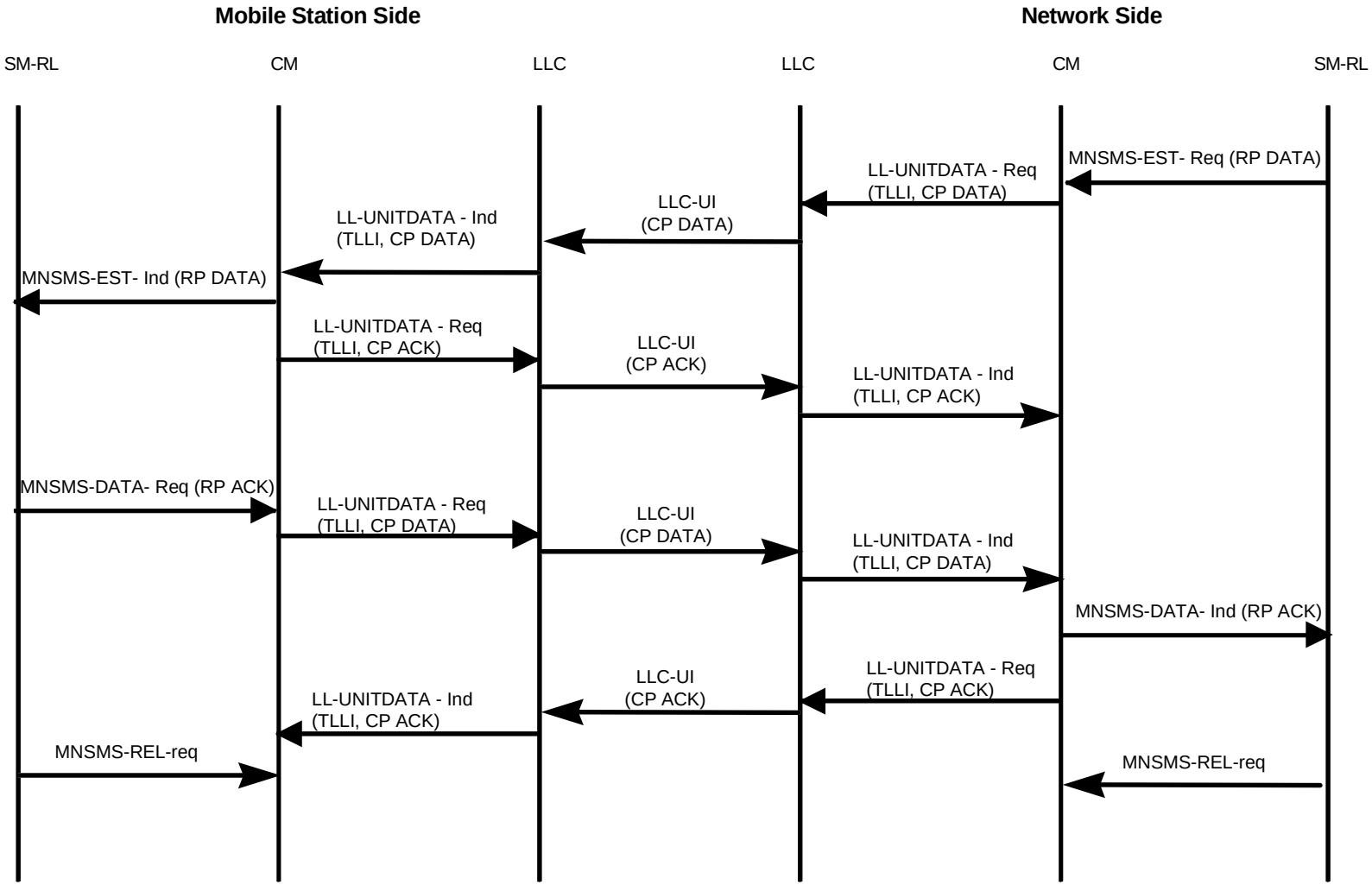
CP-ACK acknowledge CP-DATA reception on CM.

GPRS Mobile Originated Messaging on CM-sublayer in GSM



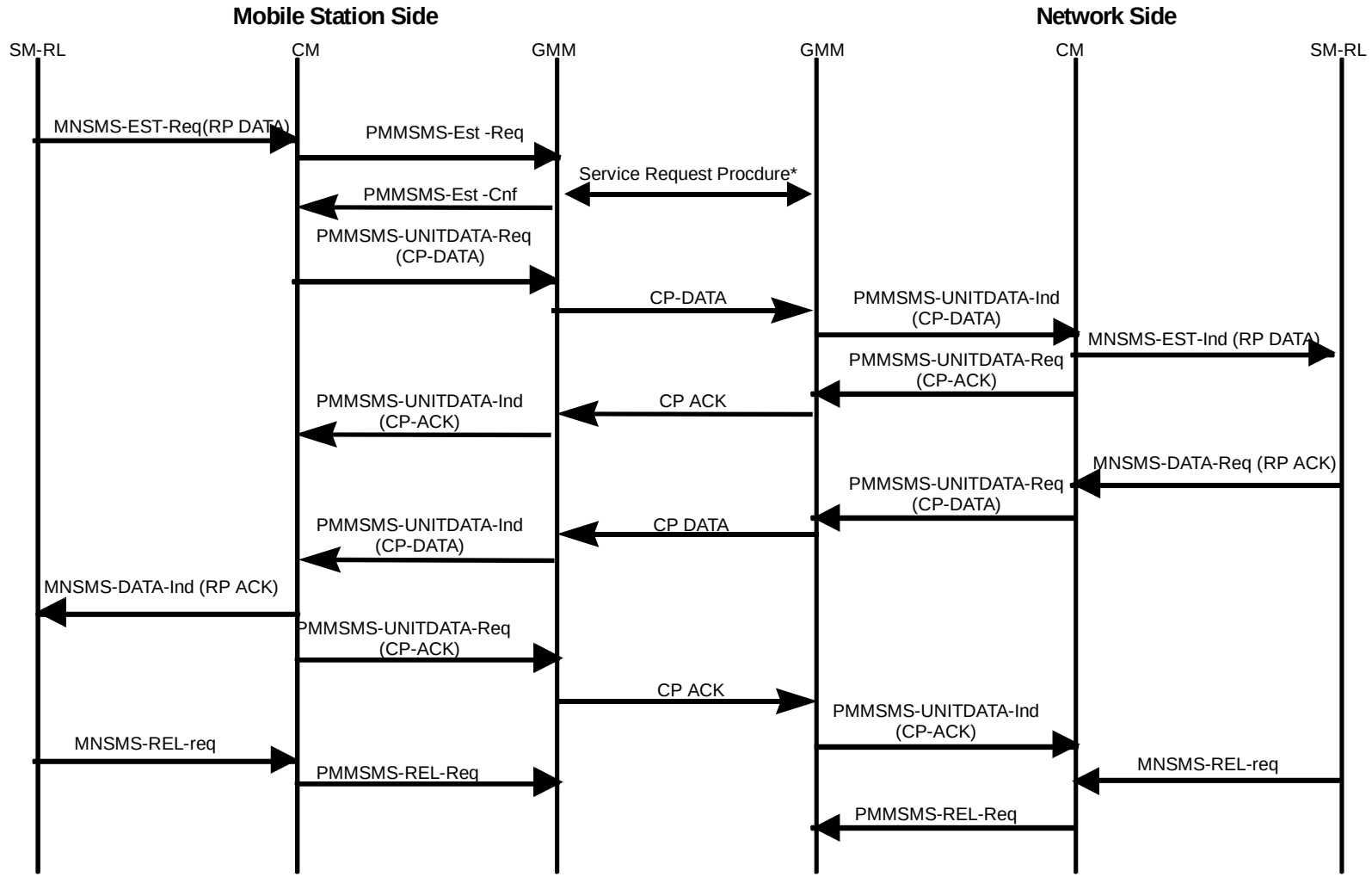
Arrow diagram A5

GPRS Mobile Terminated Messaging on CM-sublayer in GSM



Arrow diagram A6

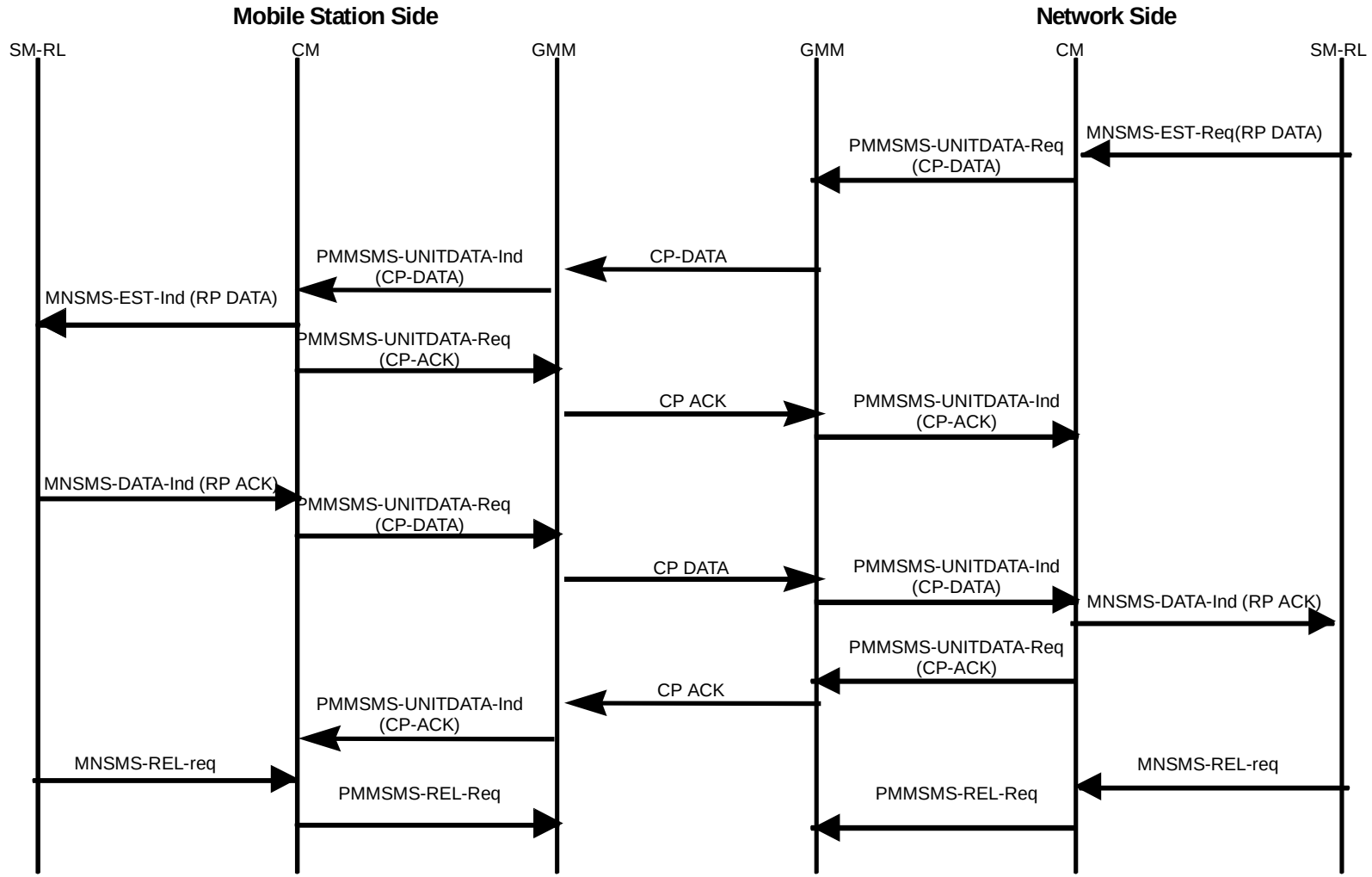
GPRS Mobile Originated Messaging on CM-sublayer in UMTS



Note: Service Request Procedure may not be initiated.

Arrow diagram A7

GPRS Mobile Terminated Messaging on CM-sublayer in UMTS



Arrow diagram A8

Annex B (normative): SDL-description of the CM-layer

B.1 Introduction

This annex contains an SDL-description of the Connection Management Sublayer in terms of the Short Message Service Support. The CM- sublayer provides services to Short Message Relay Layer.

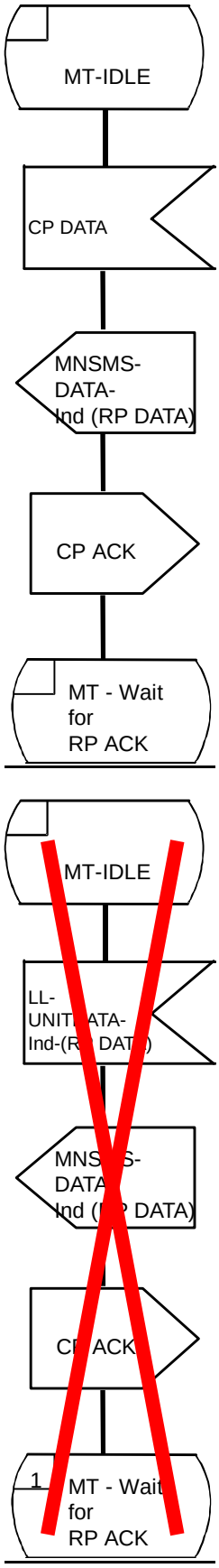
The SDLs contain a mixture of peer to peer messages and conceptual primitives between the layers SM-RL, CM, MM and LLC, as viewed by the SMC entities. SDL-1/2/3 show the CS ~~GSM~~ SMC entity on MS-side for Mobile Originated (MO) short message transfer, SDL-4/5/6 show the CS ~~GSM~~ SMC entity on MS-side for Mobile Terminated (MT) short message transfer, SDL-7/8/9 show the CS ~~GSM~~ SMC entity on the network side for Mobile Originated (MO) short message transfer, and SDL-10/11/12 show the CS ~~GSM~~ SMC entity on the network side for Mobile Terminated (MT) short message transfer.

SDL-13/14/15 show the GPRS SMC entity on MS-side for Mobile Originated (MO) short message transfer, [FFS: These diagrams don't show new UMTS state.]

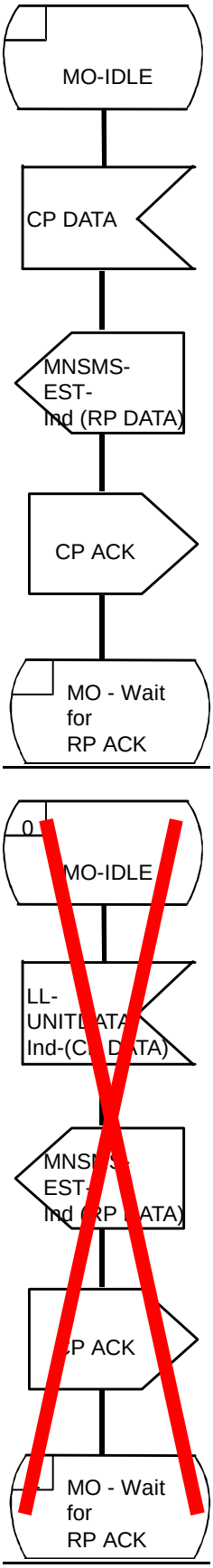
SDL-16/17/18 show the GPRS SMC entity on MS-side for Mobile Terminated (MT) short message transfer,
SDL-19/20/21 show the GPRS SMC entity on the network side for Mobile Originated (MO) short message transfer, and
SDL-22/23/24 show the GPRS SMC entity on the network side for Mobile Terminated (MT) short message transfer.

The lower layers (below MM , GMM and LLC) are transparent to an SMC entity.

******* Only the modified figures are shown below**.*****



MT-SMC-GP entity on MS-side for GPRS
SDL-16



MO-SMC-GP entity on Network side for GPRS
SDL-19

3GPP/SMG Meeting #9
Bad Aibling, Germany, 30 Nov- 3 Dec. 1999

***Document* N1-99F03**
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

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24.007	CR	003r5	Current Version:	3.1.0

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

For submission to:	CN#6	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic		

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

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

Source: NTT Communicationware **Date:** 3.12.99

Subject: Using MM sublayer for PS-SMS message transfer

Work item: GSM/UMTS Interworking

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

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

Reason for change:

In GSM, LLC is used for PS-SMS message transfer. However, It is agreed that the GMM shall be used for PS-SMS transfer in UMTS system which is described in TS 23.121.

This CR proposes the protocol architecture for UMTS PS-SMS. In UMTS, in order to send SMS message as GMM signalling message, PS signalling connection establishment may be required. The new SAP for this purpose is introduced to GMM(PMMSMS-SAP).

Clauses affected:

5.2
9.5, 10.5 and new subchapters in chapter 9.5 and 10.5

Other specs affected:

Other 3G core specifications	X	→ List of CRs:	24.011 CR001r5
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.

5.2 Protocol architecture

The protocol architecture is visualised for each of the three models:

- Figure 5.1/~~GSM 0407~~ TS 24.007 shows the protocol architecture for a MS not supporting the GPRS service, restricting the representation of CM sublayer protocols to four paradigmatic examples, CC, LCS, SS, and SMS. Note that the protocol stack for a class C GPRS service may be present in the MS, but it is not active simultaneously.
- Figure 5.2 shows the protocol architecture for a MS supporting the Class C GPRS service. (Note that the protocol stack for a circuit switched services may be present in the MS, but it is not active simultaneously)
- Figure 5.3 shows the protocol architecture for non-GPRS and GPRS-services supporting Class A and Class B MSs
- Figure 5.4 shows the protocol architecture for a MS supporting CTS services in addition to non-GPRS services.
- Figure 5.5 shows the protocol architecture for a MS supporting the PS mode of operation UMTS service
- Figure 5.6 shows the protocol architecture for UMTS services supporting CS/PS mode of operation MSs

***** Figure 5.1,5.2.5.3.5.4 are not shown in this CR.*****

-

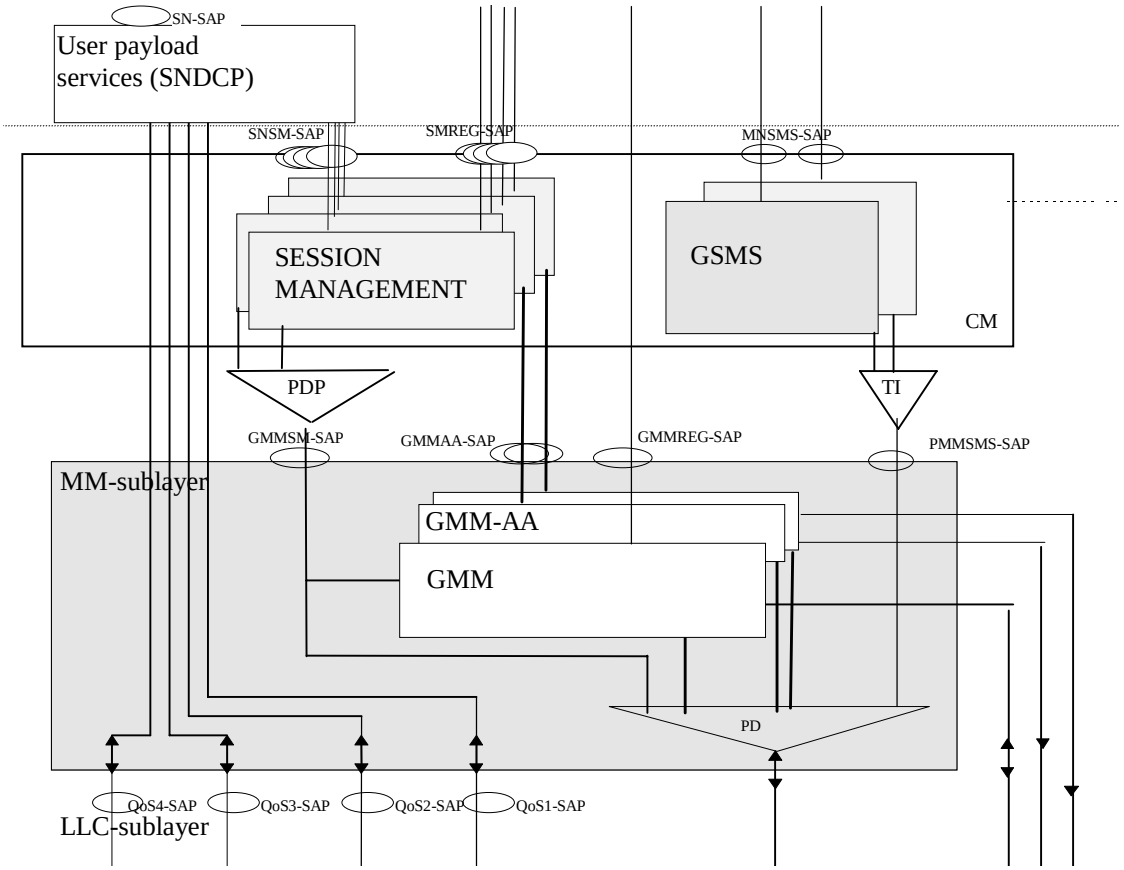

Figure 5.5, Protocol architecture of Non Access Stratum supporting PS mode of operation MSs, MS – side

Note: SMS un-related parts of this figure e.g. SNDCP and GMM-AA should be modified for UMTS.

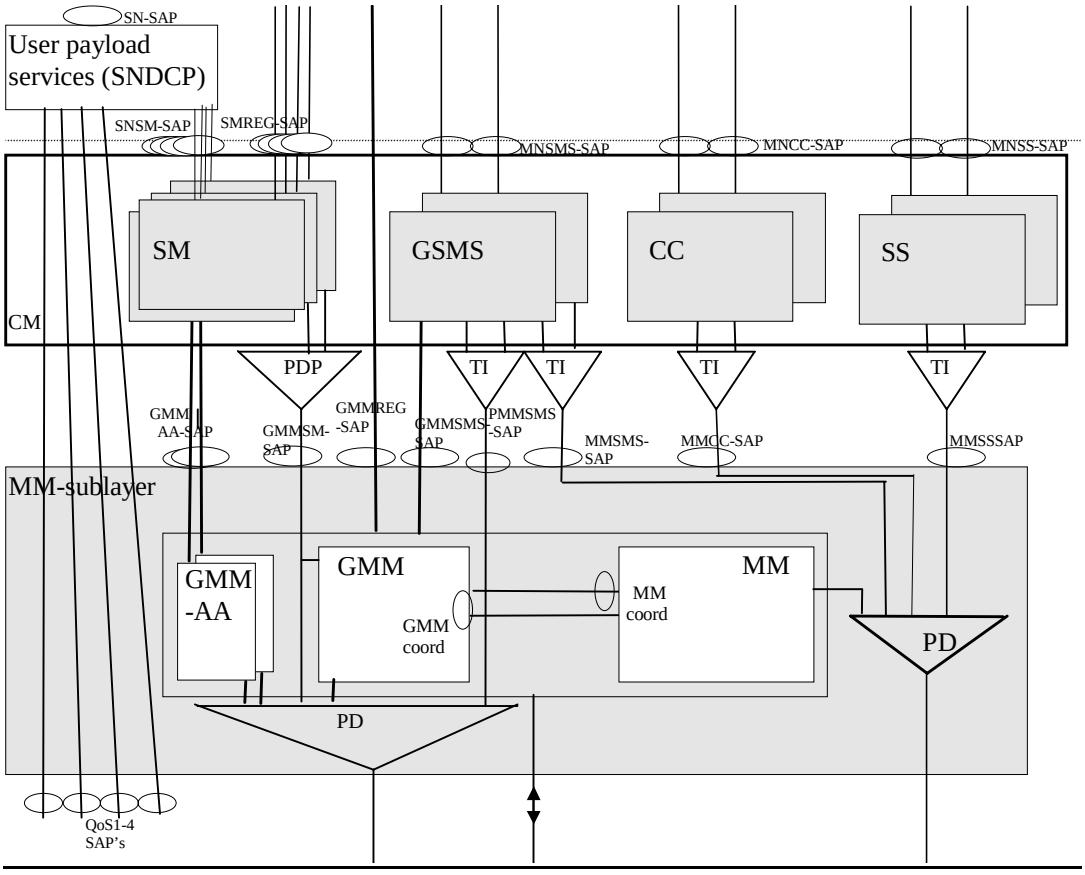

Figure 5.6/ 24.007, Protocol architecture of Non Access Stratum supporting CS/PS mode of operation MSs, MS -– side

Note: SMS un-related parts of this figure, e.g. SNDCP and GMM-AA should be modified for UMTS.

As shown in figure 5.1 a hierarchy of 3 sublayers is defined:

- the RR sublayer provides services to the MM sublayer and utilizes the services of signalling layer 2;
- the MM sublayer provides common services to the entities of the Connection Management (CM) sublayer;
- the CM sublayer includes, among others, the CC, SS, and SMS entities, which are independent entities.

Figure 5.2 defines four sublayers for GPRS services supporting Class C MSs:

- the RR sublayer provides services to the MM and LLC sublayers;
- the LLC sublayer provides services to the MM sublayer, the SNDCP and GSMS entities and uses services of the RR sublayer;
- the MM sublayer provides services to the SM entities of the CM. The MM sublayer either includes (a.) one GMM entity for non-anonymous access or (b.) one or more GMM-AA entities for anonymous access or (c.) one GMM entity and one or more GMM-AA entities;
- the CM sublayer includes the SM and GSMS entities. The SM entity provides services to the SNDCP entity and uses services of the MM sublayer. The GSMS entity is identical to the SMS entity for non-GPRS services except it uses the services from the LLC sublayer

Figure 5.3 defines four sublayers for non-GPRS and GPRS-services supporting Class A and Class B MSs :

- the RR sublayer provides services to the MM and LLC sublayers;
- the LLC sublayer provides services to the MM sublayer, the SNDCP and GSMS entities and uses services of the RR sublayer;

- the MM sublayer provides services to the SNDCP entity and to the entities of the Connection Management (CM) sublayer. In addition to the MM entity for non-GPRS services, the MM sublayer further includes either (a.) one GMM entity for non-anonymous access or (b) one or more GMM-AA entities for anonymous access or (c.) one GMM entity and one or more GMM-AA entities;

- the CM sublayer includes, among others, the CC, SS, GSMS and SM entities, which are independent entities.

  The SM entity provides services to the SNDCP entity and uses services of the MM sublayer.
  The GSMS entity is an extension of the SMS entity for non-GPRS services. For message transfer it uses the services both from the LLC sublayer and the MM entity of the MM sublayer. Furthermore it retrieves from the MM entity information about which transport service to use.

Figure 5.4 defines three sub-layers for CTS services:

- the RR sublayer provides services (including CTS services) to the MM sublayer and uses the services of signalling layer 2;

- the MM sublayer provides common services to the entities of the Connection Management (CM) sublayer; it provides also specific CTS services to the entities above CM.

- the CM sublayer includes, among others, the CC, SS, and SMS entities, which are independent entities.

Figure 5.5 defines two sublayers for UMTS PS domain services supporting PS mode of operation:

- the MM sublayer provides services to the SM entities and GSMS entities of the CM. The MM sublayer either includes (a.) one GMM entity for non-anonymous access or (b.) one or more GMM-AA entities for anonymous access or (c.) one GMM entity and one or more GMM-AA entities;

(GMM-AA for UMTS is FFS)

- the CM sublayer includes the SM and GSMS entities. The SM entity provides services to the PDCP entity and uses services of the MM sublayer. The GSMS entity is identical to the SMS entity for GPRS services in GSM except it uses the services from the GMM sublayer.

Figure 5.6 defines two sublayers for UMTS CS domain services and UMTS PS domain services supporting CS/PS mode of operation MSs :

- the MM sublayer provides services to the entities of the Connection Management (CM) sublayer. In addition to the MM entity for CS domain services, the MM sublayer further includes either (a.) one GMM entity for non-anonymous access or (b) one or more GMM-AA entities for anonymous access or (c.) one GMM entity and one or more GMM-AA entities;

(GMM-AA for UMTS is FFS)

- the CM sublayer includes, among others, the CC, SS, GSMS and SM entities, which are independent entities.

  The SM entity provides services to the PDCP entity and uses services of the MM sublayer.
  The GSMS entity is an extension of the SMS entity for CS domain services. For message transfer it uses the services both from the GMM entity of the MM sublayer and the MM entity of the MM sublayer. Furthermore it retrieves from the MM entity information about which transport service to use.

9 Interlayer service interfaces on the MS side

9.5 Services provided by the GMM for GPRS services~~Registration Services provided for GPRS Services~~

The GPRS Mobility Management (GMM) sublayer provides services to the Session Management (SM) entity and the Short Message Service Support (GSMS) entity for message transfer.

9.5.X Service primitives for PMMSMS-SAP

Table 9.X: Primitives and Parameters at PMMSMS-SAP - UE side

PRIMITIVES	PARAMETERS (message, info elements of message, other parameters)	REFERENCE
PMMSMS_EST_REQ	Mobile-ID	9.5.X.1
PMMSMS_EST_CNF	-	9.5.X.2
PMMSMS_REL_REQ	-	9.5.X.3
PMMSMS_ERROR_IND	cause	9.5.X.4
PMMSMS_UNITDATA_REQ	SMS-PDU	9.5.X.5
PMMSMS_UNITDATA_IND	SMS-PDU	9.5.X.6

9.5.X.1 PMMSMS_EST_REQ

The GMM is requested to establish a PS signalling conection.

9.5.X.2 PMMSMS_EST_CNF

The GMM indicates a PS signalling connection is established.

9.5.X.3 PMMSMS_REL_REQ

The GMM is requested to release of a PS signalling connection.

9.5.X.4 PMMSMS_ERROR_IND

The GMM indicates that a PS signalling connection has been released.

9.5.X.5 PMMSMS_UNITDATA_REQ

The GMM is requested to forward a SMS PDU in order to send it to the peer entity.

9.5.X.6 PMMSMS_UNITDATA_IND

Indication used by GMM to transfer the received data to the GSMS entities.

10 Interlayer service interfaces on the Network side

10.5 Services provided by the GMM for GPRS services

The GPRS Mobility Management (GMM) sublayer provides services to the Session Management (SM) entity and the Short Message Service Support (SMS) entity for message transfer.

10.5.X Service primitives for PMMSMS-SAP

Table 10.X: Primitives and Parameters at PMMSMS-SAP - Network side

PRIMITIVES	PARAMETERS (message, info elements of message, other parameters)	REFERENCE
PMMSMS_REL_REQ	-	10.5.X.1
PMMSMS_ERROR_IND	cause	10.5.X.2
PMMSMS_UNITDATA_REQ	SMS-PDU	10.5.X.3

PMMSMS_UNITDATA_IND	SMS-PDU	10.5.X.4

10.5.X.1 PMMSMS_REL_REQ

The GMM is requested to release of a PS signalling connection.

10.5.X.2 PMMSMS_ERROR_IND

The GMM indicates that a PS signalling connection has been released.

10.5.X.3 PMMSMS_UNITDATA_REQ

The GMM is requested to forward a SMS PDU in order to send to the peer entity.

10.5.X.4 PMMSMS_UNITDATA_IND

Indication used by GMM to transfer the received data to the GSMS entities.

3GPP/SMG Meeting #8
Kobe, Japan, 25-29 Oct 1999

Document N1-99D14
e.g. for 3GPP use the format TP-99xxx
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24.007	**CR**	**004r1**	Current Version:	3.1.0

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

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

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

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

Source: Vodafone **Date:** 19-10-1999

Subject: Uplink L3 Message Sequencing

Work item: R99- GSM/UMTS Interworking

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

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

Reason for change:

Currently, after re-establishment of a layer 2 connection, the MS shall re-transmit any unacknowledged layer 3 messages. (The reason for no acknowledgement is likely to be because of the change in channels). The MSC needs to know whether messages arriving are duplicates of messages already received or not. In GSM, one-bit sequence numbering is used. The MS sets the sequence number of messages to alternate between 0 and 1. Therefore, if the MSC receives two consecutive messages with the same sequence number, it has to treat the second as a duplicate, and discard it.

UMTS will offer improved signalling, by having a larger layer 2 transmit window size. This means that a MS handing over from UMTS to GSM, may retransmit several unacknowledged L3 messages. The GSM core network- operating with a window size of one- may not be able to distinguish between original messages and duplicated messages.

The purpose of this CR is to extend the Send Sequence Number (N (SD)) field in the layer 3 header to 2 bits, thus allowing for a window size of up to 3. Bit 8 of octet 1, in the L3 header, is currently reserved and it is this bit that should be used.

The N(SD) mechanism only applies to messages to the MSC. Release 97 GPRS does not use the N(SD) scheme. These CRs do not attempt to add the N(SD) scheme to R99 GMM/SM.

Handover issues are not impacted, due to the anchor MSC system.

Clauses affected: 11.2.3.2

Other specs affected:

Other 3G core specifications	X	→ List of CRs:	CR041r1 to 24.008
Other GSM core specifications	X	→ List of CRs:	CRA026 to 04.18
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.

11.2.3.2.1 Message type octet (when accessing Release 98 and older networks only)

The message type octet is the second in a standard L3 message.
When a standard L3 message is expected, and a message is received that is less than 16 bit long, that message shall be ignored.
When the radio connection started with a core network node of a Release 98 or older network, the message type IE is coded as shown in figure 11.10a.
Bit 8 is encoded as "0"; value "1" is reserved for possible future use as an extension bit. A protocol entity expecting a standard L3 message, and receiving a message containing bit 8 of octet 2 encoded as "1" shall diagnose a " message not defined for the PD" error and treat the message accordingly.
In messages sent using the transmission functionality provided by the RR layer to upper layers, and sent from the mobile station to the network , bit 7 of octet 2 is used by the RR protocol.
In all other standard layer 3 messages bit 7 is set to a default value. A protocol entity expecting a standard L3 message, and not using the transmission functionality provided by the RR layer, and receiving a message containing bit 7 of octet 2 encoded different to the default value shall diagnose a "message not defined for the PD" error and treat the message accordingly.
The default value for bit 7 is 0 except for the SM protocol where the default value is 1.

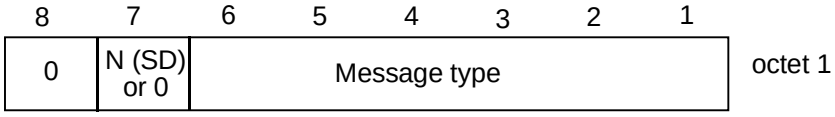

Figure 11.10a: Message type IE

Bit 1 to 6 of octet 2 of standard L3 messages contain the message type.
The message type determines the function of a message within a protocol in a given direction and for a given lower layer SAP. The meaning of the message type is therefore dependent on the protocol (the same value may have different meanings in different protocols), the direction (the same value may have different meanings in the same protocol, when sent from the Mobile Station to the network and when sent from the network to the Mobile Station) and the lower layer SAP (the same value may have different meanings, e.g., whether the message was sent on the SACCH or on the main DCCH).
Each protocol defines a list of allowed message types for each relevant SAP. A message received analysed as a standard L3 message, and with a message type not in the corresponding list leads to the diagnosis "message not defined for the PD". Some message types may correspond to a function not implemented by the receiver. They are then said to be non implemented by the receiver.
The reaction of a protocol entity expecting a standard L3 message and receiving a message with message type not defined for the PD or not implemented by the receiver and the reception conditions is defined in the relevant protocol specification. As a general rule, a protocol specification should not force the receiver to analyse the message further.

11.2.3.2.2 Message type octet (when accessing Release 99 and newer networks only)

The message type octet is the second in a standard L3 message.
When a standard L3 message is expected, and a message is received that is less than 16 bit long, that message shall be ignored.
When the radio connection started with a core network node of a Release 99 network, the message type IE is coded as shown in figure 11.10b and 11.10c.

In messages- other than GMM and SM- sent using the transmission functionality provided by the RR and/or RRC layer to upper layers, and sent from the mobile station to the network , bits 7 and 8 of octet 2 are used by the RR and/or RRC protocol.
In all other standard layer 3 messages bits 7 and 8 are set to a default value. A protocol entity expecting a standard L3 message, and not using the transmission functionality provided by the RR and/or RRC layer, and receiving a message containing bit 7 or bit 8 of octet 2 encoded different to the default value shall diagnose a "message not defined for the PD" error and treat the message accordingly.

The default value for bit 8 is 0. The default value for bit 7 is 0 except for the SM protocol which has a default value of 1.

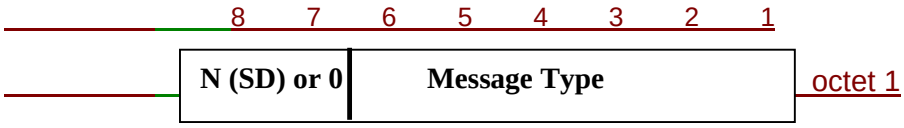

Figure 11.10b: Message type IE (protocol other than GMM and SM)

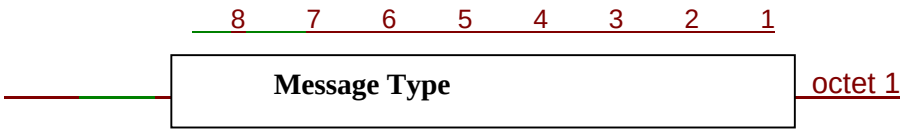

Figure 11.10c: Message type IE (GMM and SM)

Bit 1 to 6 of octet 2 of standard L3 messages contain the message type.
The message type determines the function of a message within a protocol in a given direction and for a given lower layer SAP. The meaning of the message type is therefore dependent on the protocol (the same value may have different meanings in different protocols), the direction (the same value may have different meanings in the same protocol, when sent from the Mobile Station to the network and when sent from the network to the Mobile Station) and the lower layer SAP (the same value may have different meanings, e.g., whether the message was sent on the SACCH or on the main DCCH).
Each protocol defines a list of allowed message types for each relevant SAP. A message received analysed as a standard L3 message, and with a message type not in the corresponding list leads to the diagnosis "message not defined for the PD". Some message types may correspond to a function not implemented by the receiver. They are then said to be non implemented by the receiver.
The reaction of a protocol entity expecting a standard L3 message and receiving a message with message type not defined for the PD or not implemented by the receiver and the reception conditions is defined in the relevant protocol specification. As a general rule, a protocol specification should not force the receiver to analyse the message further.

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Kobe, Japan, 25-29 Oct 1999

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e.g. for 3GPP use the format TP-99xxx
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24.008	**CR**	**041r1**	Current Version:	3.1.0

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

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

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

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

Source: Vodafone **Date:** 19-10-1999

Subject: Uplink L3 Message Sequencing

Work item: R99- GSM/UMTS interworking

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

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

Reason for change:

Currently, after re-establishment of a layer 2 connection, the MS shall re-transmit any unacknowledged layer 3 messages. (The reason for no acknowledgement is likely to be because of the change in channels). The MSC needs to know whether messages arriving are duplicates of messages already received or not. In GSM, one-bit sequence numbering is used. The MS sets the sequence number of messages to alternate between 0 and 1. Therefore, if the MSC receives two consecutive messages with the same sequence number, it has to treat the second as a duplicate, and discard it.

UMTS will offer improved signalling, by having a larger layer 2 transmit window size. This means that a MS handing over from UMTS to GSM, may retransmit several unacknowledged L3 messages. The GSM core network- operating with a window size of one- may not be able to distinguish between original messages and duplicated messages.

The purpose of this CR is to extend the Send Sequence Number (N (SD)) field in the layer 3 header to 2 bits, thus allowing for a window size of up to 3. Bit 8 of octet 1, in the L3 header, is currently reserved and it is this bit that should be used.

The N(SD) mechanism only applies to messages to the MSC. Release 97 GPRS does not use the N(SD) scheme. These CRs do not attempt to add the N(SD) scheme to R99 GMM/SM.

Handover issues are not impacted, due to the anchor MSC system.

Clauses affected: 10.4

Other specs affected:	Other 3G core specifications	X	→ List of CRs:	CR004r1 to 24.007
	Other GSM core specifications	X	→ List of CRs:	CRA026 to 04.18
	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.

10.4 Message Type

The message type IE and its use are defined in TS 24.007 [20]. Tables 10.3/TS 24.008, 10.4/TS 24.008, and 10.4a/TS 24.008 define the value part of the message type IE used in the Mobility Management protocol, the Call Control protocol, and Session management protocol.

Table 10.2/TS 24.008: Message types for Mobility Management

8 7 6 5 4 3 2 1	
x~~0~~ x 0 0 - - - -	Registration messages:
0 0 0 1	- IMSI DETACH INDICATION
0 0 1 0	- LOCATION UPDATING ACCEPT
0 1 0 0	- LOCATION UPDATING REJECT
1 0 0 0	- LOCATION UPDATING REQUEST
x~~0~~ x 0 1 - - - -	Security messages:
0 0 0 1	- AUTHENTICATION REJECT
0 0 1 0	- AUTHENTICATION REQUEST
0 1 0 0	- AUTHENTICATION RESPONSE
1 0 0 0	- IDENTITY REQUEST
1 0 0 1	- IDENTITY RESPONSE
1 0 1 0	- TMSI REALLOCATION COMMAND
1 0 1 1	- TMSI REALLOCATION COMPLETE
x~~0~~ x 1 0 - - - -	Connection management messages:
0 0 0 1	- CM SERVICE ACCEPT
0 0 1 0	- CM SERVICE REJECT
0 0 1 1	- CM SERVICE ABORT
0 1 0 0	- CM SERVICE REQUEST
0 1 0 1	- CM SERVICE PROMPT
0 1 1 0	- NOTIFICATION RESPONSE
1 0 0 0	- CM RE-ESTABLISHMENT REQUEST
1 0 0 1	- ABORT
x~~0~~ x 1 1 - - - -	Miscellaneous messages:
0 0 0 0	- MM NULL
0 0 0 1	- MM STATUS
0 0 1 0	- MM INFORMATION

~~Bit 8 is reserved for possible future use as an extension bit, see TS 24.007.~~
When the radio connection started with a core network node of earlier than R99, bit 8 shall be set to 0 and b~~B~~it 7 is reserved for the send sequence number in messages sent from the mobile station. In messages sent from the network, bits 7 and 8 are~~is~~ coded with a "0". See TS 24.007.

When the radio connection started with a core network node of R'99 or later, bits 7 and 8 are reserved for the send sequence number in messages sent from the mobile station. In messages sent from the network, bits 7 and 8 are~~is~~ coded with a "0". See TS 24.007.

Table 10.3/TS 24.008: Message types for Call Control and call related SS messages

8 7 6 5 4 3 2 1	
~~x0~~ x 0 0 0 0 0 0	escape to nationally specific message types ; see 1) below
~~x0~~ x 0 0 - - - -	Call establishment messages:
0 0 0 1	- ALERTING
1 0 0 0	- CALL CONFIRMED
0 0 1 0	- CALL PROCEEDING
0 1 1 1	- CONNECT
1 1 1 1	- CONNECT ACKNOWLEDGE
1 1 1 0	- EMERGENCY SETUP
0 0 1 1	- PROGRESS
0 1 0 0	- CC-ESTABLISHMENT
0 1 1 0	- CC-ESTABLISHMENT CONFIRMED
1 0 1 1	- RECALL
1 0 0 1	- START CC
0 1 0 1	- SETUP
~~x0~~ x 0 1 - - - -	Call information phase messages:
0 1 1 1	- MODIFY
1 1 1 1	- MODIFY COMPLETE
0 0 1 1	- MODIFY REJECT
0 0 0 0	- USER INFORMATION
1 0 0 0	- HOLD
1 0 0 1	- HOLD ACKNOWLEDGE
1 0 1 0	- HOLD REJECT
1 1 0 0	- RETRIEVE
1 1 0 1	- RETRIEVE ACKNOWLEDGE
1 1 1 0	- RETRIEVE REJECT
~~x0~~ x 1 0 - - - -	Call clearing messages:
0 1 0 1	- DISCONNECT
1 1 0 1	- RELEASE
1 0 1 0	- RELEASE COMPLETE
~~x0~~ x 1 1 - - - -	Miscellaneous messages:
1 0 0 1	- CONGESTION CONTROL
1 1 1 0	- NOTIFY
1 1 0 1	- STATUS
0 1 0 0	- STATUS ENQUIRY
0 1 0 1	- START DTMF
0 0 0 1	- STOP DTMF
0 0 1 0	- STOP DTMF ACKNOWLEDGE
0 1 1 0	- START DTMF ACKNOWLEDGE
0 1 1 1	- START DTMF REJECT
1 0 1 0	- FACILITY

1): When used, the message type is defined in the following octet(s), according to the national specification.

~~Bit 8 is reserved for possible future use as an extension bit, see TS 24.007.~~
~~Bit 7 is reserved for the send sequence number in messages sent from the mobile station. In messages sent from the network, bit 7 is coded with a "0". See TS 24.007.~~
When the radio connection started with a core network node of earlier than R99, bit 8 shall be set to 0 and bit 7 is reserved for the send sequence number in messages sent from the mobile station. In messages sent from the network, bits 7 and 8 are coded with a "0". See TS 24.007.

When the radio connection started with a core network node of R'99 or later, bits 7 and 8 are reserved for the send sequence number in messages sent from the mobile station. In messages sent from the network, bits 7 and 8 are coded with a "0". See TS 24.007.

Table 10.4/TS 24.008: Message types for GPRS mobility management

Bits 8 7 6 5 4 3 2 1	
0 0 - - - - - -	Mobility management messages
0 0 0 0 0 0 0 1	Attach request
0 0 0 0 0 0 1 0	Attach accept
0 0 0 0 0 0 1 1	Attach complete
0 0 0 0 0 1 0 0	Attach reject
0 0 0 0 0 1 0 1	Detach request
0 0 0 0 0 1 1 0	Detach accept
0 0 0 0 1 0 0 0	Routing area update request
0 0 0 0 1 0 0 1	Routing area update accept
0 0 0 0 1 0 1 0	Routing area update complete
0 0 0 0 1 0 1 1	Routing area update reject
0 0 0 1 0 0 0 0	P-TMSI reallocation command
0 0 0 1 0 0 0 1	P-TMSI reallocation complete
0 0 0 1 0 0 1 0	Authentication and ciphering req
0 0 0 1 0 0 1 1	Authentication and ciphering resp
0 0 0 1 0 1 0 0	Authentication and ciphering rej
0 0 0 1 0 1 0 1	Identity request
0 0 0 1 0 1 1 0	Identity response
0 0 1 0 0 0 0 0	GMM status
0 0 1 0 0 0 0 1	GMM information

Table 10.4a/TS 24.008: Message types for GPRS session management

Bits 8 7 6 5 4 3 2 1	
0 1 - - - - - -	Session management messages
0 1 0 0 0 0 0 1	Activate PDP context request
0 1 0 0 0 0 1 0	Activate PDP context accept
0 1 0 0 0 0 1 1	Activate PDP context reject
0 1 0 0 0 1 0 0	Request PDP context activation
0 1 0 0 0 1 0 1	Request PDP context activation rej.
0 1 0 0 0 1 1 0	Deactivate PDP context request
0 1 0 0 0 1 1 1	Deactivate PDP context accept
0 1 0 0 1 0 0 0	Modify PDP context request
0 1 0 0 1 0 0 1	Modify PDP context accept
0 1 0 1 0 0 0 0	Activate AA PDP context request
0 1 0 1 0 0 0 1	Activate AA PDP context accept
0 1 0 1 0 0 1 0	Activate AA PDP context reject
0 1 0 1 0 0 1 1	Deactivate AA PDP context request
0 1 0 1 0 1 0 0	Deactivate AA PDP context accept
0 1 0 1 0 1 0 1	SM Status

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Bad Aibling, Germany, 30.11.-3.12.1999

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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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24.008	CR	069r1	Current Version:	3.1.0

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

For submission to:	CN#9	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: Ericsson, Siemens, Nokia **Date:** 99-11-30

Subject: 24.008 Vocabulary

Work item: GSM-UMTS Interworking

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:

TS 24.008 is based on GSM TS 04.08 and consequently the terminology has been defined for GSM and GPRS environment.

For UMTS the common Core Network specification will need to cover the requirements of GSM, UMTS and GSM-UMTS multimode.

If agreed the originators of this CR are volunteering to provide the CRs that are necessary to take these definitions to 24.008 CC, MM, SM and GMM sections.

Clauses affected: Vocabulary

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:


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

2.2.2 Vocabulary

The following terms are used in this Technical Specification:

- **idle mode:** In this mode, the mobile station is not allocated any dedicated channel; it listens to the CCCH and the BCCH;

- **group receive mode:** (only applicable for mobile stations supporting VGCS listening or VBS listening) In this mode, the mobile station is not allocated a dedicated channel with the network; it listens to the downlink of a voice broadcast channel or voice group call channel allocated to the cell. Occasionally, the mobile station has to listen to the BCCH of the serving cell as defined in TS 23.022 and 05.08;

- **dedicated mode:** In this mode, the mobile station is allocated at least two dedicated channels, only one of them being a SACCH;

- **group transmit mode:** (only applicable for mobile stations supporting VGCS talking) In this mode, one mobile station of a voice group call is allocated two dedicated channels, one of them being a SACCH. These channels can be allocated to one mobile station at a time but to different mobile stations during the voice group call;

- **packet idle mode**: (only applicable for mobile stations supporting GPRS) In this mode, mobile station is not allocated any radio resource on a packet data physical channel; it listens to the PBCCH and PCCCH or, if those are not provided by the network, to the BCCH and the CCCH, see GSM 04.60.

- **packet transfer mode**: (only applicable for mobile stations supporting GPRS) In this mode, the mobile station is allocated radio resource on one or more packet data physical channels for the transfer of LLC PDUs.

- **main DCCH:** In Dedicated mode and group transmit mode, only two channels are used as DCCH, one being a SACCH, the other being a SDCCH or a FACCH; the SDCCH or FACCH is called here "the main DCCH";

- A channel is **activated** if it can be used for transmission, in particular for signalling, at least with UI frames. On the SACCH, whenever activated, it must be ensured that a contiguous stream of layer 2 frames is sent;

- A TCH is **connected** if circuit mode user data can be transferred. A TCH cannot be connected if it is not activated. A TCH which is activated but not connected is used only for signalling, i.e. as a DCCH;

- The data link of SAPI 0 on the main DCCH is called the **main signalling link**. Any message specified to be sent on the main signalling link is sent in acknowledged mode except when otherwise specified;

- The term **"to establish"** a link is a short form for **"to establish the multiframe mode"** on that data link. It is possible to send UI frames on a data link even if it is not established as soon as the corresponding channel is activated. Except when otherwise indicated, a data link layer establishment is done without an information field.

- **“channel set”** is used to identify TCHs that carry related user information flows, e.g., in a multislot configuration used to support circuit switched connection(s), which therefore need to

- be handled together.

- A **temporary block flow** (TBF) is a physical connection used by the two RR peer entities to support the uni-directional transfer of LLC PDUs on packet data physical channels, see GSM 04.60.

- **RLC/MAC block:** A RLC/MAC block is the protocol data unit exchanged between RLC/MAC entities, see GSM 04.60.

- A **GMM context** is established when a GPRS attach procedure is successfully completed.

-- **Network operation mode**

The three different network operation modes I, II, and III are defined in TS 23.060 [74].

The network operation mode shall be indicated as system information. For proper operation, the network operation mode should be the same in each cell of one routing area.

-- **GPRS MS operation mode**

The three different GPRS MS operation modes A, B, and C are defined in TS 23.060 [74].

- **Anonymous access** refers to limited service provisioning to an MS whose identity is unknown in the network.

- **RR connection:** A RR connection is a dedicated physical circuit switched domain connection used by the two RR or RRC peer entities to support the upper layers' exchange of information flows.

- **PS signalling connection** is a peer to peer UMTS connection between MS and CN packet domain node.

- **Inter-System change** is a change of radio access between different radio access technologies such as GSM and UMTS.

- **GPRS:** Packet Services for GSM and UMTS system.

- The label **(GSM only)** indicates this section or paragraph applies only to GSM system. For multi system case this is determined by the current serving radio access network.

- The label **(UMTS only)** indicates this section or paragraph applies only to UMTS system. For multi system case this is determined by the current serving radio access network.

- **In GSM,...** Indicates this paragraph applies only to GSM System. For multi system case this is determined by the current serving radio access network.

- **In UMTS,...** Indicates this paragraph applies only to UMTS System. For multi system case this is determined by the current serving radio access network.

- **SIM,** Subscriber Identity Module (see TS GSM 02.17). This specification makes no distinction between SIM and USIM.

- **MS,** Mobile Station. This specification makes no distinction between MS and UE.

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Bad Aibling, Germany, 30 Nov – 3 Dec 1999

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or for SMG, use the format P-99-xxx

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24.008	CR	081r1	Current Version:	3.1.0

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

For submission to: CN#6	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑	for information		non-strategic		

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

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

Source: Nokia **Date:** 99-11-12

Subject: Alignment of MM for R99

Work item: GSM/UMTS interworking

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

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

Release:

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

Reason for change:

CR proposes changes to MM. The authentication (ch. 4.3.2) is not considered. Following changes were made:

- references to 25.331 added when radio interface L3-RR is referred
- L3-RRC SYSTEM INFORMATION BLOCK 1 added when relevant
- dedicated system informations added
- classmark interrogation procedure conserns only GSM
- reference to "security mode setting" added

Clauses affected: Chapters 4.3 - 4.6

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:


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4 Elementary procedures for Mobility Management

4.1 General

This section describes the procedures used for mobility management for non-GPRS services and for GPRS-services at the radio interface (Reference Point Um and Uu).

The main function of the Mobility Management sublayer is to support the mobility of user terminals, such as informing the network of its present location and providing user identity confidentiality.

A further function of the MM sublayer is to provide connection management services to the different entities of the upper Connection Management (CM) sublayer (see TS 24.007).

There are two sets of procedures defined in this chapter:

- MM procedures for non-GPRS services (performed by the MM entity of the MM sublayer); and
- GMM procedures for GPRS services (performed by the GMM entity and GMM-AA entity of the MM sublayer), see GSM ~~0~~2~~4~~.0~~0~~7 [20].

All the MM procedures described in this section can only be performed if a RR connection has been established between the MS and the network. Else, the MM sublayer has to initiate the establishment of a RR connection ~~according to the procedures specified in section 3.3~~ (see GSM 04.18 section 3.3 and ~~3GPP~~TS 25.331 section 8.2.3). The GMM procedures described in this section, use services provided by the RR sublayer without prior RR connection establishment.

GMM procedures are mandatory and applicable only for GPRS MSs and networks supporting those MSs. For GPRS MSs which are IMSI attached for both GPRS and non-GPRS services, some MM procedures are replaced by GMM combined procedures provided that the network operates in network operation mode I, i.e. is supporting combined GMM procedures. GMM combined procedures are not applicable for the GPRS MS operation mode C but are mandatory for the GPRS MS operation modes A and B and networks supporting network operation mode I, see TS 23.060.

4.1.1 MM and GMM procedures

4.1.1.1 Types of MM and GMM procedures

Depending on how they can be initiated, three types of MM procedures can be distinguished:

1) MM common procedures:

   A MM common procedure can always be initiated whilst a RR connection exists. The procedures belonging to this type are:

   Initiated by the network:

   - TMSI reallocation procedure;
   - authentication procedure;
   - identification procedure;
   - MM information procedure;
   - abort procedure.

     However, abort procedure is used only if an MM connection is being established or has already been established i.e. not during MM specific procedures or during IMSI detach procedure, see section 4.3.5.

   Initiated by the mobile station:

   - IMSI detach procedure (with the exceptions specified in section 4.3.4).

ii) MM specific procedures:

A MM specific procedure can only be initiated if no other MM specific procedure is running or no MM connection exists. The procedures belonging to this type are:

- normal location updating procedure;
- periodic updating procedure;
- IMSI attach procedure.

iii) MM connection management procedures:

These procedures are used to establish, maintain and release a MM connection between the mobile station and the network, over which an entity of the upper CM layer can exchange information with its peer. A MM connection establishment can only be performed if no MM specific procedure is running. More than one MM connection may be active at the same time. Depending on how they can be initiated, two types of GMM procedures can be distinguished:

i) GMM common procedures:

Initiated by the network when a GMM context has been established:

- P-TMSI (re-) allocation;
- GPRS authentication and ciphering;
- GPRS identification;
- GPRS information.

ii) GMM specific procedures:

Initiated by the network and used to detach the IMSI in the network for GPRS services and/or non-GPRS services and to release a GMM context:

- GPRS detach.

Initiated by the MS and used to attach or detach the IMSI in the network for GPRS services and/or non-GPRS services and to establish or release a GMM context:

- GPRS attach and combined GPRS attach;
- GPRS detach and combined GPRS detach.

Initiated by the MS when a GMM context has been established:

- normal routing area updating and combined routing area updating;
- periodic routing area updating.

4.1.1.2 MM-GMM co-ordination for GPRS MS's

4.1.1.2.1 GPRS MS operating in mode A or B in a network that operates in mode I

If the network operates in mode I, GPRS MSs that operate in mode A or B and wish to be or are simultaneously IMSI attached for GPRS and non-GPRS services, shall use the combined GPRS attach and the combined and periodic routing area updating procedures instead of the corresponding MM specific procedures IMSI attach and normal and periodic location area updating.

NOTE: A GPRS MS operating in mode A or B in a network that operates in mode I, shall perform the combined GPRS attach or routing area update procedure regardless the value of the ATT flag.

If a GPRS MS is operating in mode A or B in a network that operates in mode I the IMSI detach shall be performed by the GMM using the combined GPRS detach procedure

NOTE: A GPRS MS operating in mode A or B in a network that operates in mode I, shall perform the combined GPRS detach procedure regardless the value of the ATT flag.

A GPRS MS operating in mode A or B in network that operates in mode I, uses the combined GMM specific procedures in place of the MM specific procedures, so all conditions describing when to trigger a MM specific procedure listed in subsections 4.3 and 4.4 shall not apply.

A GPRS MS operating in mode A or B in a network that operates in mode I should not use any MM timers relating to MM specific procedures, (e.g T3210, T3211, T3212, T3213) except in some error and abnormal cases. If the MM timers are already running, the MS should not react on the expiration of the timers.

NOTE: Whenever GMM performs a combined GMM procedure, a GPRS MS enters the MM state MM LOCATION UPDATING PENDING in order to prevent the MM to perform a location update procedure.

If the authentication procedure is performed by MM and the authentication is rejected by the network (i.e upon receive of AUTHENTICATION REJECT), the MS shall in addition set the GPRS update status to GU3 ROAMING NOT ALLOWED and shall, if available, delete the P-TMSI, P-TMSI signature, RAI and GPRS ciphering key sequence number stored. The SIM shall be considered as invalid for GPRS and non-GPRS services until switching off or the SIM is removed. The MS shall abort any GMM procedure and shall enter state GMM-DEREGISTERED.

4.1.1.2.2 GPRS MS operating in mode A or B in a network that operates in mode II or III

If the network operates in mode II or III, a GPRS MSs that operate in mode A or B and wish to be or are simultaneously IMSI attached for GPRS and non-GPRS services, shall use the MM specific procedures listed in subsections 4.3 and 4.4 and the GMM specific procedures listed in subsections 4.7.3, 4.7.4 and 4.7.5. The applicability of periodic location updating is further specified in section 4.4.2 and the periodic routing area updating is specified in section 4.7.2.2.

If the authentication procedure is performed by MM and the authentication is rejected by the network (i.e upon receive of AUTHENTICATION REJECT), the MS shall in addition set the GPRS update status to GU3 ROAMING NOT ALLOWED and shall, if available, delete the P-TMSI, P-TMSI signature, RAI and GPRS ciphering key sequence number stored. The SIM shall be considered as invalid for GPRS and non-GPRS services until switching off or the SIM is removed. The MS shall abort any GMM procedure and shall enter state GMM-DEREGISTERED.

4.1.2 MM sublayer states

The description of the states for the MM sublayer is organized as follows. The main states for the MS side, related to the procedures, are described in section 4.1.2.1.1. The MM IDLE state is subdivided in substates for the description of the behaviour in idle mode (section 4.1.2.1.2). This behaviour depends on an update status, described in 4.1.2.2. The states for the network side are described in 4.1.2.3.

4.1.2.1 MM sublayer states in the mobile station

In this section, the possible states for the MM sublayer in the mobile station is described. In figure 4.1/TS 24.008 an overview of the MM sublayer protocol is given.

4.1.2.1.1 Main states

0 NULL

The mobile station is inactive (e.g. power down). Important parameters are stored. Only manual action by the user may transfer the MM sublayer to another state.

3 LOCATION UPDATING INITIATED

A location updating procedure has been started and the MM awaits a response from the network. The timer T3210 is running.

5 WAIT FOR OUTGOING MM CONNECTION

The MM connection establishment has been started, and the MM awaits a response from the network. The timer T3230 is running.

6 MM CONNECTION ACTIVE

The MM sublayer has a RR connection to its peer entity on the network side. One or more MM connections are active.

7 IMSI DETACH INITIATED

The IMSI detach procedure has been started. The timer T3220 is running.

8 PROCESS CM SERVICE PROMPT

The MM sublayer has a RR connection to its peer entity on the network side. The Mobile Station has received a CM SERVICE PROMPT message but has not yet responded $(CCBS)$.

9 WAIT FOR NETWORK COMMAND

The MM sublayer has a RR connection to its peer entity in the network, but no MM connection is established. The mobile station is passive, awaiting further commands from the network. The timer T3240 may be running.

10 LOCATION UPDATE REJECTED

A location updating procedure has been rejected and RR connection release is awaited. The timer T3240 is running.

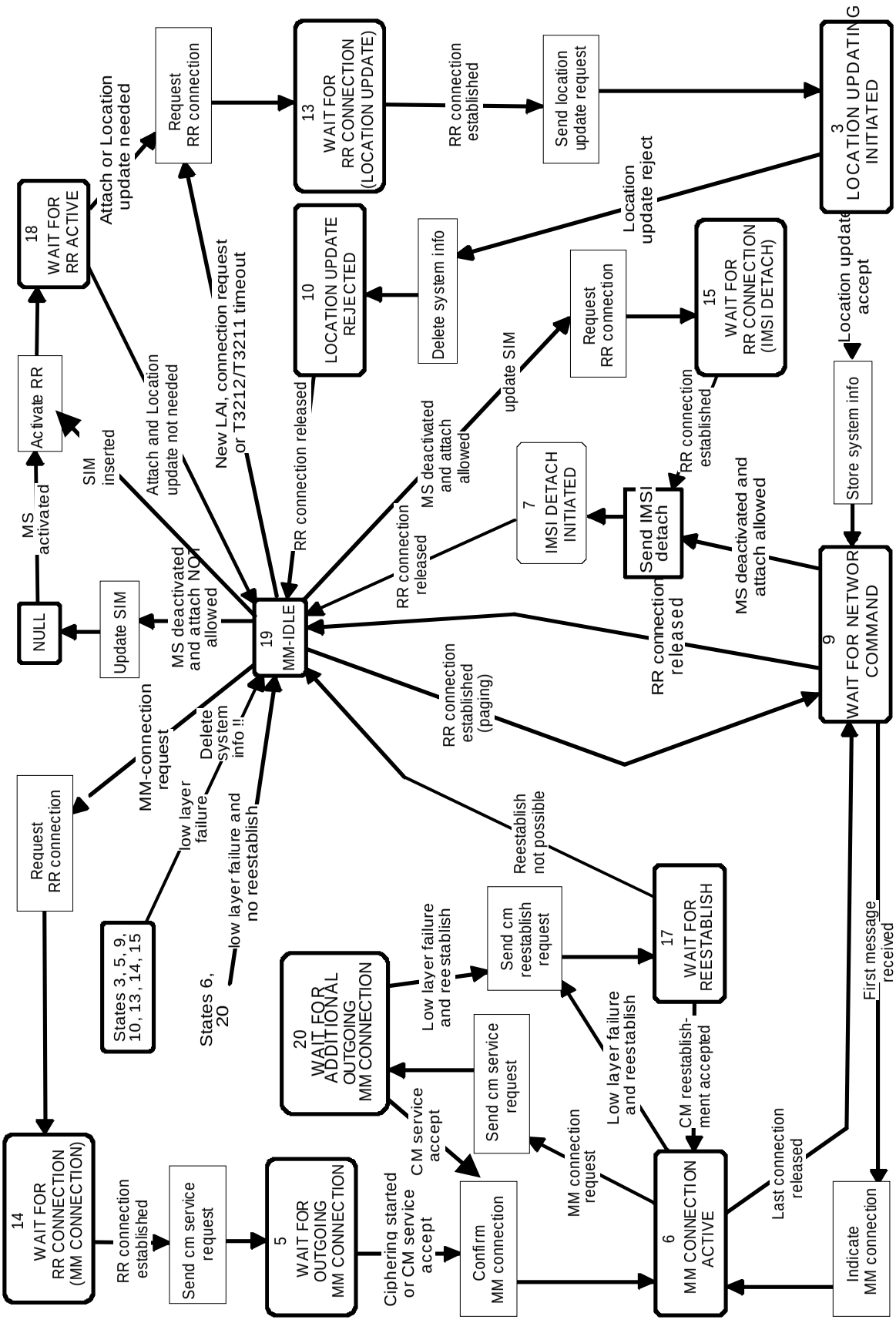
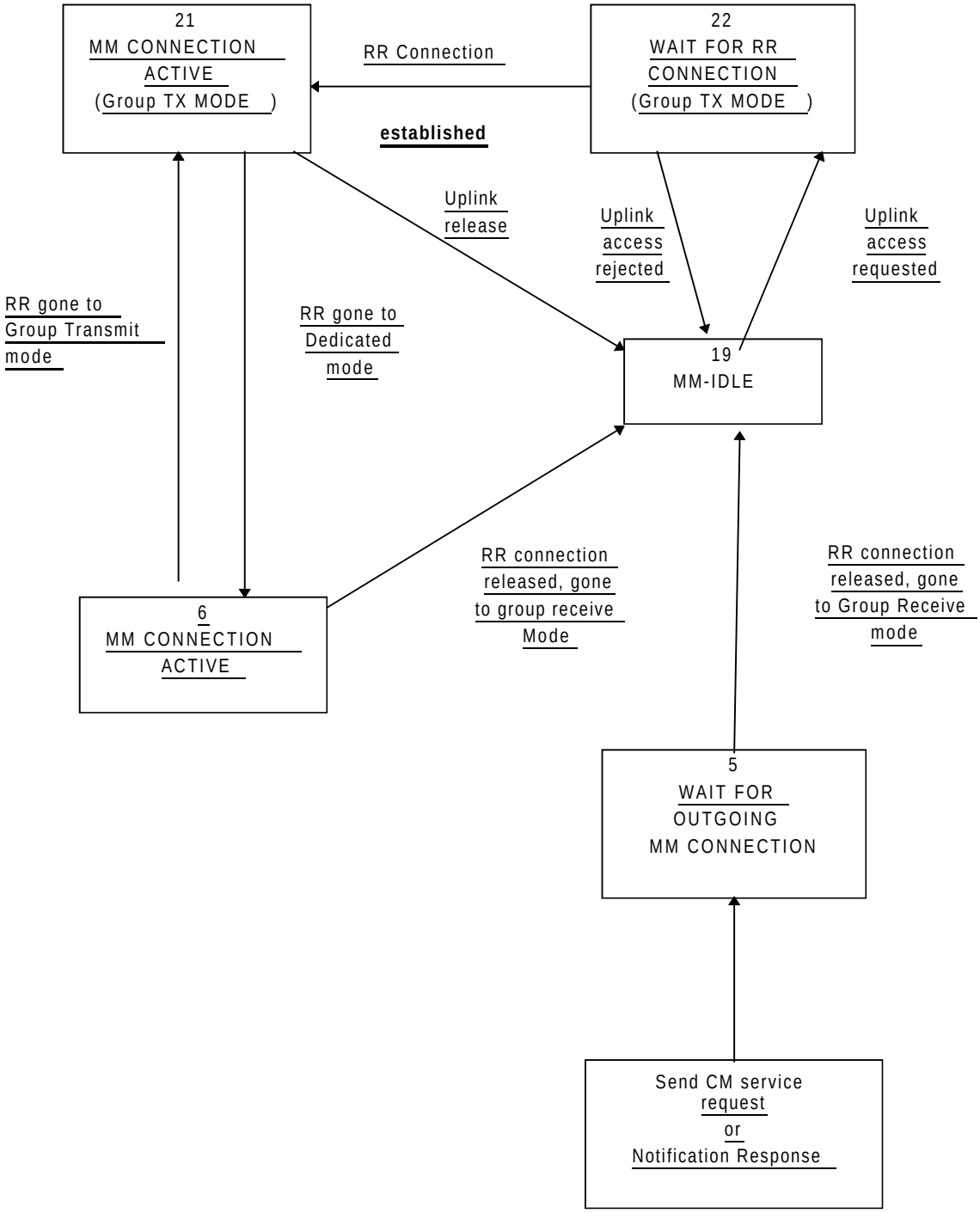


Figure 4.1a / TS 24.008: Overview mobility management protocol / MS Side



Additions to Figure 4.1.a/TS 24.008

13. WAIT FOR RR CONNECTION (LOCATION UPDATING)

The MM sublayer has requested RR connection establishment for starting the location updating procedure.

14. WAIT FOR RR CONNECTION (MM CONNECTION)

The MM sublayer has requested RR connection establishment for dedicated mode for starting the MM connection establishment.

15. WAIT FOR RR CONNECTION (IMSI DETACH)

The MM sublayer has requested RR connection establishment for starting the IMSI detach procedure.

17. WAIT FOR REESTABLISH

    A lower layer failure has occurred and re-establishment may be performed from the disturbed CM layer entities.

18. WAIT FOR RR ACTIVE

    The MM sublayer has requested activation of the RR sublayer.

19. MM IDLE

    There is no MM procedure running and no RR connection exists except that a local MM context may exist when the RR sublayer is in Group Receive mode. This is a compound state, and the actual behaviour of the mobile station to Connection Management requests is determined by the actual substate as described hereafter.

20. WAIT FOR ADDITIONAL OUTGOING MM CONNECTION.

    The MM connection establishment for an additional MM connection has been started, and the MM awaits response from the network.

21. MM CONNECTION ACTIVE (GROUP TRANSMIT MODE)

    (Only applicable for mobile stations supporting VGCS talking:) The MM sublayer has a RR connection on the VGCS channel to its peer entity on the network side. Only one MM connection is active.

22. WAIT FOR RR CONNECTION (GROUP TRANSMIT MODE)

    (Only applicable for mobile stations supporting VGCS talking:) The MM sublayer has requested to perform an uplink access on the VGCS channel.

23. LOCATION UPDATING PENDING

    (Only applicable for GPRS MS operation modes A and B; not shown in figure 4.1a) A location updating has been started using the combined GPRS routing area updating procedure.

24. IMSI DETACH PENDING

    (Only applicable for GPRS MS operation modes A and B; not shown in figure 4.1a) An IMSI detach for non-GPRS services has been started using the combined GPRS detach procedure at not switching off.

4.1.2.1.2 Substates of the MM IDLE state

For the description of the behaviour of the MS the MM IDLE state is subdivided in several substates, also called the service states. The service state pertains to the whole MS (ME alone if no SIM is inserted, or ME plus SIM.). The service state depends on the update status (see 4.1.2.2) and on the selected cell.

19.1 NORMAL SERVICE

Valid subscriber data are available, update status is U1, a cell is selected that belongs to the LA where the subscriber is registered.

In this state, all requests from the CM layers are treated normally.

19.2 ATTEMPTING TO UPDATE

Valid subscriber data are available, update status is U2 and a cell is selected. Requests from upper layers are accepted. Emergency call requests are treated normally, otherwise the request triggers first a location updating attempt in the selected cell, and then triggers the needed procedure only in case of successful location updating, otherwise the request is rejected.

19.3 LIMITED SERVICE

Valid subscriber data are available, update status is U3, and a cell is selected, which is known not to be able to provide normal service. Only emergency services are offered.

19.4 NO IMSI

No valid subscriber data (no SIM, or the SIM is not considered valid by the ME), and a cell is selected. Only emergency services are offered.

19.5 NO CELL AVAILABLE

No cell can be selected. This state is entered after a first intensive search failed (state 19.7). Cells are searched at a low rhythm. No services are offered.

19.6 LOCATION UPDATE NEEDED

Valid subscriber data are available, and for some reason a location updating must be done as soon as possible (for instance update status is U1 but the selected cell is not in the registered LA, or the timer has expired, ...). This state is usually of no duration, but can last, e.g., in the case of access class blocking.

19.7 PLMN SEARCH

The mobile station is searching for PLMNs, and the conditions for state 19.8 are not met. This state is ended when either a cell is selected (the new state is 19.1, 19.3 or 19.6), or when it is concluded that no cell is available for the moment (the new state is 19.5).

19.8 PLMN SEARCH, NORMAL SERVICE

Valid subscriber data are available, update status is U1, a cell is selected which belongs to the LA where the subscriber is registered, and the mobile station is searching for PLMNs. This state is ended when either a cell is selected (the new state is 19.1, 19.3 or 19.6), or when it is concluded that no cell is available for the moment (the new state is 19.5).

19.9 RECEIVING GROUP CALL (NORMAL SERVICE)

Only applicable for mobile stations supporting VGCS listening or VBS listening. Valid subscriber data are available, update status is U1, a VGCS channel or VBS channel is received in a cell that belongs to the LA where the subscriber is registered.

In this state, only requests from the GCC or BCC layers are treated.

19.10 RECEIVING GROUP CALL (LIMITED SERVICE)

Only applicable for mobile stations supporting VGCS listening or VBS listening. Valid subscriber data are available, update status is U3, a VGCS channel or VBS channel is received in a cell which is known not to be able to provide normal service.

In this state, only requests from the GCC or BCC layers for the reception of VGCS or VBS calls are treated and group call emergency services are offered.

4.1.2.2 The update Status

In parallel with the sublayer states described in section 4.1.2.1 and which control the MM sublayer protocol, an update status exists.

The update status pertains to a specific subscriber embodied by a SIM. This status is defined even when the subscriber is not activated (SIM removed or connected to a switched-off ME). It is stored in a non volatile memory in the SIM. The update status is changed only as a result of a location updating procedure attempt (with the exception of an authentication failure and of some cases of CM service rejection). In some cases, the update status is changed as a result of a GPRS attach, GPRS routing area update, or network initiated GPRS detach procedure.

U1 UPDATED

The last location updating attempt was successful (correct procedure outcome, and the answer was acceptance from the network). With this status, the SIM contains also the LAI of the LA where the subscriber is registered, and possibly valid TMSI, integrity key, ciphering key and ciphering key sequence number. The "Location update status" stored on the SIM shall be "updated".

U2 NOT UPDATED

The last location updating attempt made failed procedurally (no significant answer was received from the network, including the cases of failures or congestion inside the network).

For this status, the SIM does not contain any valid LAI, TMSI, integrity key, ciphering key or ciphering key sequence number. For compatibility reasons, all these fields must be set to the "deleted" value at the moment the status is set to NOT UPDATED. However the presence of other values shall not be considered an error by the mobile station. The "Location update status" stored on the SIM shall be "not updated".

U3 ROAMING NOT ALLOWED

The last location updating attempt run correctly, but the answer from the network was negative (because of roaming or subscription restrictions).

For this status, the SIM does not contain any valid LAI, TMSI, integrity key, ciphering key or ciphering key sequence number. For compatibility reasons, all these fields must be set to the "deleted" value at the moment the status is set to ROAMING NOT ALLOWED. However the presence of other values shall not be considered an error by the mobile station. The "Location update status" stored on the SIM shall be "Location Area not allowed".

4.1.2.3 MM sublayer states on the network side

1. IDLE

The MM sublayer is not active except possibly when the RR sublayer is in Group Receive mode.

2. WAIT FOR RR CONNECTION

The MM sublayer has received a request for MM connection establishment from the CM layer. A RR connection to the mobile station is requested from the RR sublayer (i.e. paging is performed).

3. MM CONNECTION ACTIVE

The MM sublayer has a RR connection to a mobile station. One or more MM connections are active.

4. IDENTIFICATION INITIATED

The identification procedure has been started by the network. The timer T3270 is running.

5. AUTHENTICATION INITIATED

The authentication procedure has been started by the network. The timer T3260 is running.

6. TMSI REALLOCATION INITIATED

The TMSI reallocation procedure has been started by the network. The timer T3250 is running.

7. CIPHERING MODE INITIATED

The cipher mode setting or security mode control procedure has been requested to the RR sublayer.

8a. WAIT FOR MOBILE ORIGINATED MM CONNECTION

A CM SERVICE REQUEST message is received and processed, and the MM sublayer awaits the "opening message" of the MM connection.

8b. WAIT FOR NETWORK ORIGINATED MM CONNECTION

A CM SERVICE PROMPT message has been sent by the network and the MM sublayer awaits the “opening message” of the MM connection $(CCBS)$.

9. WAIT FOR REESTABLISHMENT

The RR connection to a mobile station with one or more active MM connection has been lost. The network awaits a possible re-establishment request from the mobile station.

10. WAIT OF A GROUP CALL

Only applicable in case for mobile station supporting VGCS talking. The MM sublayer has received a request for establishing a VGCS from the GCC sublayer. The request for establishing a VGCS channels is given to the RR sublayer.

11. GROUP CALL ACTIVE

    Only applicable in case of mobile station supporting VGCS talking. A VGCS channel is established by the RR sublayer. An RR connection to the talking mobile station can be established by the RR sublayer on the VGCS channel. The MM sublayer is active but no sending of MM message between the network and the mobile station has occurred.

12. MM CONNECTION ACTIVE (GROUP CALL)

    Only applicable in case of mobile station supporting VGCS talking. The MM sublayer has a RR connection to the talking mobile station on the VGCS channel. Only one MM connection is active.

13. WAIT FOR BROADCAST CALL

    Only applicable in case of VBS. The MM sublayer has received a request for a VBS establishment from the BCC sublayer. The request for establishment of VBS channels is given to the RR sublayer.

14. BROADCAST CALL ACTIVE

    Only applicable in case of VBS. A VBS channel is established by the RR sublayer. The MM sublayer is active but no explicit MM establishment between the Network and the mobile station has occurred.

4.1.3 GPRS mobility management (GMM) sublayer states

4.2 Behaviour of the MS in MM Idle state, GMM-DEREGISTERED state and GMM-REGISTERED state

In this section, the detailed behaviour of the MS in the main states MM IDLE, GMM-DEREGISTERED and GMM-REGISTERED is described. Sections 4.2.1 to 4.2.3 refer to the state MM IDLE, whereas section 4.2.4 and section 4.2.5 refer to the states GMM-DEREGISTERED and GMM-REGISTERED, respectively.

The MM IDLE state is entered when none of the MM procedures are running and no RR connection exists. It is left when one of the MM procedures are triggered or a RR connection is established.

The specific behaviour in the MM IDLE state depends on the service state of the mobile station as described in section 4.1.2.1.2. The service state depends in particular on the update status which is defined in section 4.1.2.2.

How an appropriate service state is chosen after power on is described in section 4.2.1, and the specific behaviour of the mobile station in MM IDLE state is described in section 4.2.2. The service state chosen when the MM IDLE state is returned to from any state except NULL state is described in 4.2.3.

It should be noted that transitions between the various MM idle states are caused by (e.g.):

- results of procedures on RR connected mode (see section 4.2.3);
- insertion or removal of the SIM;
- cell selection/reselection (see also TS 23.022);
- PLMN search;
- loss of coverage.

How various MM procedures affects the service state and the update status is described in the detailed descriptions of the procedures in sections 4.3 to 4.5.

4.2.1 Primary Service State selection

4.2.1.1 Selection of the Service State after Power On.

When mobility management is activated after power-on, the service state is 19.7 PLMN SEARCH. The detailed processing in this state is described in detail in TS 23.022 and 05.08, where procedures for power on and selection of

PLMN is described in detail. If the "Location update status" stored on the SIM is different from "updated", then the mobile shall act as if the "Location update status" stored on the SIM is "not updated".

The service state when the PLMN SEARCH state is left depends on the outcome of the search and on the presence of the SIM:

- if no cell has been found, the state is NO CELL AVAILABLE, until a cell is found;
- if no SIM is present the state is NO IMSI;
- if the mobile station has been continuously activated since loosing coverage and then returns to coverage, and if the selected cell is in the location area where the mobile station is registered and the timer T3212 has not expired, then the state is NORMAL SERVICE;
- if the selected cell is in the location area where the mobile station is registered and IMSI ATTACH is not required and timer T3212 has not expired, then the state is NORMAL SERVICE;
- if the mobile station is in automatic network selection mode and the selected cell is in a forbidden PLMN or a forbidden LA, then the mobile station enters the LIMITED SERVICE state;
- if the mobile station is in manual network selection mode and no cell of the selected PLMN has been found, then the mobile station enters the LIMITED SERVICE state;
- otherwise, the mobile station enters the LOCATION UPDATE NEEDED state.

4.2.1.2 Other Cases

The state PLMN SEARCH is also entered in the following cases:

- In state NO IMSI, a SIM is inserted;
- In any state except NO IMSI, NO CELL AVAILABLE, NORMAL SERVICE and RECEIVING GROUP CALL (NORMAL SERVICE) after the user has asked for a PLMN selection;
- In any state except NO IMSI and NO CELL AVAILABLE, coverage is lost;
- Roaming is denied;
- optionally, when the mobile station is in the ATTEMPTING TO UPDATE state and is in Automatic Network Selection mode and location update attempt counter is greater than or equal to 4.

The service state when the PLMN SEARCH is left depends on the outcome of the search and on the presence of the SIM as specified in paragraph 4.2.1.1.

4.2.2 Detailed Description of the MS behaviour in MM IDLE State.

In the MM IDLE state the mobile station shall behave according to the service state. In the following sections the behaviour is described for the non transient service states. It should be noted that after procedures in RR connected mode, e.g. location updating procedures, section 4.2.3 applies which specifies the selection of the MM idle state. Furthermore when in sub-state NORMAL SERVICE, if a PLMN selection is requested, the MS enters sub-state SEARCH FOR PLMN, NORMAL SERVICE.

4.2.2.1 Service State, NORMAL SERVICE

When in state MM IDLE and service state NORMAL SERVICE, the mobile station shall:

- perform normal location updating when a new location area is entered;
- perform location updating procedure at expiry of timer T3211 or T3213;
- perform periodic updating at expiration of timer T3212;
- perform IMSI detach;
- support requests from the CM layer;

- respond to paging.

In addition, mobile stations supporting VGCS listening or VBS listening shall:

- indicate notifications to the GCC or BCC sublayer;
- respond to notification if the GCC or BCC sublayer requests the reception of a voice group or broadcast call for which no channel description has been received in the notification by the RR sublayer;
- request the RR sublayer to receive a voice group or broadcast call if the GCC or BCC sublayer requests the reception of a voice group or broadcast call for which a channel description has been received in the notification by the RR sublayer and then go to the service state RECEIVING GROUP CALL (NORMAL SERVICE).

4.2.2.2 Service State, ATTEMPTING TO UPDATE

When in state MM IDLE and service state ATTEMPTING TO UPDATE the mobile station shall:

- perform location updating procedure at expiry of timer T3211 or T3213;
- perform normal location updating when the location area identification of the serving cell changes;
- if entry into this state was caused by c) or d) or f) (with cause different from "abnormal release, unspecified") or g) (with cause "retry upon entry into a new cell") of section 4.4.4.9, then location updating shall be performed when a new cell is entered;
- if entry into this state was caused by e) or f) (with cause "abnormal release, unspecified") or g) (with cause different from "retry upon entry into a new cell") of section 4.4.4.9, then location updating shall not be performed because a new cell is entered;
- perform normal location updating at expiry of timer T3212;
- not perform IMSI detach;
- support request for emergency calls;
- use other request from CM layer as triggering of normal location updating procedure (if the location updating procedure is successful, then the request for MM connection is accepted, see section 4.5.1);
- respond to paging (with IMSI).

In addition, mobile stations supporting VGCS listening or VBS listening shall:

- indicate notifications to the GCC or BCC sublayer for which a channel description has been received in the notification by the RR sublayer;
- reject requests of the GCC or BCC sublayer to respond to notifications for which no channel description has been received in the notification by the RR sublayer;
- request the RR sublayer to receive a voice group or broadcast call if the GCC or BCC sublayer requests the reception of a voice group or broadcast call for which a channel description has been received in the notification by the RR sublayer and then go to the service state RECEIVING GROUP CALL (LIMITED SERVICE).

4.2.2.3 Service State, LIMITED SERVICE

When in state MM IDLE and service state LIMITED SERVICE the mobile station shall:

- not perform periodic updating;
- not perform IMSI detach;
- reject any requests from CM entities for MM connections except for emergency calls;
- perform normal location updating when a cell is entered which may provide normal service (e.g. location area not in one of the forbidden LAI lists.);
- it may respond to paging (with IMSI).

In addition, mobile stations supporting VGCS listening or VBS listening shall:

- indicate notifications to the GCC or BCC sublayer for which a channel description has been received in the notification by the RR sublayer;
- reject requests of the GCC or BCC sublayer to respond to notifications for which no channel description has been received in the notification by the RR sublayer;
- request the RR sublayer to receive a voice group or broadcast call if the GCC or BCC sublayer requests the reception of a voice group or broadcast call for which a channel description has been received in the notification by the RR sublayer and then go to the service state RECEIVING GROUP CALL (LIMITED SERVICE).

4.2.2.4 Service State, NO IMSI

When in state MM IDLE and service state NO IMSI the mobile station shall (see section 3.2, TS 23.022 and GSM 05.08):

- not start any normal location updating attempt;
- not perform periodic updating;
- not perform IMSI detach if powered down;
- reject any request from CM entities for MM connections except for emergency calls;
- not respond to paging;
- only perform default cell selection.

In addition, mobile stations supporting VGCS listening or VBS listening shall:

- not indicate notifications to the GCC or BCC layer.

4.2.2.5 Service State, SEARCH FOR PLMN, NORMAL SERVICE

When in state MM IDLE and service state SEARCH FOR PLMN, NORMAL SERVICE the mobile station shall:

- if timer T3211 or T3213 expires in this state perform a location updating procedure at the latest if and when back to NORMAL SERVICE state and if the cell is not changed;
- if timer T3212 expires in this state perform a periodic location updating procedure at the latest if and when back to NORMAL SERVICE state;
- perform IMSI detach;
- support requests from the CM layer;
- listen as far as possible to paging, and respond.

In addition, mobile stations supporting VGCS listening or VBS listening shall:

- listen as far as possible to notifications and indicate notifications to the GCC or BCC layer;
- respond to notification if the GCC or BCC sublayer requests the reception of a voice group or broadcast call for which no channel description has been received in the notification by the RR sublayer;
- request the RR sublayer to receive a voice group or broadcast call if the GCC or BCC sublayer requests the reception of a voice group or broadcast call for which a channel description has been received in the notification by the RR sublayer.

4.2.2.6 Service State, SEARCH FOR PLMN

When in state MM IDLE and service state SEARCH FOR PLMN the mobile station shall:

- not start any normal location updating attempt;
- not perform periodic updating;

- not perform IMSI detach if powered down;
- reject any request from CM entities for MM connections except emergency calls;
- not respond to paging.

4.2.2.7 Service State, RECEIVING GROUP CALL (NORMAL SERVICE)

Only applicable for mobile stations supporting VGCS listening or VBS listening:

When in state MM IDLE and service state RECEIVING GROUP CALL (NORMAL SERVICE), the mobile station shall:

- perform normal location updating when a new location area is entered;
- perform location updating procedure at expiry of timer T3211 or T3213;
- perform periodic updating at expiration of timer T3212;
- perform IMSI detach;
- support requests from the GCC or BCC layers;
- indicate notifications or paging information to the GCC or BCC layer;
- respond to notification if the GCC or BCC sublayer requests the reception of a voice group or broadcast call for which no channel description has been received in the notification by the RR sublayer;
- request the RR sublayer to receive another voice group or broadcast call if the GCC or BCC sublayer requests the reception of a voice group or broadcast call for which a channel description has been received in the notification by the RR sublayer.

4.2.2.8 Service State, RECEIVING GROUP CALL (LIMITED SERVICE)

Only applicable for mobile stations supporting VGCS listening or VBS listening:

When in state MM IDLE and service state RECEIVING GROUP CALL (LIMITED SERVICE), the mobile station shall:

- not perform periodic updating;
- not perform IMSI detach;
- reject any requests from CM entities for MM connections except for emergency calls;
- perform normal location updating when a cell is entered which may provide normal service (e.g. location area not in one of the forbidden LAI lists.);
- it may respond to paging (with IMSI);
- indicate notifications to the GCC or BCC sublayer for which a channel description has been received in the notification by the RR sublayer;
- reject requests of the GCC or BCC sublayer to respond to notifications for which no channel description has been received in the notification by the RR sublayer;
- request the RR sublayer to receive a voice group or broadcast call if the GCC or BCC sublayer requests the reception of a voice group or broadcast call for which a channel description has been received in the notification by the RR sublayer and then go to the service state RECEIVING GROUP CALL (LIMITED SERVICE).

4.2.3 Service state when back to state MM IDLE from another state

When returning to MM IDLE, e.g., after a location updating procedure, the mobile station selects the cell as specified in TS 23.022. With one exception, this is a normal cell selection.

If this return to idle state is not subsequent to a location updating procedure terminated with reception of cause "Roaming not allowed in this location area" the service state depends on the result of the cell selection procedure, on the update status of the mobile station, on the location data stored in the mobile station and on the presence of the SIM:

- if no cell has been found, the state is NO CELL AVAILABLE, until a cell is found;
- if no SIM is present, or if the inserted SIM is considered invalid by the MS, the state is NO IMSI;
- if the selected cell is in the location area where the MS is registered, then the state is NORMAL SERVICE; it shall be noted that this also includes an abnormal case described in paragraph 4.4.4.9;
- (Only applicable for mobile stations supporting VGCS listening or VBS listening.) if the mobile stations was in the service state RECEIVING GROUP CALL (NORMAL SERVICE) or RECEIVING GROUP CALL (LIMITED SERVICE) before the location updating procedure and the selected cell is in the location area where the mobile station is registered, then the state is RECEIVING GROUP CALL (NORMAL SERVICE);
- if the selected cell is in a location area where the mobile station is not registered but in which the MS is allowed to attempt a location update, then the state is LOCATION UPDATE NEEDED;
- if the selected cell is in a location area where the mobile station is not allowed to attempt a location update, then the state is LIMITED SERVICE;
- (Only applicable for MSs supporting VGCS listening or VBS listening.) if the MSs was in the service state RECEIVING GROUP CALL (NORMAL SERVICE) or RECEIVING GROUP CALL (LIMITED SERVICE) before the location updating procedure and the selected cell is in the location area where the MS is not allowed to attempt a location update, then the state is RECEIVING GROUP CALL (LIMITED SERVICE);
- after some abnormal cases occurring during an unsuccessful location updating procedure, as described in paragraph 4.4.4.9, the state is ATTEMPTING TO UPDATE.

In case of a return from a location updating procedure to which was answered "Roaming not allowed in this location area", the service state PLMN SEARCH is entered as specified in section 4.2.1.2.

4.3 MM common procedures

As described in section 4.1.1, a MM common procedure can be initiated at any time whilst a RR connection exists between the network and the mobile station.

4.3.1 TMSI reallocation procedure

The purpose of the TMSI reallocation procedure is to provide identity confidentiality , i.e. to protect a user against being identified and located by an intruder (see GSM 02.09~~, and~~ 03.20 and ~~3GPP~~TS 33.102).

If the identity confidentiality service is applied for an IMSI, a Temporary Mobile Subscriber Identity (TMSI) is used for identification within the radio interface signalling procedures.

The structure of the TMSI is specified in TS 23.003. The TMSI has significance only within a location area. Outside the location area it has to be combined with the Location Area Identifier (LAI) to provide for an unambiguous identity.

Usually the TMSI reallocation is performed at least at each change of a location area. (Such choices are left to the network operator).

The reallocation of a TMSI can be performed either by a unique procedure defined in this section or implicitly by a location updating procedure using the TMSI. The implicit reallocation of a TMSI is described together with that procedure.

If a TMSI provided by a mobile station is unknown in the network e.g. due to a data base failure, the network may require the mobile station to provide its International Mobile Subscriber Identity (IMSI). In this case the identification procedure (see section 4.3.3) should be used before the TMSI reallocation procedure may be initiated.

The TMSI reallocation can be initiated by the network at any time whilst a RR connection exists between the network and the mobile station.

NOTE 1: Usually the TMSI reallocation is performed in ciphered mode.

NOTE 2: Normally the TMSI reallocation will take place in conjunction with another procedure, e.g. at location updating or at call setup (see ~~TS~~ 3GPP~~P~~TS 29.002).

4.3.1.1 TMSI reallocation initiation by the network

The network initiates the TMSI reallocation procedure by sending a TMSI REALLOCATION COMMAND message to the mobile station and starts the timer T3250.

The TMSI REALLOCATION COMMAND message contains a new combination of TMSI and LAI allocated by the network or a LAI and the IMSI if the used TMSI shall be deleted. Usually the TMSI-REALLOCATION COMMAND message is sent to the mobile station using a RR connection in ciphered mode (see GSM 03.20 and 3GPP~~P~~TS 33.102).

4.3.1.2 TMSI reallocation completion by the mobile station

Upon receipt of the TMSI REALLOCATION COMMAND message the mobile station stores the Location Area Identifier (LAI) in the SIM. If the received identity is the IMSI of the relevant mobile station, the mobile station deletes any TMSI. If the received identity is a TMSI the mobile station stores the TMSI in the SIM. In both cases the mobile station sends a TMSI REALLOCATION COMPLETE message to the network.

4.3.1.3 TMSI reallocation completion in the network.

Upon receipt of the TMSI REALLOCATION COMPLETE message, the network stops the timer T3250 and either considers the new TMSI as valid or, if an IMSI was sent to the mobile station, considers the old TMSI as deleted.

If the RR connection is no more needed, then the network will request the RR sublayer to release it (see GSM 04.18 section 3.5 and 3GPP~~P~~TS 25.331 section 8.2.2).

4.3.1.4 Abnormal cases

Mobile station side:

The mobile station shall consider the new TMSI and new LAI, if any, as valid and the old TMSI and old LAI as deleted as soon as a TMSI REALLOCATION COMMAND or another message containing a new TMSI (e.g. LOCATION UPDATING ACCEPT) is correctly received. Any RR connection failure at a later stage shall not have any impact on the TMSI and LAI storage.

Network side:

(a) RR connection failure:

If the RR connection is lost before the TMSI REALLOCATION COMPLETE message is received, all MM connections (if any) shall be released and both the old and the new TMSIs should be considered as occupied for a certain recovery time.

During this period the network may:

- use the IMSI for paging in the case of network originated transactions on the CM layer. Upon response from the mobile station the TMSI reallocation is restarted;
- consider the new TMSI as valid if it is used by the mobile station in mobile originated requests for RR connection;
- use the Identification procedure followed by a new TMSI reallocation if the mobile station uses the old TMSI.

Other implementations are possible.

(b) Expiry of timer T3250:

The TMSI reallocation is supervised by the timer T3250 in the network. At the first expiry of timer T3250 the network may release the RR connection. In this case, the network shall abort the reallocation procedure release all MM connections if any, and follow the rules described for RR connection failure above.

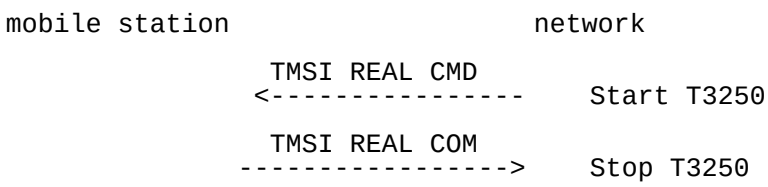


Figure 4.1/TS 24.008: TMSI reallocation sequence

4.3.2 Authentication procedure

Authentication procedure is not handled in this contribution.

4.3.3 Identification procedure

The identification procedure is used by the network to request a mobile station to provide specific identification parameters to the network e.g. International Mobile Subscriber Identity, International Mobile Equipment Identity (cf. ~~TS 3GPP~~TS 23.003). For the presentation of the IMEI, the requirements of GSM 02.09 apply.

4.3.3.1 Identity request by the network

The network initiates the identification procedure by transferring an IDENTITY REQUEST message to the mobile station and starts the timer T3270. The IDENTITY REQUEST message specifies the requested identification parameters in the identity type information element.

4.3.3.2 Identification response by the mobile station

The mobile station shall be ready to respond to an IDENTITY REQUEST message at any time whilst a RR connection exists.

Upon receipt of the IDENTITY REQUEST message the mobile station sends back an IDENTITY RESPONSE message. The IDENTITY RESPONSE message contains the identification parameters as requested by the network.

Upon receipt of the IDENTITY RESPONSE the network shall stop timer T3270.

4.3.3.3 Abnormal cases

(a) RR connection failure:

Upon detection of a RR connection failure before the IDENTITY RESPONSE is received, the network shall release all MM connections (if any) and abort any ongoing MM specific procedure.

(b) Expiry of timer T3270:

The identification procedure is supervised by the network by the timer T3270. At expiry of the timer T3270 the network may release the RR connection. In this case, the network shall abort the identification procedure and any ongoing MM specific procedure, release all MM connections if any, and initiate the RR connection release procedure as described in GSM 04.18 section 3.5 and 25.331 section 8.2.1.

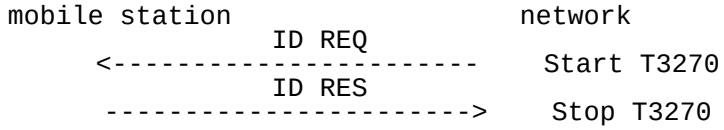


Figure 4.3/TS 24.008: Identification sequence

4.3.4 IMSI detach procedure

The IMSI detach procedure may be invoked by a mobile station if the mobile station is deactivated or if the Subscriber Identity Module (see GSM 02.17 and 31.102) is detached from the mobile station.

In GSM, ~~A~~ a flag (ATT) broadcast in the L3-RR SYSTEM INFORMATION TYPE 3 message on the BCCH is used by the network to indicate whether the detach procedure is required. The value of the ATT flag to be taken into account shall be the one broadcast when the mobile station was in MM idle.

In UMTS, a flag (ATT) broadcast in the L3-RRC SYSTEM INFORMATION BLOCK 1 message on the BCCH is used by the network to indicate whether the detach procedure is required. The value of the ATT flag to be taken into account shall be the one broadcast when the mobile station was in MM idle.

The procedure causes the mobile station to be indicated as inactive in the network.

4.3.4.1 IMSI detach initiation by the mobile station

The IMSI detach procedure consists only of the IMSI DETACH INDICATION message sent from the mobile station to the network. The mobile station then starts timer T3220 and enters the MM sublayer state IMSI DETACH INITIATED.

If no RR connection exists, the MM sublayer within the mobile station will request the RR sublayer to establish a RR connection. If establishment of the RR connection is not possible because a suitable cell is not (or not yet) available then, the mobile station shall try for a period of at least 5 seconds and for not more than a period of 20 seconds to find a suitable cell. If a suitable cell is found during this time then, the mobile station shall request the RR sublayer to establish an RR connection, otherwise the IMSI detach is aborted.

If a RR connection exists, the MM sublayer will release locally any ongoing MM connections before the IMSI DETACH INDICATION message is sent.

The IMSI detach procedure may not be started if a MM specific procedure is active. If possible, the IMSI detach procedure is then delayed until the MM specific procedure is finished, else the IMSI detach is omitted.

4.3.4.2 IMSI detach procedure in the network

When receiving an IMSI DETACH INDICATION message, the network may set an inactive indication for the IMSI. No response is returned to the mobile station. After reception of the IMSI DETACH INDICATION message the network shall release locally any ongoing MM connections, and start the normal RR connection release procedure (see GSM 04.18 section 3.5 and 25.331 section 8.2.1).

Only applicable for a network supporting VGCS: If an IMSI DETACH INDICATION message is received from the talking mobile station in a group call while the network is in service state MM CONNECTION ACTIVE (GROUP TRANSMIT MODE), the network shall release locally the ongoing MM connection and then go to the service state GROUP CALL ACTIVE.

4.3.4.3 IMSI detach completion by the mobile station

Timer T3220 is stopped when the RR connection is released. The mobile station should, if possible, delay the local release of the channel to allow a normal release from the network side until T3220 timeout. If this is not possible (e.g. detach at power down) the RR sublayer on the mobile station side should be aborted.

4.3.4.4 Abnormal cases

If the establishment of an RR connection is unsuccessful, or the RR connection is lost, the IMSI detach is aborted by the mobile station.

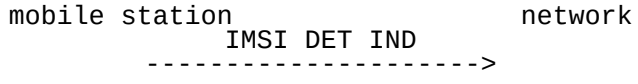


Figure 4.4/TS 24.008: IMSI detach sequence

4.3.5 Abort procedure

The abort procedure may be invoked by the network to abort any on-going MM connection establishment or already established MM connection. The mobile station shall treat ABORT message as compatible with current protocol state only if it is received when at least one MM connection exists or an MM connection is being established.

4.3.5.1 Abort procedure initiation by the network

The abort procedure consists only of the ABORT message sent from the network to the mobile station. Before the sending of the ABORT message the network shall locally release any ongoing MM connection. After the sending the network may start the normal RR connection release procedure.

The Cause information element indicates the reason for the abortion. The following cause values may apply:

6: Illegal ME

#17: Network failure

4.3.5.2 Abort procedure in the mobile station

At the receipt of the ABORT message the mobile station shall abort any MM connection establishment or call re-establishment procedure and release all MM connections (if any). If cause value #6 is received the mobile station shall delete any TMSI, LAI and ciphering key sequence number stored in the SIM, set the update status to ROAMING NOT ALLOWED (and store it in the SIM according to section 4.1.2.2) and consider the SIM invalid until switch off or the SIM is removed. As a consequence the mobile station enters state MM IDLE, substate NO IMSI after the release of the RR connection.

The mobile station shall then wait for the network to release the RR connection - see section 4.5.3.1.

4.3.6 MM information procedure

The MM information message support is optional in the network.

The MM information procedure may be invoked by the network at any time during an RR connection.

4.3.6.1 MM information procedure initiation by the network

The MM information procedure consists only of the MM INFORMATION message sent from the network to the mobile station. During an RR connection, the network shall send none, one, or more MM INFORMATION messages to the mobile station. If more than one MM INFORMATION message is sent, the messages need not have the same content.

NOTE: The network may be able to select particular instants where it can send the MM INFORMATION message without adding delay to, or interrupting, any CM layer transaction, e.g. immediately after the AUTHENTICATION REQUEST message.

4.3.6.2 MM information procedure in the mobile station

When the mobile station (supporting the MM information message) receives an MM INFORMATION message, it shall accept the message and optionally use the contents to update appropriate information stored within the mobile station.

If the mobile station does not support the MM information message the mobile station shall ignore the contents of the message and return an MM STATUS message with cause #97.

4.4 MM specific procedures

A MM specific procedure can only be started if no other MM specific procedure is running or no MM connection exists between the network and the mobile station. The end of the running MM specific procedure or the release of all MM connections have to be awaited before a new MM specific procedure can be started.

During the lifetime of a MM specific procedure, if a MM connection establishment is requested by a CM entity, this request will either be rejected or be delayed until the running MM specific procedure is terminated (this depends on the implementation).

Any MM common procedure (except IMSI detach) may be initiated during a MM specific procedure.

Unless it has specific permission from the network (follow-on proceed) the mobile station side should await the release of the RR connection used for a MM specific procedure before a new MM specific procedure or MM connection establishment is started.

NOTE: The network side may use the same RR connection for MM connection management.

4.4.1 Location updating procedure

The location updating procedure is a general procedure which is used for the following purposes:

- normal location updating (described in this section);
- periodic updating (see section 4.4.2);
- IMSI attach (see section 4.4.3).

The normal location updating procedure is used to update the registration of the actual Location Area of a mobile station in the network. The location updating type information element in the LOCATION UPDATING REQUEST message shall indicate normal location updating. The conditions under which the normal location updating procedure is used by a mobile station in the MM IDLE state are defined for each service state in section 4.2.2.

Only applicable for mobile stations supporting VGCS listening or VBS listening: A mobile station in RR group receive mode is in the MM IDLE state, substate RECEIVING GROUP CALL (NORMAL SERVICE) or RECEIVING GROUP CALL (LIMITED SERVICE). To perform a location updating, the MS in RR group receive mode shall leave the group receive mode, establish an independent dedicated RR connection to perform the location updating as described above and return to the RR group receive mode afterwards.

The normal location updating procedure shall also be started if the network indicates that the mobile station is unknown in the VLR as a response to MM connection establishment request.

To limit the number of location updating attempts made, where location updating is unsuccessful, an attempt counter is used. The attempt counter is reset when a mobile station is switched on or a SIM card is inserted.

Upon successful location updating the mobile station sets the update status to UPDATED in the SIM, and stores the received Location Area Identification in the SIM. The attempt counter shall be reset.

The detailed handling of the attempt counter is described in 4.4.4.6 to 4.4.4.9.

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". These lists shall be erased when the MS is switched off or when the SIM is removed, and periodically (with period in the range 12 to 24 hours). The location area identification received on the BCCH that triggered the location updating request shall be added to the suitable list whenever a location update reject message is received with the cause "Roaming not allowed in this location area" or with the cause "Location Area not allowed". The lists shall accommodate each 10 or more location area identifications. When the list is full and a new entry has to be inserted, the oldest entry shall be deleted.

The cell selection processes in the different states are described in ~~TS~~ 3GPPTS 23.022 and GSM 05.08.

The location updating procedure is always initiated by the mobile station.

4.4.2 Periodic updating

Periodic updating may be used to notify periodically the availability of the mobile station to the network. Periodic updating is performed by using the location updating procedure. The location updating type information element in the LOCATION UPDATING REQUEST message shall indicate periodic updating.

The procedure is controlled by the timer T3212 in the mobile station. If the timer is not already started, the timer is started each time the mobile station enters the MM IDLE substate NORMAL SERVICE or ATTEMPTing TO UPDATE. When the MS leaves the MM Idle State the timer T3212 shall continue running until explicitly stopped.

The timer is stopped (shall be set to its initial value for the next start) when:

- a LOCATION UPDATING ACCEPT or LOCATION UPDATING REJECT message is received;
- an AUTHENTICATION REJECT message is received;
- the first MM message is received, or ciphering mode setting, or security mode control is completed in the case of MM connection establishment, except when the most recent service state is LIMITED SERVICE;
- the mobile station has responded to paging and thereafter has received the first correct layer 3 message except RR message;
- the mobile station is deactivated (i.e. equipment powered down or SIM removed).

When the timer T3212 expires, the location updating procedure is started and the timer shall be set to its initial value for the next start. If the mobile station is in other state than MM Idle when the timer expires the location updating procedure is delayed until the MM Idle State is entered.

The conditions under which the periodic location updating procedure is used by a mobile station in the MM IDLE state are defined for each service state in section 4.2.2.

If the mobile station is in service state NO CELL AVAILABLE, LIMITED SERVICE, PLMN SEARCH or PLMN SEARCH-NORMAL SERVICE when the timer expires the location updating procedure is delayed until this service state is left.

In GSM, ~~The~~ the (periodic) location updating procedure is not started if the BCCH information at the time the procedure is triggered indicates that periodic location shall not be used. The timeout value is broadcasted in the L3-RR SYSTEM INFORMATION TYPE 3 message on the BCCH, in the Control channel description IE, see GSM 04.18 section 10.5.2.11.

In UMTS, the (periodic) location updating procedure is not started if the information on BCCH or in the last received dedicated system information at the time the procedure is triggered indicates that periodic location shall not be used. The timeout value is broadcasted in the L3-RRC SYSTEM INFORMATION BLOCK 1 message on the BCCH, see ~~3GPP~~TS 25.331 section 10.1.6.4.3.

The T3212 timeout value shall not be changed in the NO CELL AVAILABLE, LIMITED SERVICE, PLMN SEARCH and PLMN SEARCH-NORMAL SERVICE states.

When a change of the T3212 timeout value has to be taken into account and the timer is running (at change of the serving cell or, change of the broadcast value of T3212), the MS shall behave as follows:

> Let t1 be the new T3212 timeout value and let t be the current timer value at the moment of the change to the new T3212 timeout value; then the timer shall be restarted with the value t modulo t1.

When the mobile station is activated, or when a change of the T3212 timeout value has to be taken into account and the timer is not running, the mobile station shall behave as follows:

> Let t1 be the new T3212 timeout value, the new timer shall be started at a value randomly, uniformly drawn between 0 and t1.

4.4.3 IMSI attach procedure

The IMSI attach procedure is the complement of the IMSI detach procedure (see section 4.3.4). It is used to indicate the IMSI as active in the network.

In GSM, ~~A~~ a flag (ATT) is broadcast in the L3-RR SYSTEM INFORMATION TYPE 3 message. It indicates whether the attach and detach procedures are required to be used or not.

In UMTS, a flag (ATT) is broadcast in the L3-RRC SYSTEM INFORMATION BLOCK 1 message. It indicates whether the attach and detach procedures are required to be used or not.

The IMSI attach procedure is invoked if the detach/attach procedures are required by the network and an IMSI is activated in a mobile station (i.e. activation of a mobile station with plug-in SIM, insertion of a card in a card-operated mobile station etc.) within coverage area from the network or a mobile station with an IMSI activated outside the coverage area enters the coverage area. The IMSI attach procedure is used only if the update status is UPDATED and if the stored Location Area Identification is the same as the one which is actually broadcasted on the BCCH of the current

serving cell. Otherwise a normal location updating procedure (see section 4.4.1) is invoked independently of the ATT flag indication.

IMSI attach is performed by using the location updating procedure. The location updating type information element in the LOCATION UPDATING REQUEST message shall in this case indicate IMSI attach.

4.4.4 Generic Location Updating procedure

4.4.4.1 Location updating initiation by the mobile station

Any timer used for triggering the location updating procedure (e.g. T3211, T3212) is stopped if running.

As no RR connection exists at the time when the location updating procedure has to be started, the MM sublayer within the mobile station will request the RR sublayer to establish a RR connection and enter state WAIT FOR RR CONNECTION (LOCATION UPDATE). The procedure for establishing an RR connection is described in GSM 04.18 section 3.3 and 3GPPTS 25.331 section 8.2.3.

The mobile station initiates the location updating procedure by sending a LOCATION UPDATING REQUEST message to the network, starts the timer T3210 and enters state LOCATION UPDATING INITIATED. The location updating type information element shall indicate what kind of updating is requested.

4.4.4.1a Network Request for Additional mobile station Capability Information

In GSM, The the network may initiate the classmark interrogation procedure, for example, to obtain further information on the mobile station's encryption capabilities.

4.4.4.2 Identification request from the network

The network may initiate the identification procedure, e.g. if the network is unable to get the IMSI based on the TMSI and LAI used as identification by the mobile station (see section 4.3.3).

4.4.4.3 Authentication by the network

The authentication procedure (see section 4.3.2) may be initiated by the network upon receipt of the LOCATION UPDATING REQUEST message from the mobile station. (See the cases defined in GSM 02.09).

4.4.4.4 Ciphering mode setting by the network

In GSM, Tthe ciphering mode setting procedure (see GSM 04.18 section 3.4.7) may be initiated by the network, e.g., if a new TMSI has to be allocated.

In UMTS, the security mode control procedure (see 3GPPTS 25.331 section 8.1.10) may be initiated by the network, e.g., if a new TMSI has to be allocated.

4.4.4.5 Attempt Counter

To limit the number of location updating attempts made, where location updating is unsuccessful, an attempt counter is used. It counts the number of consecutive unsuccessful location update attempts.

The attempt counter is incremented when a location update procedure fails. The specific situations is specified in section 4.4.4.9.

The attempt counter is reset when:

- the mobile station is powered on;
- a SIM is inserted;
- location update is successfully completed;
- location update completed with cause #11, #12 or #13 (see section 4.4.4.7).

and in case of service state ATTEMPTING to UPDATE:

- a MS detects that a new location area is entered;
- expiry of timer T3212;
- location update is triggered by CM sublayer requests.

The attempt counter is used when deciding whether to re-attempt a location update after timeout of timer T3211.

4.4.4.6 Location updating accepted by the network

If the location updating is accepted by the network a LOCATION UPDATING ACCEPT message is transferred to the mobile station.

In case the identity confidentiality service is active (see section 4.3.1 and 4.4.4.4), the TMSI reallocation may be part of the location updating procedure. The TMSI allocated is then contained in the LOCATION UPDATING ACCEPT message together with the location area identifier LAI. The network shall in this case start the supervision timer T3250 as described in section 4.3.1.

If the network wishes to prolong the RR connection to allow the mobile station to initiate MM connection establishment (for example if the mobile station has indicated in the LOCATION UPDATING REQUEST that it has a follow-on request pending) the network shall send "follow on proceed" in the LOCATION UPDATING ACCEPT and start timer T3255.

The mobile station receiving a LOCATION UPDATING ACCEPT message shall store the received location area identification LAI, stop timer T3210, reset the attempt counter and set the update status in the SIM to UPDATED. If the message contains an IMSI, the mobile station is not allocated any TMSI, and shall delete any TMSI in the SIM accordingly. If the message contains a TMSI, the mobile station is allocated this TMSI, and shall store this TMSI in the SIM and a TMSI REALLOCATION COMPLETE shall be returned to the network. If neither IMSI nor TMSI is received in the LOCATION UPDATING ACCEPT message, the old TMSI if any available shall be kept.

If the LAI or PLMN identity contained in the LOCATION UPDATING ACCEPT message is a member of any of the "forbidden lists" then any such entries shall be deleted.

After that, the mobile station shall act according to the presence of the "Follow-on proceed" information element in the LOCATION UPDATING ACCEPT; if this element is present and the mobile station has a CM application request pending, it shall send a CM SERVICE REQUEST to the network and proceed as in section 4.5.1.1. Otherwise, it shall start timer T3240 and enter state WAIT FOR NETWORK COMMAND.

Furthermore, the network may grant authorisation for the mobile station to use GSM-Cordless Telephony System (CTS) in the Location Area and its immediate neighbourhood. The mobile should memorise this permission in non-volatile memory. If the "CTS permission" IE is not present in the message, the mobile is not authorised to use GSM-CTS, and shall accordingly delete any memorised permission.

NOTE: the interaction between CTS and GPRS procedures are not yet defined.

4.4.4.7 Location updating not accepted by the network

If the location updating cannot be accepted the network sends a LOCATION UPDATING REJECT message to the mobile station. The mobile station receiving a LOCATION UPDATING REJECT message shall stop the timer T3210, store the reject cause, start T3240, enter state LOCATION UPDATING REJECTED await the release of the RR connection triggered by the network. Upon the release of the RR connection the mobile station shall take the following actions depending on the stored reject cause:

2: IMSI unknown in HLR;

3: Illegal MS; or

6: Illegal ME.

The mobile station shall set the update status to ROAMING NOT ALLOWED (and store it in the SIM according to section 4.1.2.2), and delete any TMSI, stored LAI and ciphering key sequence number and shall consider the SIM as invalid until switch-off or the SIM is removed.

11: PLMN not allowed;

12: Location Area not allowed; or

13: Roaming not allowed in this location area.

The mobile station shall delete any LAI, TMSI and ciphering key sequence number stored in the SIM, reset the attempt counter, set the update status to ROAMING NOT ALLOWED (and store it in the SIM according to section 4.1.2.2). The mobile station shall store the LAI or the PLMN identity in the suitable forbidden list, i.e. in the "forbidden PLMN list" for cause #11, in the list of "forbidden location areas for regional provision of service" for cause #12, and in the list of "forbidden location areas for roaming" for cause #13. In addition, the MS will memorize if cause #13 was received, so to perform a PLMN selection instead of a cell selection when back to the MM IDLE state.

Other values are considered as abnormal cases and the specification of the mobile station behaviour in those cases is given in section 4.4.4.9.

4.4.4.8 Release of RR connection after location updating

When the Location updating procedure is finished (see sections 4.4.4.6 and 4.4.4.7) the mobile station shall (except in the case where the mobile has a follow-on CM application request pending and has received the follow-on proceed indication, see 4.4.4.6) set timer T3240 and enter the state WAIT FOR NETWORK COMMAND, expecting the release of the RR connection. The network may decide to keep the RR connection for network initiated establishment of a MM connection, or to allow for mobile initiated MM connection establishment.

Any release of the RR connection shall be initiated by the network according to section 3.55 in GSM 04.18, and section 8.2.1 in ~~3GPP~~TS 25.331. If the RR connection is not released within a given time controlled by the timer T3240, the mobile station shall abort the RR connection. In both cases, either after a RR connection release triggered from the network side or after a RR connection abort requested by the MS-side, the MS shall return to state MM IDLE.

At transition to state MM IDLE, substates NORMAL SERVICE or RECEIVING GROUP CALL (NORMAL SERVICE) or ATTEMPTING TO UPDATE either timer T3212 or timer T3211 is started as described in section 4.4.4.9.

4.4.4.9 Abnormal cases on the mobile station side

The different abnormal cases that can be identified are the following:

a) Access barred because of access class control

The location updating procedure is not started. The mobile station stays in the current serving cell and applies normal cell reselection process. The procedure is started as soon as possible and if still necessary (when the barred state is ended or because of a cell change)

b) The answer to random access is an IMMEDIATE ASSIGNMENT REJECT message

The location updating is not started. The mobile station stays in the chosen cell and applies normal cell selection process. The waiting timer T3122 is reset when a cell change occurs. The procedure is started as soon as possible after T3122 timeout if still necessary.

c) Random access failure

Timer T3213 is started. When it expires the procedure is attempted again if still necessary.

NOTE: As specified in GSM 05.08, a cell reselection then takes place, with return to the cell inhibited for 5 seconds if there is at least one other suitable cell. Typically the selection process will take the mobile station back to the cell where the random access failed after 5 seconds.

If at the expiry of timer T3213 a new cell has not been selected due to the lack of valid information (see GSM 05.08), the mobile station may as an option delay the repeated attempt for up to 8 seconds to allow cell re-selection to take place. In this case the procedure is attempted as soon as a new cell has been selected or the mobile station has concluded that no other cell can be selected.

If random access failure occurs for two successive random access attempts for location updating the mobile station proceeds as specified below.

d) RR connection failure

The procedure is aborted and the mobile station proceeds as specified below.

e) T3210 timeout

The procedure is aborted, the RR connection is aborted and the MS proceeds as specified below.

f) RR release before the normal end of procedure

The procedure is aborted and the mobile station proceeds as specified below.

g) Location updating reject, other causes than those treated in section 4.4.4.7

The MS waits for release of the RR connection as specified in section 4.4.4.8, and then proceeds as specified below.

In cases d) to g) above and for repeated failures as defined in c) above the mobile station proceeds as follows. Timer T3210 is stopped if still running. The RR Connection is aborted in case of timer T3210 timeout. The attempt counter is incremented. The next actions depend on the Location Area Identities (stored and received from the BCCH of the current serving cell) and the value of the attempt counter.

– the update status is UPDATED, and the stored LAI is equal to the one received on the BCCH from the current serving cell and the attempt counter is smaller than 4:

The mobile station shall keep the update status to UPDATED, the MM IDLE sub-state after the RR connection release is NORMAL SERVICE. The mobile station shall memorize the location updating type used in the location updating procedure. It shall start timer T3211 when the RR connection is released. When timer T3211 expires the location updating procedure is triggered again with the memorized location updating type;

– either the update status is different from UPDATED, or the stored LAI is different from the one received on the BCCH from the current serving cell, or the attempt counter is greater or equal to 4:

The mobile station shall delete any LAI, TMSI, ciphering key sequence number stored in the SIM, set the update status to NOT UPDATED and enter the MM IDLE sub-state ATTEMPTING TO UPDATE when the RR connection is released (See section 4.2.2.2 for the subsequent actions). If the attempt counter is smaller than 4, the mobile station shall memorize that timer T3211 is to be started when the RR connection is released, otherwise it shall memorize that timer T3212 is to be started when the RR connection is released.

4.4.4.10 Abnormal cases on the network side

a) RR connection failure

If a RR connection failure occurs during a common procedure integrated with the location updating procedure, the behaviour of the network should be according to the description of that common procedure.

If a RR connection failure occurs when a common procedure does not exist, the location updating procedure towards the mobile station should be aborted.

b) protocol error

If the LOCATION UPDATING REQUEST message is received with a protocol error, the network should, if possible, return a LOCATION UPDATING REJECT message with one of the following Reject causes:

#96: Mandatory information element error

#99: Information element non-existent or not implemented

#100: Conditional IE error

#111: Protocol error, unspecified

Having sent the response, the network should start the channel release procedure (see section 3.5).

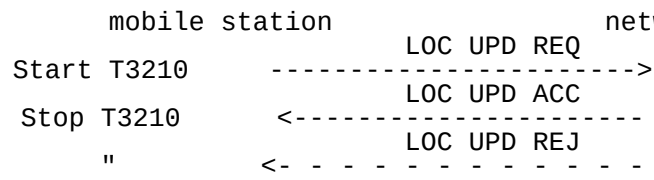


Figure 4.5/TS 24.008: Location updating sequence

4.5 Connection management sublayer service provision

The concept of MM connection is introduced in this section. This concept is mainly a descriptive tool: The establishment of an MM connection by the network can be local (i.e. it is achieved by the transmission of the first CM layer message and without the transmission of any MM layer messages) or can be achieved by the transmission of a CM SERVICE PROMPT message (eg. in the case of certain ring back services). The release of an MM connection by the network or by the mobile station is always local, i.e. these purposes can be achieved without sending any MM messages over the radio interface. (On the contrary, establishment of an MM connection by the mobile station requires the sending of MM messages over the radio interface. An exception is VGCS, where an MM connection will be established as result of an uplink access procedure (see section 3.7.2.1.1in GSM 04.18).)

The Mobility Management (MM) sublayer is providing connection management services to the different entities of the upper Connection management (CM) sublayer (see ~~TS 3GPP~~TS 24.007). It offers to a CM entity the possibility to use an MM connection for the exchange of information with its peer entity. An MM connection is established and released on request from a CM entity. Different CM entities communicate with their peer entity using different MM connections. Several MM connections may be active at the same time.

An MM connection requires an RR connection. All simultaneous MM connections for a given mobile station use the same RR connection.

In the following sections, the procedures for establishing, re-establishing, maintaining, and releasing an MM connection are described, usually separately for the mobile station and the network side.

4.5.1 MM connection establishment

4.5.1.1 MM connection establishment initiated by the mobile station

Upon request of a CM entity to establish an MM connection the MM sublayer first decides whether to accept, delay, or reject this request:

- An MM connection establishment may only be initiated by the mobile station when the following conditions are fulfilled:

  - Its update status is UPDATED.

  - The MM sublayer is in one of the states MM IDLE or MM connection active but not in MM connection active (Group call).

  An exception from this general rule exists for emergency calls (see section 4.5.1.5). A further exception is defined in the following clause.

- If an MM specific procedure is running at the time the request from the CM sublayer is received, and the LOCATION UPDATING REQUEST message has been sent, the request will either be rejected or delayed, depending on implementation, until the MM specific procedure is finished and, provided that the network has not sent a "follow-on proceed" indication, the RR connection is released. If the LOCATION UPDATING REQUEST message has not been sent, the mobile station may include a "follow-on request" indicator in the message. The mobile station shall then delay the request until the MM specific procedure is completed, when it may be given the opportunity by the network to use the RR connection: see section 4.4.4.6.

In order to establish an MM connection, the mobile station proceeds as follows:

a) If no RR connection exists, the MM sublayer requests the RR sublayer to establish an RR connection and enters MM sublayer state WAIT FOR RR CONNECTION (MM CONNECTION). This request contains an establishment cause and a CM SERVICE REQUEST or NOTIFICATION RESPONSE message. When the establishment of an RR connection is indicated by the RR sublayer (this indication implies that the CM

SERVICE REQUEST or NOTIFICATION RESPONSE message has been successfully transferred via the radio interface, see section 2.2), the MM sublayer of the mobile station starts timer T3230, gives an indication to the CM entity that requested the MM connection establishment, and enters MM sublayer state WAIT FOR OUTGOING MM CONNECTION.

b) If an RR connection is available, the MM sublayer of the mobile station sends a CM SERVICE REQUEST or NOTIFICATION RESPONSE message to the network, starts timer T3230, gives an indication to the CM entity that requested the MM connection establishment, and enters:

- MM sublayer state WAIT FOR OUTGOING MM CONNECTION, if no MM connection is active;
- MM sublayer state WAIT FOR ADDITIONAL OUTGOING MM CONNECTION, if at least one MM connection is active;
- If an RR connection exists but the mobile station is in the state WAIT FOR NETWORK COMMAND then any requests from the CM layer that are received will either be rejected or delayed until this state is left.

c) Only applicable for mobile stations supporting VGCS talking:

If a mobile station which is in the MM sublayer state MM IDLE, service state RECEIVING GROUP CALL (NORMAL SERVICE), receives a request from the GCC sublayer to perform an uplink access, the MM sublayer requests the RR sublayer to perform an uplink access procedure and enters MM sublayer state WAIT FOR RR CONNECTION (GROUP TRANSMIT MODE).

When a successful uplink access is indicated by the RR sublayer, the MM sublayer of the mobile station gives an indication to the GCC sublayer and enters MM sublayer state MM CONNECTION ACTIVE (GROUP TRANSMIT MODE).

When an uplink access reject is indicated by the RR sublayer, the MM sublayer of the mobile station gives an indication to the GCC sublayer and enters the MM sublayer state MM IDLE, service state RECEIVING GROUP CALL (NORMAL SERVICE).

In the network, if an uplink access procedure is performed, the RR sublayer in the network provides an indication to the MM sublayer together with the mobile subscriber identity received in the TALKER INDICATION message. The network shall then enter the MM sublayer state MM CONNECTION ACTIVE (GROUP TRANSMIT MODE).

The CM SERVICE REQUEST message contains the

- mobile identity according to section 10.5.1.4;
- mobile station classmark 2;
- ciphering key sequence number; and
- CM service type identifying the requested type of transaction (e.g. mobile originating call establishment, emergency call establishment, short message service, supplementary service activation), location services)

A MS supporting eMLPP may optionally include a priority level in the CM SERVICE REQUEST message.

Only applicable for mobile stations supporting VGCS listening or VBS listening:

The NOTIFICATION RESPONSE message is used if a mobile station has received a notification message on the NCH for a VGCS or VBS call without a description of the respective VGCS or VBS channel. The mobile station therefore establishes an MM connection with a NOTIFICATION RESPONSE in order to obtain the necessary details from the network. The NOTIFICATION RESPONSE message contains the

- mobile identity according to section 10.5.1.4;
- mobile station classmark 2; and
- notified voice group or broadcast call reference according to section 10.5.1.9.

A collision may occur when a CM layer message is received by the mobile station in MM sublayer state WAIT FOR OUTGOING MM CONNECTION or in WAIT FOR ADDITIONAL OUTGOING MM CONNECTION. In this case the MM sublayer in the MS shall establish a new MM connection for the incoming CM message as specified in 4.5.1.3.

Upon receiving a CM SERVICE REQUEST or NOTIFICATION RESPONSE message, the network shall analyse its content. The type of semantic analysis may depend on other on going MM connection(s). Depending on the type of request and the current status of the RR connection, the network may start any of the MM common procedures and RR procedures.

In GSM,~~The~~ the network may initiate the classmark interrogation procedure, for example, to obtain further information on the mobile station's encryption capabilities.

The identification procedure (see section 4.3.3) may be invoked for instance if a TMSI provided by the mobile station is not recognized.

The network may invoke the authentication procedure (see section 4.3.2) depending on the CM service type.

In GSM, ~~T~~the network decides also if the ciphering mode setting procedure shall be invoked (see section 3.4.7 in GSM 04.18).

In UMTS, the network decides also if the security mode control procedure shall be invoked (see section 8.1.10 in ~~3GPP~~TS 25.331).

NOTE: If the CM_SERVICE_REQUEST message contains a priority level the network may use this to perform queuing and pre-emption as defined in ~~GSM 3GPP~~TS ~~03~~23.0~~6~~7.

In GSM, ~~A~~an indication from the RR sublayer that the ciphering mode setting procedure is completed, or reception of a CM SERVICE ACCEPT message, shall be treated as a service acceptance indication by the mobile station.

In UMTS, an indication from the RR sublayer that the security mode control procedure is completed, or reception of a CM SERVICE ACCEPT message, shall be treated as a service acceptance indication by the mobile station.

The MM connection establishment is completed, timer T3230 shall be stopped, the CM entity that requested the MM connection shall be informed, and MM sublayer state MM CONNECTION ACTIVE is entered. The MM connection is considered to be active.

If the service request cannot be accepted, the network returns a CM SERVICE REJECT message to the mobile station.

The reject cause information element (see 10.5.3.6 and Annex G) indicates the reason for rejection. The following cause values may apply:

#4 : IMSI unknown in VLR

#6 : Illegal ME

#17 : Network failure

#22 : Congestion

#32 : Service option not supported

#33 : Requested service option not subscribed

#34 : Service option temporarily out of order

If no other MM connection is active, the network may start the RR connection release (see section 3.5) when the CM SERVICE REJECT message is sent.

If a CM SERVICE REJECT message is received by the mobile station, timer T3230 shall be stopped, the requesting CM sublayer entity informed. Then the mobile station shall proceed as follows:

- If the cause value is not #4 or #6 the MM sublayer returns to the previous state (the state where the request was received). Other MM connections shall not be affected by the CM SERVICE REJECT message.
- If cause value #4 is received, the mobile station aborts any MM connection, deletes any TMSI, LAI and ciphering key sequence number in the SIM, changes the update status to NOT UPDATED (and stores it in the SIM according to section 4.1.2.2), and enters the MM sublayer state WAIT FOR NETWORK COMMAND. If subsequently the RR connection is released or aborted, this will force the mobile station to initiate a normal location updating). Whether the CM request shall be memorized during the location updating procedure, is a choice of implementation.

- If cause value #6 is received, the mobile station aborts any MM connection, deletes any TMSI, LAI and ciphering key sequence number in the SIM, changes the update status to ROAMING NOT ALLOWED (and stores it in the SIM according to section 4.1.2.2), and enters the MM sublayer state WAIT FOR NETWORK COMMAND. The mobile station shall consider the SIM as invalid until switch-off or the SIM is removed.

4.5.1.2 Abnormal cases

Mobile station side:

a) RR connection failure or IMSI deactivation

If an RR connection failure occurs or the IMSI is deactivated during the establishment of an MM connection, the MM connection establishment is aborted, timers T3230 is stopped, and an indication is given to the CM entity that requested the MM connection establishment. This shall be treated as a rejection for establishment of the new MM connection, and the MM sublayer shall release all active MM connections.

b) T3230 expiry

If T3230 expires (i.e. no response is given but a RR connection is available) the MM connection establishment is aborted and the requesting CM sublayer is informed. If no other MM connection exists then the mobile station shall proceed as described in section 4.5.3.1 for release of the RR connection. Otherwise the mobile station shall return to the MM sublayer state where the request of an MM connection was received, i.e. to MM sublayer state MM connection active. Other ongoing MM connections (if any) shall not be affected.

c) Reject cause values #95, #96, #97, #99, #100, #111 received

The same actions as on timer expiry shall be taken by the mobile station.

d) Random access failure or RR connection establishment failure

If the mobile station detects a random access failure or RR connection establishment failure during the establishment of an MM connection, it aborts the MM connection establishment and gives an indication to the CM entity that requested the MM connection establishment.

NOTE: Further actions of the mobile station depend on the RR procedures and MM specific procedures during which the abnormal situation has occurred and are described together with those procedures.

Network side:

a) RR connection failure

The actions to be taken upon RR connection failure within a MM common procedure are described together with that procedure. A RR connection failure occurring outside such MM common procedures, shall trigger the release of all active MM connections if any.

b) Invalid message or message content

Upon reception of an invalid initial message or a CM SERVICE REQUEST message with invalid content, a CM SERVICE REJECT message shall be returned with one of the following appropriate Reject cause indications:

95: Semantically incorrect message

96: Mandatory information element error

97: Message type non-existent or not implemented

99: Information element non-existent or not implemented

100: Conditional IE error

111: Protocol error, unspecified

When the CM SERVICE REJECT message has been sent, the network may start RR connection release if no other MM connections exist or if the abnormal condition also has influence on the other MM connections.

4.5.1.3 MM connection establishment initiated by the network

4.5.1.3.1 Mobile Terminating CM Activity

When a CM sublayer entity in the network requests the MM sublayer to establish a MM connection, the MM sublayer will request the establishment of an RR connection to the RR sublayer if no RR connection to the desired mobile station exists. The MM sublayer is informed when the paging procedure is finished (see GSM 04.18 section 3.3.2 and ~~3GPP~~TS 25.331 section 8.2.1) and the mobile station shall enter the MM state WAIT FOR NETWORK COMMAND.

(* editor's note: this does not appear to be stated any where other than in fig 4.1a. Without this statement, there does not seem to be anything to stop the mobile sending a CM SERVICE REQUEST message which might cross (ambiguously) with a CIPHERING MODE COMMAND or a SECURITY MODE CONTROL message. *)

In GSM, ~~W~~when an RR connection is established (or if it already exists at the time the request is received), the MM sublayer may initiate any of the MM common procedures (except IMSI detach); it may request the RR sublayer to perform the RR classmark interrogation procedure, and/or the ciphering mode setting procedure.

In UMTS, when an RR connection is established (or if it already exists at the time the request is received), the MM sublayer may initiate any of the MM common procedures (except IMSI detach); it may request the RR sublayer to perform the security mode control procedure.

When all MM and RR procedures are successfully completed which the network considers necessary, the MM sublayer will inform the requesting mobile terminating CM sublayer entity on the success of the MM connection establishment.

If an RR connection already exists and no MM specific procedure is running, the network may also establish a new mobile terminating MM connection by sending a CM message with a new PD/TI combination.

In GSM, ~~I~~if the establishment of an RR connection is unsuccessful, or if any of the MM common procedures or the ciphering mode setting fail, this is indicated to the CM layer with an appropriate error cause.

In UMTS, if the establishment of an RR connection is unsuccessful, or if any of the MM common procedures or the security mode control fail, this is indicated to the CM layer with an appropriate error cause.

If an RR connection used for a MM specific procedure exists to the mobile station, the CM request may be rejected or delayed depending on implementation. When the MM specific procedure has been completed, the network may use the same RR connection for the delayed CM request.

Only applicable in case of VGCS talking:

In the MM CONNECTION ACTIVE (GROUP TRANSMIT MODE) the mobile station is in RR Group transmit mode. There shall be only one MM connection active.

When in MM CONNECTION ACTIVE (GROUP TRANSMIT MODE) state, the MM sublayer in the network shall reject the request for the establishment of another MM connection by any CM layer.

If the RR sublayer in the network indicates a request to perform a transfer of the mobile station from RR connected mode to RR Group transmit mode which will result in a transition from MM CONNECTION ACTIVE state to MM CONNECTION ACTIVE (GROUP TRANSMIT MODE) state in the MM sublayer, the MM sublayer shall not allow the transition if more than one MM connection is active with the mobile station.

4.5.1.3.2 Mobile Originating CM Activity $(CCBS)$

When a CM sublayer entity in the network requests the MM sublayer to establish a MM connection, the MM sublayer will request the establishment of an RR connection to the RR sublayer if no RR connection to the desired mobile station exists. The MM sublayer is informed when the paging procedure is finished (see GSM 04.18 section 3.3.2 and ~~3GPP~~TS 25.331section 8.2.1) and the mobile station shall enter the MM state WAIT FOR NETWORK COMMAND.

In GSM, ~~W~~when an RR connection is established (or if it already exists at the time the request is received), the MM sublayer may initiate any of the MM common procedures (except IMSI detach), it may request the RR sublayer to perform the RR classmark interrogation procedure and/or the ciphering mode setting procedure.

In UMTS, when an RR connection is established (or if it already exists at the time the request is received), the MM sublayer may initiate any of the MM common procedures (except IMSI detach), it may request the RR sublayer to perform the security mode control procedure.

The network should use the information contained in *the Mobile Station Classmark Type* 2 IE on the mobile station's support for "Network Initiated MO CM Connection Request" to determine whether to:

not start this procedure (eg if an RR connection already exists), or,

to continue this procedure, or,

to release the newly established RR connection.

In the case of a "Network Initiated MO CM Connection Request" the network shall use the established RR connection to send a CM SERVICE PROMPT message to the mobile station.

If the mobile station supports "Network Initiated MO CM Connection Request", the MM sublayer of the MS gives an indication to the CM entity identified by the CM SERVICE PROMPT message and enters the MM sublayer state PROCESS CM SERVICE PROMPT. In the state PROCESS CM SERVICE PROMPT the MM sublayer waits for either the rejection or confirmation of the recall by the identified CM entity. Any other requests from the CM entities shall either be rejected or delayed until this state is left.

When the identified CM entity informs the MM sublayer, that it has send the first CM message in order to start the CM recall procedure the MM sublayer enters the state MM CONNECTION ACTIVE.

If the identified CM entity indicates that it will not perform the CM recall procedure the MM sublayer starts timer T3240 and enter the state WAIT FOR NETWORK COMMAND, expecting the release of the RR connection.

If the CM SERVICE PROMPT message is received by the MS in MM sublayer states WAIT FOR OUTGOING MM CONNECTION or in WAIT FOR ADDITIONAL OUTGOING MM CONNECTION then the mobile station shall send an MM STATUS message with cause " Message not compatible with protocol state".

A mobile that does not support "Network Initiated MO CM Connection Request" shall return an MM STATUS message with cause #97 "message type non-existent or not implemented" to the network.

If the mobile station supports "Network Initiated MO CM Connection Request" but the identified CM entity in the mobile station does not provide the associated support, then the mobile station shall send an MM STATUS message with cause "Service option not supported". In the case of a temporary CM problem (eg lack of transaction identifiers) then the mobile station shall send an MM STATUS message with cause "Service option temporarily out of order".

If an RR connection already exists and no MM specific procedure is running, the network may use it to send the CM SERVICE PROMPT message.

In GSM, ~~I~~if the establishment of an RR connection is unsuccessful, or if any of the MM common procedures or the ciphering mode setting fail, this is indicated to the CM layer in the network with an appropriate error cause.

In UMTS, if the establishment of an RR connection is unsuccessful, or if any of the MM common procedures or the security mode control fail, this is indicated to the CM layer in the network with an appropriate error cause.

If an RR connection used for a MM specific procedure exists to the mobile station, the "Network Initiated MO CM Connection Request" may be rejected or delayed depending on implementation. When the MM specific procedure has been completed, the network may use the same RR connection for the delayed "Network Initiated MO CM Connection Request".

4.5.1.4 Abnormal cases

The behaviour upon abnormal events is described together with the relevant RR procedure or MM common procedure.

4.5.1.5 MM connection establishment for emergency calls

A MM connection for an emergency call may be established in all states of the mobility management sublayer which allow MM connection establishment for a normal originating call. In addition, establishment may be attempted in all service states where a cell is selected (see 4.2.2) but not in the MM CONNECTION ACTIVE state (GROUP TRANSMIT MODE) state. However, as a network dependent option, a MM connection establishment for emergency call may be rejected in some of the states.

When a user requests an emergency call establishment the mobile station will send a CM SERVICE REQUEST message to the network with a CM service type information element indicating emergency call establishment. If the network does not accept the emergency call request, e.g., because IMEI was used as identification and this capability is

not supported by the network, the network will reject the request by returning a CM SERVICE REJECT message to the mobile station.

The reject cause information element indicates the reason for rejection. The following cause values may apply:

#3 "Illegal MS"

#4 "IMSI unknown in VLR"

#5 "IMEI not accepted"

#6 "Illegal ME"

#17 "Network failure"

#22 "Congestion"

#32 "Service option not supported"

#34 "Service option temporarily out of order"

With the above defined exceptions, the procedures described for MM connection establishment in 4.5.1.1 and 4.5.1.2 shall be followed.

NOTE: Normally, the mobile station will be identified by an IMSI or a TMSI. However, if none of these identifiers is available in the mobile station, then the mobile station shall use the IMEI for identification purposes. The network may in that case reject the request by returning a CM SERVICE REJECT message with reject cause:

#5 "IMEI not accepted".

4.5.1.6 Call re-establishment

The re-establishment procedure allows a MS to resume a connection in progress after a radio link failure, possibly in a new cell and possibly in a new location area. The conditions in which to attempt call re-establishment or not depend on the call control state, see section 5.5.4 and, whether or not a cell allowing call re-establishment has been found (as described in GSM 05.08). MM connections are identified by their protocol discriminators and transaction identifiers: these shall not be changed during call re-establishment.

The re-establishment takes place when a lower layer failure occurs and at least one MM connection is active (i.e.. the mobile station's MM sublayer is either in state 6 "MM CONNECTION ACTIVE" or state 20 "WAIT FOR ADDITIONAL OUTGOING MM CONNECTION").

NOTE: During a re-establishment attempt the mobile station does not return to the MM IDLE state; thus no location updating is performed even if the mobile is not updated in the location area of the selected cell.

No call re-establishment shall be performed for voice group and broadcast calls.

4.5.1.6.1 Call re-establishment, initiation by the mobile station

NOTE: The network is unable to initiate call re-establishment.

If at least one request to re-establish an MM connection is received from a CM entity as a response to the indication that the MM connection is interrupted (see 4.5.2.3.) the mobile station initiates the call re-establishment procedure. If several CM entities request re-establishment only one re-establishment procedure is initiated. If any CM entity requests re-establishment, then re-establishment of all transactions belonging to all Protocol Discriminators that permit Call Re-establishment shall be attempted.

Upon request of a CM entity to re-establish an MM connection the MM sublayer requests the RR sublayer to establish an RR connection and enters MM sublayer state WAIT FOR REESTABLISH. This request contains an establishment cause and a CM RE-ESTABLISHMENT REQUEST message. When the establishment of an RR connection is indicated by the RR sublayer (this indication implies that the CM RE-ESTABLISHMENT REQUEST message has been successfully transferred via the radio interface, see section 2.2), the MM sublayer of the mobile station starts timer T3230, gives an indication to all CM entities that are being re-established, and remains in the MM sublayer state WAIT FOR REESTABLISH.

The CM RE-ESTABLISHMENT REQUEST message contains the

- mobile identity according to section 10.5.1.4;
- mobile station classmark 2;
- ciphering key sequence number.

NOTE: Whether or not a CM entity can request re-establishment depends upon the Protocol Discriminator. The specifications for Short Message Service (GSM 04.11), Call Independent Supplementary Services (TS 24.010) and Location Services (TS 24.071) do not currently specify any re-establishment procedures.

Upon receiving a CM RE-ESTABLISHMENT REQUEST message, the network shall analyse its content. Depending on the type of request, the network may start any of the MM common procedures and RR procedures.

The network may initiate the classmark interrogation procedure, for example, to obtain further information on the mobile station's encryption capabilities.

The identification procedure (see section 4.3.3) may be invoked.

The network may invoke the authentication procedure (see section 4.3.2).

In GSM, ~~T~~the network decides if the ciphering mode setting procedure shall be invoked (see GSM 04.18 section 3.4.7). An indication from the RR sublayer that the ciphering mode setting procedure is completed, or reception of a CM SERVICE ACCEPT message, shall be treated as a service acceptance indication by the mobile station.

In UMTS, the network decides if the security mode control procedure shall be invoked (see section 8.1.10 in ~~3GPP~~TS 25.331). An indication from the RR sublayer that the security mode control procedure is completed, or reception of a CM SERVICE ACCEPT message, shall be treated as a service acceptance indication by the mobile station.

The MM connection re-establishment is completed, timer T3230 shall be stopped, all CM entities associated with the re-establishment shall be informed, and MM sublayer state MM CONNECTION ACTIVE is re-entered. All the MM connections are considered to be active.

If the network cannot associate the re-establishment request with any existing call for that mobile station, a CM SERVICE REJECT message is returned with the reject cause:

#38 "call cannot be identified"

If call re-establishment cannot be performed for other reasons, a CM SERVICE REJECT is returned, the appropriate reject cause may be any of the following (see annex G):

4 "IMSI unknown in VLR";

6 "illegal ME";

#17 "network failure";

#22 "congestion";

#32 "service option not supported";

#34 "service option temporarily out of order".

Whatever the reject cause a mobile station receiving a CM SERVICE REJECT as a response to the CM RE-ESTABLISHMENT REQUEST shall stop T3230, release all MM connections and proceed as described in section 4.5.3.1. In addition:

- if cause value #4 is received, the mobile station deletes any TMSI, LAI and ciphering key sequence number in the SIM, changes the update status to NOT UPDATED (and stores it in the SIM according to section 4.1.2.2), and enters the MM sublayer state WAIT FOR NETWORK COMMAND. If subsequently the RR connection is released or aborted, this will force the mobile station to initiate a normal location updating). The CM re-establishment request shall not be memorized during the location updating procedure.
- if cause value #6 is received, the mobile station deletes any TMSI, LAI and ciphering key sequence number in the SIM, changes the update status to ROAMING NOT ALLOWED (and stores it in the SIM according to section 4.1.2.2), and enters the MM sublayer state WAIT FOR NETWORK COMMAND. The MS shall consider the SIM as invalid until switch-off or the SIM is removed.

4.5.1.6.2 Abnormal cases

Mobile station side:

a) Random access failure or RR connection establishment failure

   If the mobile station detects a random access failure or RR connection establishment failure during the re-establishment of an MM connection, the re-establishment is aborted and all MM connections are released.

b) RR connection failure

   If a RR connection failure occurs, timer T3230 is stopped, the re-establishment is aborted and all active MM connections are released.

c) IMSI deactivation

   If the IMSI deactivated during the re-establishment attempt then timer T3230 is stopped, the re-establishment is aborted and all MM connections are released.

d) T3230 expires

   If T3230 expires (i.e. no response is given but a RR connection is available) the re-establishment is aborted, all active MM connections are released and the mobile station proceeds as described in section 4.5.3.1.

e) Reject causes #96, #97, #99, #100, #111 received

   The mobile station shall perform the same actions as if timer T3230 had expired.

Network side:

a) RR connection failure

   If a RR connection failure occurs after receipt of the CM RE-ESTABLISHMENT REQUEST the network shall release all MM connections.

b) Invalid message content

   Upon reception an invalid initial of message or a CM RE-ESTABLISHMENT REQUEST message with invalid content, a CM SERVICE REJECT message shall be returned with one of the following appropriate Reject cause indications:

   #96: Mandatory information element error

   #99: Information element non-existent or not implemented

   #100: Conditional IE error

   #111: Protocol error, unspecified

When the CM SERVICE REJECT message has been sent, the network shall release the RR connection.

4.5.1.7 Forced release during MO MM connection establishment

If the mobile station's CM layer initiated the MM connection establishment but the CM layer wishes to abort the establishment prior to the completion of the establishment phase, the mobile station shall send a CM SERVICE ABORT message any time after the completion of the RR connection and not after the first CM message (e.g. SETUP) is sent.

If the first CM message has already been sent, the normal release procedure defined by the appropriate CM protocol applies and the CM SERVICE ABORT shall not be sent.

Sending of the CM SERVICE ABORT message is only allowed during the establishment of the first MM connection, where no other MM connection exists in parallel. If parallel MM connections exist already, a new connection establishment cannot be aborted and normal MM connection release according to 4.5.3 applies after MM connection establishment.

Upon transmission of the CM SERVICE ABORT message the mobile station shall set timer T3240 and enter the state WAIT FOR NETWORK COMMAND, expecting the release of the RR connection.

Upon receipt of the CM SERVICE ABORT message the network shall abort ongoing processes, release the appropriate resources, and unless another MM connection establishment is pending, initiate a normal release of the RR connection.

If the RR connection is not released within a given time controlled by timer T3240, the mobile station shall abort the RR connection. In both cases, either after a RR connection release triggered from the network side or after a RR connection abort requested by the mobile station side the mobile station shall return to state MM IDLE; the service state depending upon the current update status as specified in section 4.2.3.

4.5.2 MM connection information transfer phase

After the MM connection has been established, it can be used by the CM sublayer entity for information transfer. According to the protocol architecture described in TS 24.007, each CM entity will have its own MM connection. These different MM connections are identified by the protocol discriminator PD and, additionally, by the transaction identifier TI.

All MM common procedures may be initiated at any time while MM connections are active. Except for Short Message Control which uses a separate layer 2 low priority data link, no priority mechanism is defined between the CM, MM and RR sublayer messages.

4.5.2.1 Sending CM messages

A CM sublayer entity, after having been advised that a MM connection has been established, can request the transfer of CM messages. The CM messages passed to the MM sublayer are then sent to the other side of the interface with the PD and TI set according to the source entity.

4.5.2.2 Receiving CM messages

Upon receiving a CM message, the MM sublayer will distribute it to the relevant CM entity according to the PD value and TI value. However, if the received CM message is the first for the MM connection (identified by PD and TI), the MM sublayer will in addition indicate to the CM entity that a new MM connection has been established.

4.5.2.3 Abnormal cases

RR connection failure:

If the RR connection failure occurs during a RR or MM common procedure, the consequent actions are described together with that procedure.

In other cases, the following applies:

Mobile station:

The MM sublayer shall indicate to all CM entities associated with active MM connections that the MM connection is interrupted, the subsequent action of the MM sublayer (call re-establishment, see 4.5.1.6, or local release) will then depend on the decisions by the CM entities.

Network:

The MM sublayer shall locally release all active MM connections. As an option the network may delay the release of all or some of the MM connections to allow the mobile station to initiate call re-establishment

4.5.3 MM connection release

An established MM connection can be released by the local CM entity. The release of the CM connection will then be done locally in the MM sublayer, i.e. no MM message are sent over the radio interface for this purpose.

4.5.3.1 Release of associated RR connection

If all MM connections are released by their CM entities, the mobile station shall set timer T3240 and enter the state WAIT FOR NETWORK COMMAND, expecting the release of the RR connection.

In the network, if the last MM connection is released by its user, the MM sublayer may decide to release the RR connection ~~by requesting the RR sublayer according to section 3.5~~. The RR connection may be maintained by the network, e.g. in order to establish another MM connection.

If the RR connection is not released within a given time controlled by the timer T3240, the mobile station shall abort the RR connection. In both cases, either after a RR connection release triggered from the network side or after a RR connection abort requested by the MS-side, the MS shall return to MM IDLE state; the service state depending upon the current update status as specified in section 4.2.3.

4.5.3.2 Uplink release in a voice group call

(Only applicable for mobile stations supporting VGCS talking:)

If a mobile station which is in the MM sublayer state MM CONNECTION ACTIVE (GROUP TRANSMIT MODE) receives a request from the GCC sublayer to perform an uplink release, the MM sublayer requests the RR sublayer to perform an uplink release procedure and enters the MM sublayer state RECEIVING GROUP CALL (NORMAL SERVICE).

4.6 Receiving a MM STATUS message by a MM entity.

If the MM entity of the mobile station receives a MM STATUS message no state transition and no specific action shall be taken as seen from the radio interface, i.e. local actions are possible.

With the exceptions described for the responses to the CM SERVICE PROMPT message, the actions to be taken on receiving a MM STATUS message in the network are an implementation dependent option.

3GPP TSG-CN WG1 Meeting #9
Bad Aibling, Germany, 30 Nov – 3 Dec 1999

***Document* N1-99F07**
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	082r1	Current Version:	3.1.0

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

For submission to: TSGN#6 *list expected approval meeting # here ↑*	for approval	X	strategic		*(for SMG use only)*
	for information		non-strategic		

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

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

Source: Nokia **Date:** 99-11-12

Subject: Attach procedure for R99

Work item: GSM/UMTS interworking

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

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

Reason for change: This CR proposes changes in the Attach procedure in order to align the procedure with the TS 23.060.

Clauses affected: 4.7.3

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:


help.doc

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

4.7.3 GPRS attach procedure

The GPRS attach procedure is used for two purposes:

- normal GPRS attach, performed by the MS to IMSI attach for GPRS services only. The normal GPRS attach procedure shall be used by GPRS MSs in MS operation mode C, independent of the network operation mode. It shall also be used by GPRS MSs in MS operation modes A or B if the network operates in network operation mode II or III .

- combined GPRS attach procedure, used by GPRS MSs in MS operation modes A or B to attach the IMSI for GPRS and non-GPRS services provided that the network operates in network operation mode I.

With a successful GPRS attach procedure a GMM context is established.

Section 4.7.3.1 describes the GPRS attach procedure to attach the IMSI only for GPRS services. The combined GPRS attach procedure used to attach the IMSI for both GPRS and non-GPRS services is described in section 4.7.3.2.

If an IMSI attach for non-GPRS services is requested and a GMM context exists, the routing area updating procedure shall be used as described in section 4.7.5.2.

To limit the number of subsequently rejected attach attempts, a GPRS attach attempt counter is introduced. The GPRS attach attempt counter shall be incremented as specified in section 4.7.3.1.5. Depending on the value of the GPRS attempt counter, specific actions shall be performed. The GPRS attach attempt counter shall be reset when:

- the MS is powered on;

- a SIM is inserted;

- a GPRS attach procedure is successfully completed; or

- a combined GPRS attach procedure is completed for GPRS services only with cause #2, #16, #17 or #22

- a GPRS attach procedure is completed with cause #11, #12 or #13,

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

- expiry of timer T3302;

- a new routing area is entered; or

- an attach is triggered by CM sublayer requests.

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; the same lists are used by GMM and MM procedures.

4.7.3.1 GPRS attach procedure for GPRS services

The GPRS attach procedure is a GMM procedure used by GPRS MSs to IMSI attach for GPRS services.

The attach type information element shall indicate “GPRS attach”.

4.7.3.1.1 GPRS attach procedure initiation

In state GMM-DEREGISTERED, the MS initiates the GPRS attach procedure by sending an ATTACH REQUEST message to the network, starts timer T3310 and enters state GMM-REGISTERED-INITIATED.

The MS shall include a valid P-TMSI, if any is available, the P-TMSI signature associated with the P-TMSI and the routing area identity associated with the P-TMSI in the ATTACH REQUEST message. If there is no valid P-TMSI available, the IMSI shall be included instead of the P-TMSI and P-TMSI signature.

The MS capable both UMTS and GSM or only GSM system shall also indicate within the DRX parameters whether it supports the split pg cycle option on CCCH. The optional support of the split pg cycle on CCCH by the network is indicated in SI13 or PSI1. Split pg cycle on CCCH is applied by both the network and the MS when the split pg cycle option is supported by both (see GSM 05.02).

4.7.3.1.2 GMM common procedure initiation

The network may initiate GMM common procedures, e.g. the GMM identification and GMM authentication and ciphering procedure, depending on the received information such as IMSI, CKSN, old RAI, P-TMSI and P-TMSI signature.

4.7.3.1.3 GPRS attach accepted by the network

If the GPRS attach request is accepted by the network, an ATTACH ACCEPT message is sent to the MS.

The P-TMSI reallocation may be part of the GPRS attach procedure. The P-TMSI that shall be allocated is then included in the ATTACH ACCEPT message together with the routing area identifier. The network shall, in this case, change to state GMM-COMMON-PROCEDURE-INITIATED and shall start timer T3350 as described in section 4.7.6. Furthermore, the network may assign a P-TMSI signature for the GMM context which is then also included in the ATTACH ACCEPT message. If the LAI or PLMN identity that has been transmitted in the ATTACH ACCEPT message is a member of any of the “forbidden” lists, any such entry shall be deleted. Additionally, the network shall include the radio priority level to be used by the MS for mobile originated SMS transfer in the ATTACH ACCEPT message.

The MS, receiving an ATTACH ACCEPT message, stores the received routing area identification, stops timer T3310, reset the GPRS attach attempt counter, reset the routing area updating attempt counter, enters state GMM-REGISTERED and sets the GPRS update status to GU1 UPDATED.

If the message contains a P-TMSI, the MS shall use this P-TMSI as the new temporary identity for GPRS services. In this case, an ATTACH COMPLETE message is returned to the network. The MS shall delete its old P-TMSI and shall store the new one. If no P-TMSI has been included by the network in the ATTACH ACCEPT message, the old P-TMSI, if any available, shall be kept.

If the message contains a P-TMSI signature, the MS shall use this P-TMSI signature as the new temporary signature for the GMM context. The MS shall delete its old P-TMSI signature, if any is available, and shall store the new one. If the message contains no P-TMSI signature, the old P-TMSI signature, if available, shall be deleted.

The network receiving an ATTACH COMPLETE message stops timer T3350, changes to GMM-REGISTERED state and considers the P-TMSI sent in the ATTACH ACCEPT message as valid.

4.7.3.1.4 GPRS attach not accepted by the network

If the attach request cannot be accepted by the network, an ATTACH REJECT message is transferred to the MS. The MS receiving the ATTACH REJECT message stops timer T3310 and takes one of the following actions depending upon the reject cause:

3 (Illegal MS); or

6 (Illegal ME)

The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED (and shall store it according to section 4.1.3.2) and shall delete any P-TMSI, P-TMSI signature, RAI and GPRS ciphering key sequence number. The new GMM state is GMM-DEREGISTERED. The SIM shall be considered as invalid for GPRS services until switching off or the SIM is removed.

If the MS is IMSI attached via MM procedures, the MS shall in addition set the update status to U3 ROAMING NOT ALLOWED, shall delete any TMSI, LAI and ciphering key sequence number. The new MM state is MM IDLE. The SIM shall be considered as invalid also for non-GPRS services until switching off or the SIM is removed.

7 (GPRS services not allowed)

The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED (and shall store it according to section 4.1.3.2) and shall delete any P-TMSI, P-TMSI signature, RAI and GPRS ciphering key sequence number. The SIM shall be considered as invalid for GPRS services until switching off or the SIM is removed. The new state is GMM-DEREGISTERED.

8 (GPRS services and non-GPRS services not allowed)

The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED (shall store it according to section 4.1.3.2) and shall delete any P-TMSI, P-TMSI signature, RAI and GPRS ciphering key sequence number. The new GMM state is GMM-DEREGISTERED. The new MM state is MM IDLE.

The MS shall set the update status to U3 ROAMING NOT ALLOWED, shall delete any TMSI, LAI and ciphering key sequence number. The SIM shall be considered as invalid for GPRS and non-GPRS services until switching off or the SIM is removed.

11 (PLMN not allowed)

12 (Location area not allowed); or

13 (Roaming not allowed in this location area)

The MS shall delete any RAI, P-TMSI, P-TMSI signature, and GPRS ciphering key sequence number stored, shall set the GPRS update status to GU3 ROAMING NOT ALLOWED (and shall store it according to section 4.1.3.2), shall reset the GPRS attach attempt counter and shall change to state GMM-DEREGISTERED.

If the MS is IMSI attached via MM procedures, the MS shall in addition set the update status to U3 ROAMING NOT ALLOWED, shall delete any TMSI, LAI and ciphering key sequence number. and shall reset the location update attempt counter. The new MM state is MM IDLE.

The MS shall store the LAI or the PLMN identity in the appropriate forbidden list, i.e. in the “forbidden PLMN list” for cause #11, in the list of “forbidden location areas for regional provision of service” for cause #12 or in the list of “forbidden location areas for roaming” for cause #13. If cause #11 or #13 was received, the MS shall perform a PLMN selection instead of a cell selection.

Other values are considered as abnormal cases. The specification of the MS behaviour in those cases is specified in section 4.7.3.1.5.

4.7.3.1.5 Abnormal cases in the MS

The following abnormal cases can be identified:

a) Access barred because of access class control

The GPRS attach procedure shall not be started. The MS stays in the current serving cell and applies normal cell reselection process. The GPRS attach procedure is started as soon as possible, i.e. when access is granted or because of a cell change.

b) Lower layer failure before the ATTACH ACCEPT or ATTACH REJECT message is received

The procedure shall be aborted. The MS shall proceed as described below.

c) T3310 time-out

On the first expiry of the timer, the MS reset and restart timer T3310 and shall retransmit the ATTACH REQUEST message. This retransmission is repeated four times, i.e. on the fifth expiry of timer T3310, the GPRS attach procedure shall be aborted and the MS shall proceed as described below.

d) ATTACH REJECT, other causes than those treated in section 4.7.3.1.4
The MS shall proceed as described below.

e) Change of cell within the same RA(GSM only)

If a cell change occurs within the same RA when the MS is in state GMM-REGISTERED-INITIATED, then the cell update procedure shall be performed before completion of the attach procedure.

f) Change of cell into a new routing area

If a cell change into a new routing area occurs before an ATTACH ACCEPT or ATTACH REJECT message has been received, the GPRS attach procedure shall be aborted and re-initiated immediately. If a routing area border is crossed when the ATTACH ACCEPT message is received but before an ATTACH COMPLETE message is sent, the GPRS attach procedure shall be aborted and the routing area updating procedure shall be initiated. If a P-TMSI was allocated during the GPRS attach procedure, this P-TMSI shall be used in the

routing area updating procedure. If a P-TMSI signature was allocated together with the P-TMSI during the GPRS attach procedure, this P-TMSI signature shall be used in the routing area updating procedure.

g) Mobile originated detach required

If the MS is in state GMM-REGISTERED-INITIATED, the GPRS attach procedure shall be aborted and the GPRS detach procedure shall be performed (see 4.7.4.1).

h) Procedure collision

If the MS receives a DETACH REQUEST message from the network in state GMM-REGISTERED-INITIATED, the GPRS detach procedure shall be progressed and the GPRS attach procedure shall be aborted. If the cause IE, in the DETACH REQUEST message, indicated a "reattach request", the GPRS attach procedure shall be progressed and the DETACH REQUEST message shall be ignored.

In cases b, c and d the MS shall proceed as follows. Timer T3310 shall be stopped if still running. The GPRS attach attempt counter shall be incremented.

If the GPRS attach attempt counter is less than 5:

- timer T3311 is started and the state is changed to GMM-DEREGISTERED.ATTEMPTING-TO-ATTACH.

If the GPRS attach attempt counter is greater than or equal to 5:

- the MS shall delete any RAI, P-TMSI, P-TMSI signature, and GPRS ciphering key sequence number, shall set the GPRS update status to GU2 NOT UPDATED, shall start timer T3302. The state is changed to GMM-DEREGISTERED..ATTEMPTING-TO-ATTACH or optionally to GMM-DEREGISTERED.PLMN-SEARCH (see 4.2.4.1.2).

- In UMTS, in case c the MS shall release the PS signaling connection~~resources in the lower layers~~ and in case d the network shall release the ~~resources in the lower layers~~PS signaling connection for this MS (see TS 25.331).

4.7.3.1.6 Abnormal cases on the network side

The following abnormal cases can be identified:

a) Lower layer failure

If a low layer failure occurs before the message ATTACH COMPLETE has been received from the MS and a new P-TMSI (or a new P-TMSI and a new P-TMSI signature) has been assigned, the network shall consider both the old and new P-TMSI each with its corresponding P-TMSI-signature as valid until the old P-TMSI can be considered as invalid by the network (see section 4.7.1.5) and shall not resent the message ATTACH ACCEPT. During this period the network may:

- use the identification procedure followed by a P-TMSI reallocation procedure if the old P-TMSI is used by the MS in a subsequent message.

b) Protocol error

If the ATTACH REQUEST message is received with a protocol error, the network shall return an ATTACH REJECT message with one of the following reject causes:

#96: Mandatory information element error;

#99: Information element non-existent or not implemented;

#100: Conditional IE error;

#111: Protocol error, unspecified.

c) T3350 time-out

On the first expiry of the timer, the network shall retransmit the ATTACH ACCEPT message and shall reset and restart timer T3350.

This retransmission is repeated four times, i.e. on the fifth expiry of timer T3350, the GPRS attach procedure shall be aborted. If a new P-TMSI or a new P-TMSI together with a new P-TMSI signature were allocated in the

ATTACH ACCEPT message, the network shall consider both the old and new P-TMSI each together with the corresponding P-TMSI signatures as valid until the old P-TMSI can be considered as invalid by the network (see section 4.7.1.5). During this period the network acts as specified for case a.

d.1) ATTACH REQUEST received

- If one or more of the information elements in the ATTACH REQUEST message differ from the ones received within the previous ATTACH REQUEST message, the previously initiated GPRS attach procedure shall be aborted and the new GPRS attach procedure shall be progressed, or

- If no information element differ, then the ATTACH ACCEPT message shall be resent.

d.2) More than one ATTACH REQUEST received and no ATTACH ACCEPT or ATTACH REJECT message has been sent

- If one or more of the information elements in the ATTACH REQUEST message differs from the ones received within the previous ATTACH REQUEST message, the previously initiated GPRS attach procedure shall be aborted and the new GPRS attach procedure shall be progressed ;

- If the information elements do not differ, then the network shall continue with the previous attach procedure and shall not treat any further this ATTACH REQUEST message.

e) ATTACH REQUEST received in state GMM-REGISTERED

If an ATTACH REQUEST message is received in state GMM-REGISTERED the network may initiate the GMM common procedures; if it turned out that the ATTACH REQUEST message was send by an MS that has already been attached, the GMM context and PDP contexts, if any, are deleted and the new ATTACH REQUEST is progressed.

f) ROUTING AREA UPDATE REQUEST message received before ATTACH COMPLETE message.

Timer T3350 shall be stopped. The allocated P-TMSI shall be considered as valid and the routing area updating procedure shall be progressed as described in section 4.7.5.

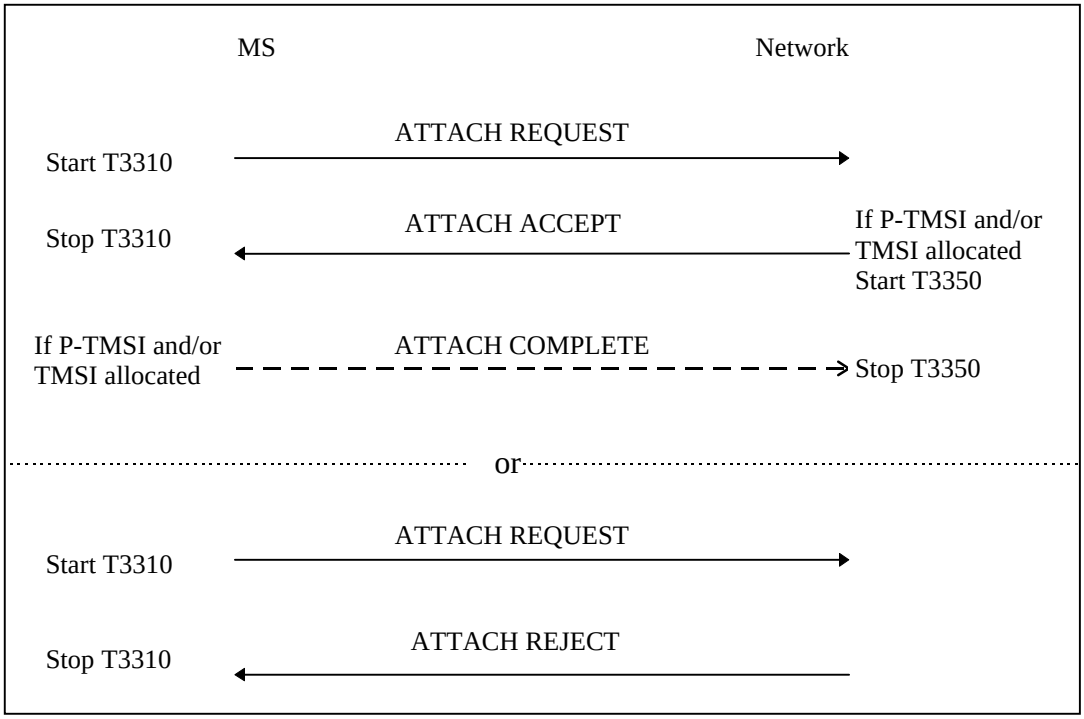


Figure 4.7.3/1 TS 24.008: GPRS attach procedure and combined GPRS attach procedure

4.7.3.2 Combined GPRS attach procedure for GPRS and non-GPRS services

The combined GPRS attach procedure is a GMM procedure used by a GPRS MS operating in MS operation modes A or B for IMSI attach for GPRS and non-GPRS services if the network operates in network operation mode I:.

If a GPRS MS operating in MS operation modes A or B is already attached for non-GPRS services by use of the MM specific IMSI attach procedure, but additionally wishes to perform an IMSI attach for GPRS services, the combined GPRS attach procedure shall also be used.

The attach type information element shall indicate “combined GPRS attach”. In this case, the messages ATTACH ACCEPT, ATTACH COMPLETE, and ATTACH REJECT used by the combined GPRS attach procedure carry information for both the GPRS and the non-GPRS services.

4.7.3.2.1 Combined GPRS attach procedure initiation

If the MS is in GMM state GMM-DEREGISTERED and in MM state MM IDLE, the MS initiates the combined GPRS attach procedure by sending an ATTACH REQUEST message to the network, starts timer T3310 and enters state GMM-REGISTERED-INITIATED and MM LOCATION UPDATING PENDING.

The MS shall include a valid P-TMSI, if available, the P-TMSI signature associated with the P-TMSI and the routing area identity associated with the P-TMSI in the ATTACH REQUEST message. If there is no valid P-TMSI available, the IMSI shall be included instead of the P-TMSI and P-TMSI signature. Furthermore the MS shall include the TMSI status IE if no valid TMSI is available.

4.7.3.2.2 GMM Common procedure initiation

The network may initiate GMM common procedures, e.g. the GMM identification and GMM authentication and ciphering procedure, depending on the received information such as IMSI, CKSN, old RAI, P-TMSI and P-TMSI signature.

4.7.3.2.3 Combined GPRS attach accepted by the network

Depending on the value of the attach result IE received in the ATTACH ACCEPT message, two different cases can be distinguished:

Case 1) The attach result IE value indicates “combined GPRS attach”: IMSI attach for GPRS and non-GPRS services have been successful.

Case 2) The attach result IE value indicates “GPRS only”: IMSI attach for GPRS services has been successful but IMSI attach for non-GPRS services has not been successful.

4.7.3.2.3.1 Combined attach successful for GPRS and non-GPRS services

The description for IMSI attach for GPRS services as specified in section 4.7.3.1.3 shall be followed. In addition, the following description for IMSI attach for non-GPRS services applies.

The TMSI reallocation may be part of the combined GPRS attach procedure. The TMSI allocated is then included in the ATTACH ACCEPT message together with the location area identification (LAI). The network shall, in this case, change to state GMM-COMMON-PROCEDURE-INITIATED and shall start timer T3350 as described in section 4.7.6.

The MS, receiving an ATTACH ACCEPT message, stores the received location area identification, stops timer T3310, reset the location update attempt counter and sets the update status to U1 UPDATED. If the message contains an IMSI, the mobile station is not allocated any TMSI, and shall delete any TMSI accordingly. If the message contains a TMSI, the MS shall use this TMSI as the new temporary identity. The MS shall delete its old TMSI and shall store the new TMSI. In this case, an ATTACH COMPLETE message is returned to the network. If neither a TMSI nor an IMSI has been included by the network in the ATTACH ACCEPT message, the old TMSI, if any available, shall be kept. The new MM state is MM IDLE, the new GMM state is GMM-REGISTERED.

Any timer used for triggering the location update procedure (e.g T3211, T3212) shall be stopped if running.

The network receiving an ATTACH COMPLETE message stops timer T3350, changes to state GMM-REGISTERED and considers the new TMSI as valid.

4.7.3.2.3.2 Combined attach successful for GPRS services only

The description for IMSI attach for GPRS services as specified in section 4.7.3.1.3 shall be followed. In addition, the following description for IMSI attach for non-GPRS services applies.

The MS receiving the ATTACH ACCEPT message takes one of the following actions depending on the reject cause:

2 (IMSI unknown in HLR)

The MS shall set the update status to U3 ROAMING NOT ALLOWED and shall delete any TMSI, LAI and ciphering key sequence number. The new MM state is MM IDLE. The SIM shall be considered as invalid for non-GPRS services until switching off or the SIM is removed.

16 (MSC temporarily not reachable)

17 (Network failure); or

22 (Congestion)

The MS shall change to state GMM-REGISTERED.ATTEMPTING-TO-UPDATE-MM. Timer T3310 shall be stopped if still running. The routing area updating attempt counter shall be incremented.

If the routing area updating attempt counter is less than 5, and the stored RAI is equal to the RAI of the current serving cell and the GMM update status is equal to GU1 UPDATED:

- the MS shall keep the GMM update status GU1 UPDATED and changes state to GMM-REGISTERED.ATTEMPTING-TO-UPDATE-MM. The MS shall start timer T3311. When timer T3311 expires the combined routing area update procedure indicating “combined RA/LA updating with IMSI attach” is triggered again.

If the routing area updating attempt counter is greater than or equal to 5:

- the MS shall start timer T3302 and shall change to state GMM-REGISTERED.ATTEMPTING-TO-UPDATE-MM;

- a GPRS MS operating in MS operation mode A shall then proceed with appropriate MM specific procedure; a GPRS MS operating in MS operation mode B may then proceed with appropriate MM specific procedures. The MM sublayer shall act as in network operation mode II as long as the combined GMM procedures are not successful and no new RA is entered. The new MM state is IDLE.Other values are considered as abnormal cases. The combined attach procedure shall be considered as failed for GPRS and non-GPRS services. The behaviour of the MS in those cases is specified in section 4.7.3.2.5.

4.7.3.2.4 Combined GPRS attach not accepted by the network

If the attach request can neither be accepted by the network for GPRS nor for non-GPRS services, an ATTACH REJECT message is transferred to the MS. The MS receiving the ATTACH REJECT message stops timer T3310 and takes one of the following actions depending upon the reject cause:

3 (Illegal MS);

6 (Illegal ME); or

8 (GPRS services and non-GPRS services not allowed)

The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED (shall store it according to section 4.1.3.2) and shall delete any P-TMSI, P-TMSI signature, RAI and GPRS ciphering key sequence number. The new GMM state is GMM-DEREGISTERED. The new MM state is MM IDLE.

The MS shall set the update status to U3 ROAMING NOT ALLOWED, shall delete any TMSI, LAI and ciphering key sequence number. The SIM shall be considered as invalid for GPRS and non-GPRS services until switching off or the SIM is removed.

7 (GPRS services not allowed)

The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED (and shall store it according to section 4.1.3.2) and shall delete any P-TMSI, P-TMSI signature, RAI and GPRS ciphering key sequence number. The SIM shall be considered as invalid for GPRS services until switching off or the SIM is removed. The new GMM state is GMM-DEREGISTERED; the MM state is MM IDLE. A GPRS MS operating in MS operation mode A shall then perform an IMSI attach for non-GPRS services by use of the MM IMSI attach procedure; a GPRS MS operating in MS operation mode B shall then perform an IMSI attach for non-GPRS services by use of the MM IMSI attach procedure.

11 (PLMN not allowed);

12 (Location area not allowed); or

13 (Roaming not allowed in this location area).

The MS shall delete any RAI, P-TMSI, P-TMSI signature and GPRS ciphering key sequence number stored, shall set the GPRS update status to GU3 ROAMING NOT ALLOWED (and shall store it according to section 4.1.3.2), shall reset the routing area updating attempt counter and reset the GPRS attach attempt counter and changes to state GMM-DEREGISTERED. The MS shall set the update status to U3 ROAMING NOT ALLOWED, reset the location update attempt counter and shall delete any TMSI, LAI and ciphering key sequence number. The new MM state is MM IDLE.

The MS shall store the LAI or the PLMN identity in the appropriate forbidden list, i.e. in the “forbidden PLMN list” for cause #11, in the list of “forbidden location areas for regional provision of service” for cause #12 or in the list of “forbidden location areas for roaming” for cause #13. If cause #11 or #13 was received, the MS shall perform a PLMN selection instead of a cell selection.

Other values are considered as abnormal cases. The specification of the MS behaviour in those cases is specified in section 4.7.3.2.5.

4.7.3.2.5 Abnormal cases in the MS

The abnormal cases specified in section 4.7.3.1.5 apply with the following modification:

If the GPRS attach attempt counter is less than 5, the MM state remains MM LOCATION UPDATING PENDING.

If the GPRS attach attempt counter is incremented according to section 4.7.3.1.5 the next actions depend on the Location Area Identities (stored on SIM and the one of the current serving cell) and the value of the attach attempt counter:

– if the update status is U1 UPDATED, and the stored LAI is equal to the one of the current serving cell and the attach attempt counter is smaller than 5, then the mobile station shall keep the update status to U1 UPDATED, the new MM state is MM IDLE substate NORMAL SERVICE; or

– if the update status is different from U1 UPDATED, or the stored LAI is different from the one of the current serving cell, or the attach attempt counter is greater or equal to 5, then the mobile station shall delete any LAI, TMSI, ciphering key sequence number stored in the SIM and set the update status to U2 NOT UPDATED. The new MM state is MM IDLE substate ATTEMPTING TO UPDATE.

4.7.3.2.6 Abnormal cases on the network side

The abnormal cases specified in section 4.7.3.1.6 apply with the exceptions for cases a and c in which in addition to the P-TMSI and P-TMSI signature the old TMSI shall be considered occupied until the new TMSI is used by the MS in a subsequent message.

3GPP/SMG Meeting TSG-CN1
Bad Abling, Germany, 30 Nov-3 Dec 1999

Document N1-99F35
Revision of N1-99E39

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	060r1	Current Version:	3.1.0

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

For submission to:	TSG#6	for approval	X	strategic	X	*(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: Ericsson **Date:** 1999-12-02

Subject: Change of Network Mode of operation

Work item: GSM-UMTS Interworking

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

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

Release:

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

Reason for change: Similar to the tables in the R97 and R98 versions of the specification, tables are needed to specify the behaviour of MSs when moving between RAs while the RAs have different Network Operation Modes.
This CR introduces both, the behaviour for MSs moving between RAs belonging to different radio interface and the behaviour for MSs moving between cells of the same RA but with different radio interface.

Clauses affected:

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: Linked to the CR “UMTS <-> GPRS Intersystem change (handover)”

help.doc

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

4.7.1.6 Change of network mode of operation

In the following tables below the abbreviations 'GSM I', 'GSM II' and 'GSM III' are used for network operation mode I, II and III in GSM.

In the following tables below the abbreviations 'UMTS I' and 'UMTS II' are used for network operation modes I and II in UMTS.

4.7.1.6.1 Change of network mode of operation in GSM (GSM only)

Whenever an MS moves to a new RA, the procedures executed by the MS depend on the network mode of operation in the old and new routing area.

In case the MS is in state GMM-REGISTERED or GMM-ROUTING-AREA-UPDATING-INITIATED and is in operation mode:

a) A or B (with the exceptions in b and c below), the MS shall execute:

Table 4.7.1.6.1/TS 24.008: Mode A or B

Network operation mode change	Procedure to execute
I → II or I → III	Normal Location Update(*), followed by a Normal Routing Area Update
II → III or III → II	Normal Location Update (see section 4.2.2), followed by a Normal Routing Area Update
II → I or III → I	Combined Routing Area Update with IMSI attach

b) B which reverts to operation mode C in network operation mode III, the MS shall execute:

Table 4.7.1.6.2/TS 24.008: Mode B which reverts into mode C in network operation mode III

Network operation mode change	Procedure to execute
I → II	Normal Location Update(*), followed by a Normal Routing Area Update
I → III or II → III	IMSI Detach (see section 4.3.4), followed by a Normal Routing Area Update
II → I or III → I	Combined Routing Area Update with IMSI attach
III → II	IMSI attach (see section 4.4.3), followed by a Normal Routing Area Update

c) B which reverts to IMSI attached for CS services only in network operation mode III, the MS shall execute:

Table 4.7.1.6.3/TS 24.008: Mode B which reverts into IMSI attached for CS services only in network operation mode III

Network operation mode change	Procedure to execute
I → II	Normal Location Update(*), followed by a Normal Routing Area Update
I → III	Normal Location Update(*), followed by a GPRS Detach with type indicating "GPRS Detach"
II → III	Normal Location Update (see section 4.2.2), followed by a GPRS Detach with detach type indicating "GPRS Detach"
II → I	Combined Routing Area Update with IMSI attach
III → I	Combined GPRS Attach
III → II	Normal Location Update (see section 4.2.2), followed by a Normal GPRS Attach

(*) Intended to remove the Gs association in the MSC/VLR.

Further details are implementation issues.

4.7.1.6.2 Change of network mode of operation in UMTS (UMTS only)

Whenever an MS moves to a new RA, the procedures executed by the MS depend on the network mode of operation in the old and new routing area.

In case the MS is in state GMM-REGISTERED or GMM-ROUTING-AREA-UPDATING-INITIATED and is in operation mode A, the MS shall execute:

Table 4.7.1.6.4/TS 24.008: Mode A

Network operation mode change	Procedure to execute
I → II	Normal Location Update(*), followed by a Normal Routing Area Update
II → I	Combined Routing Area Update with IMSI attach

(*) Intended to remove the Gs association in the MSC/VLR.

Further details are implementation issues.

4.7.1.6.3 Change of network mode of operation at UMTS to GSM inter-system change

Whenever an MS moves to a new RA supporting the GSM radio interface, the procedures executed by the MS depend on the network mode of operation in the old and new routing area.

Whenever an MS moves to a new cell suporting the GSM radio interface within the same RA, the selective procedures as specified in section 4.7.5 apply.

In case the MS is in state GMM-REGISTERED or GMM-ROUTING-AREA-UPDATING-INITIATED and is in operation mode:

a) A in UMTS, an MS that changes to GPRS operation mode A or B in GSM shall execute:

Table 4.7.1.6.5/TS 24.008: Mode A in UMTS changing to GPRS mode A or B in GSM

Network operation mode change	Procedure to execute
UMTS I → GSM I	Combined Routing Area Update
UMTS II → GSM I	Combined Routing Area Update with IMSI attach
UMTS I → GSM II or UMTS I → GSM III	Normal Location Update(*), followed by a Normal Routing Area Update

b) A in UMTS, an MS that changes due to MS specific characteristics to GPRS operation mode C in network operation mode III in GSM shall execute:

Table 4.7.1.6.6/TS 24.008: Mode A in UMTS changing to GPRS mode C in GSM

Network operation mode change	Procedure to execute
UMTS I → GSM III or UMTS II → GSM III	IMSI detach (see section 4.3.4), followed by a Normal Routing Area Update

c) A in UMTS, an MS that changes due to MS specific characteristics to IMSI attached for CS services only in network operation mode III in GSM shall execute:

Table 4.7.1.6.7/TS 24.008: Mode A in UMTS changing to IMSI attached for CS services only in GSM

Network operation mode change	Procedure to execute
UMTS I → GSM III or UMTS II → GSM III	Normal Location Update (see section 4.4.1), followed by a GPRS Detach with detach type indicating "GPRS Detach"

~~c)~~d) C in UMTS, the MS shall change to GPRS operation mode C in GSM and shall execute the normal Routing Area Update procedure

e) CS in UMTS, the MS shall execute the normal Location Update procedure

(*) Intended to remove the Gs association in the MSC/VLR.

Further details are implementation issues.

4.7.1.6.4 Change of network mode of operation at GSM to UMTS inter-system change

Whenever an MS moves to a new RA supporting the UMTS radio interface, the procedures executed by the MS depend on the network mode of operation in the old and new routing area.

Whenever an MS moves to a new cell supporting the UMTS radio interface whithin the same RA, the selective procedures as specified in section 4.7.5 apply.

In case the MS is in state GMM-REGISTERED or GMM-ROUTING-AREA-UPDATING-INITIATED and is in operation mode:

a) A or B in GSM, the MS shall change to operation mode A in UMTS and shall execute:

Table 4.7.1.6.8/TS 24.008: Mode A or B in GSM changing to mode A in UMTS

Network operation mode change	Procedure to execute
GSM I → UMTS I	Combined Routing Area Update
GSM II → UMTS I	Combined Routing Area Update with IMSI attach
GSM I → UMTS II	Normal Location Update(*), followed by a Normal Routing Area Update
GSM II → UMTS II or GSM III → UMTS II	Normal Location Update, followed by a Normal Routing Area Update

b) C in GSM, an MS that changes to operation mode C in UMTS shall execute a Normal Routing Area Update.

c) C in GSM, an MS that, due to MS specific characteristics operated in GPRS operation mode C in network operation mode III in GSM changes to operation mode A in UMTS shall execute:

Table 4.7.1.6.9/TS 24.008: Mode C changing to mode A in UMTS

Network operation mode change	Procedure to execute
GSM III → UMTS I	Combined Routing Area Update with IMSI attach
GSM III → UMTS II	IMSI attach (see section 4.4.3), Followed by a Normal Routing Area Update

d) IMSI attached for non-GPRS services only, an MS that, due to MS specific characteristics, operated in network operation mode III in GSM and changes to operation mode A in UMTS shall execute:

Table 4.7.1.6.10/TS 24.008: IMSI attached for non-GPRS services only changing to mode A in UMTS

Network operation mode change	Procedure to execute

GSM III → UMTS I	Combined GPRS Attach for GPRS and non-GPRS services
GSM III → UMTS II	GPRS Attach

(*) Intended to remove the Gs association in the MSC/VLR.

Further details are implementation issues.

3GPP/SMG Meeting TSG-CN1
Bad Abling, Germany, 30 Nov-3 Dec 1999

Document N1-99E37
Revision of IW-99024

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**	**058 r1**	Current Version:	3.1.0

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

For submission to:	CN#6	For approval	X	strategic		*(for SMG use only)*
list expected approval meeting # here ↑		for information		non-strategic		

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

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

Source: Ericsson **Date:** 99-11-26

Subject: Detach procedure

Work item: GSM-UMTS Interworking

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

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

Release:

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

Reason for change:

This CR introduces the P-TMSI as mandatory information element and the P-TMSI signature as an optional information element in the MS initiated Detach Request message in UMTS and GSM R'99.

This CR also clarifies for UMTS that if the MS initiated detach has been sent due to switching off, then the network shall release the resources in the lower layers for this MS (see TS 25.331).

This CR also describes the collision case of the network initiated Detach and the Service Request procedure.

Clauses affected: 4.7.4, 4.7.4.1.1, 4.7.4.1.2, 4.7.4.1.3, 4.7.4.2.4, 9.4.5.1.1, 9.4.5.2.1, 9.4.5.2.2

Other specs affected:

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

Other comments:

help.doc

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

4.7.4 GPRS detach procedure

The GPRS detach procedure is used:

- to detach the IMSI for GPRS services only. Independent of the network operation mode, this procedure is used by all kind of GPRS MSs;
- as a combined GPRS detach procedure used by GPRS MSs operating in MS operation mode A or B to detach the IMSI for GPRS and non-GPRS services or for non-GPRS services only, if the network operates in network operation mode I; or
- in the case of a network failure condition to indicate to the MS that a re-attach with successive activation of previously active PDP contexts shall be performed.

After completion of a GPRS detach procedure or combined GPRS detach procedure for GPRS and non-GPRS services the GMM context is released.

The GPRS detach procedure shall be invoked by the MS if the MS is switched off, the SIM card is removed from the MS or if the GPRS or non-GPRS capability of the MS is disabled. The procedure may be invoked by the network to detach the IMSI for GPRS services. The GPRS detach procedure causes the MS to be marked as inactive in the network for GPRS services, non-GPRS services or both services.

In GSM, ~~I~~if the GPRS detach procedure is performed, the PDP contexts are deactivated locally without peer to peer signalling between the SM and LLC entities in the MS and the network.

In UMTS, if the GPRS detach procedure is performed, the PDP contexts are deactivated locally without peer to peer signalling between the SM entities in the MS and the network.

4.7.4.1 MS initiated GPRS detach procedure

4.7.4.1.1 MS initiated GPRS detach procedure initiation

The GPRS detach procedure is initiated by the MS by sending a DETACH REQUEST message. The detach type information element may indicate “GPRS detach with switching off”, “GPRS detach without switching off”, “IMSI detach”, “GPRS/IMSI detach with switching off” or “GPRS/IMSI detach without switching off”.

The MS shall include the P-TMSI in the DETACH REQUEST message. The MS shall also include a valid P-TMSI signature, if available.

If the MS is not switched off, timer T3321 shall be started after the DETACH REQUEST message has been sent. If the detach type information element value indicates “IMSI Detach” the MS shall enter GMM-REGISTERED.IMSI-DETACH_INITIATED, otherwise the MS shall enter the state GMM-DEREGISTERED-INITIATED. If the detach type information element value indicates “IMSI Detach” or “GPRS/IMSI Detach”, state MM IMSI DETACH PENDING is entered

~~-~~If the detach type information element value indicates “GPRS detach without switching off ” and the MS is attached for GPRS and non-GPRS services and the network operates in network operation mode I, then if in the MS the timer T3212 is not already running, the timer T3212 shall be set to its initial value and restarted after the DETACH REQUEST message has been sent.

4.7.4.1.2 MS initiated GPRS detach procedure completion for GPRS services only

When the DETACH REQUEST message is received by the network, the network shall send a DETACH ACCEPT message to the MS, if the detach cause IE value indicates that the detach request has not been sent due to switching off. If switching off was indicated, the procedure is completed when the network receives the DETACH REQUEST message. The network and the MS shall deactivate the PDP contexts and deactivate the logical link(s), if any.

The MS is marked as inactive in the network for GPRS services; state GMM-DEREGISTERED is entered in the MS and the network.

In UMTS, if the detach has been sent due to switching off, then the network shall release the resources in the lower layers for this MS (see TS 25.331).

NOTE: When the DETACH REQUEST message is received by the network, and if the detach cause IE value indicates that the detach is not due to power off, the authentication and ciphering procedure as well as the identification procedure may be performed.

4.7.4.1.3 MS initiated combined GPRS detach procedure completion

When the DETACH REQUEST message is received by the network, a DETACH ACCEPT message shall be sent to the MS, if the detach cause IE value indicates that the detach request has not been sent due to switching off. Depending on the value of the detach type IE the following applies:

GPRS/IMSI detach:
The MS is marked as inactive in the network for GPRS and for non-GPRS services. The network and the MS shall deactivate the PDP contexts and deactivate the logical link(s), if any. The States GMM-DEREGISTERED and MM NULL are entered in both the MS and the network.

In UMTS, if the detach has been sent due to switching off, then the network shall release the resources in the lower layers for this MS (see TS 25.331).

IMSI detach:
The MS is marked as inactive in the network for non-GPRS services. State MM NULL is entered in the MS and the network.

4.7.4.1.4 Abnormal cases in the MS

The following abnormal cases can be identified:

a) T3321 time-out

On the first expiry of the timer, the MS shall retransmit the DETACH REQUEST message and shall reset and restart timer T3321. This retransmission is repeated four times, i.e. on the fifth expiry of timer T3321, the GPRS detach procedure shall be aborted, the MS shall change to state:

- MM-NULL if "IMSI detach" was requested;
- GMM-REGISTERED.NORMAL-SERVICE if “IMSI Detach” was requested
- GMM-DEREGISTERED if “GPRS detach” was requested;
- GMM-DEREGISTERED and MM-NULL if “GPRS/IMSI” detach was requested.

b) Lower layer failure before reception of DETACH ACCEPT message

The detach procedure is aborted and the MS shall change to state:

- MM-NULL if “IMSI detach” was requested;
- GMM-REGISTERED.NORMAL-SERVICE if “IMSI Detach” was requested
- GMM-DEREGISTERED if “GPRS detach” was requested;
- GMM-DEREGISTERED and MM-NULL if “IMSI/GPRS” detach was requested.

c) Detach procedure collision

If the MS receives a DETACH REQUEST message before the MS initiated GPRS detach procedure has been completed, a DETACH ACCEPT message shall be sent to the network.

d) Detach and GMM common procedure collision

GPRS detach containing cause "power off":

- If the MS receives a message used in a GMM common procedure before the GPRS detach procedure has been completed, this message shall be ignored and the GPRS detach procedure shall continue.

GPRS detach containing other causes than "power off"

- If the MS receives a P-TMSI REALLOCATION COMMAND, a GMM STATUS, or a GMM INFORMATION message before the GPRS detach procedure has been completed, this message shall be ignored and the GPRS detach procedure shall continue.

- If the MS receives an AUTHENTICATION AND CIPHERING REQUEST or IDENTITY REQUEST message, before the GPRS detach procedure has been completed, the MS shall respond to it as described in section 4.7.7 and 4.7.8 respectively.

e) Change of cell within the same RA (GSM only)

If a cell change occurs within the same RA before a DETACH ACCEPT message has been received, then the cell update procedure shall be performed before completion of the detach procedure.

f) Change of cell into a new routing area

If a cell change into a new routing area occurs before a DETACH ACCEPT message has been received, the GPRS detach procedure shall be aborted and re-initiated after successfully performing a routing area updating procedure.

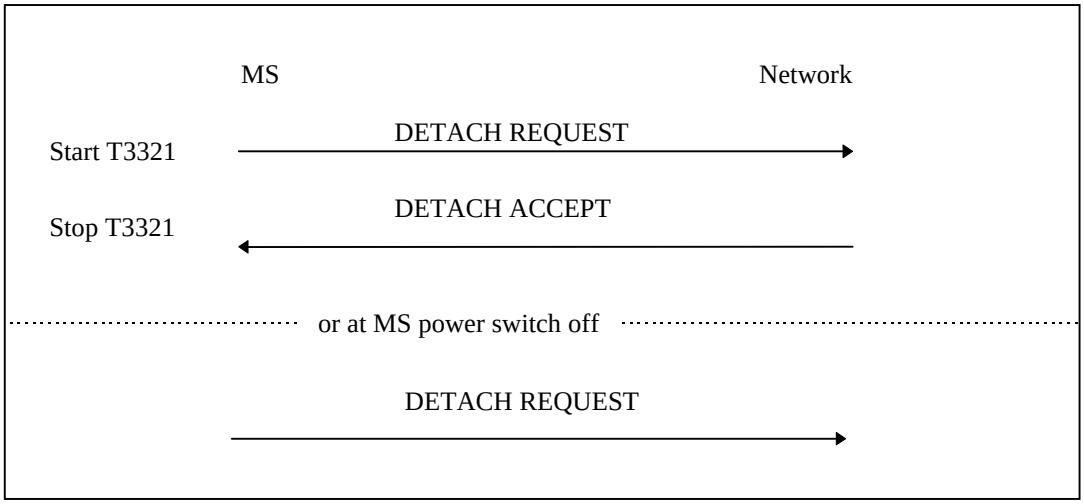


Figure 4.7.4/1 TS 24.008: MS initiated GPRS detach procedure

4.7.4.2 Network initiated GPRS detach procedure

4.7.4.2.1 Network initiated GPRS detach procedure initiation

The network initiates the GPRS detach procedure by sending a DETACH REQUEST message to the MS. The network shall start timer T3322, shall deactivate the PDP contexts and deactivate the logical link(s), if any, and shall change to state GMM-DEREGISTERED-INITIATED. The DETACH REQUEST message shall include a detach type IE. In addition, the network may include a cause IE to specify the reason for the detach request.

If the detach type IE indicates "re-attach required", the MS shall perform a new attach procedure. The MS should also activate PDP context(s) to replace any previously active PDP contexts.

NOTE: In some cases, user interaction may be required and then the MS cannot activate the PDP context(s) automatically.

4.7.4.2.2 Network initiated GPRS detach procedure completion by the MS

When receiving the DETACH REQUEST message and the detach type IE indicates “re-attach not required” or “re-attach required”, the MS shall deactivate the PDP contexts and deactivate the logical link(s), if any. The MS shall then send a DETACH ACCEPT message to the network and shall change state to GMM-DEREGISTERED. The MS shall, after the completion of the GPRS detach procedure, initiate a GPRS attach procedure if indicated by the network in the detach type IE.

A GPRS MS operating in MS operation mode A or B in network operation mode I, which receives an DETACH REQUEST message with detach type indicating "re-attach required" or "re-attach not required" and no cause code, is only detached for GPRS services in the network.

When receiving the DETACH REQUEST message and the detach type IE indicates “IMSI detach”, the MS shall send a DETACH ACCEPT message to the network.

If the detach type information element value indicates "re-attach required" or "re-attach not required" and the MS is attached for GPRS and non-GPRS services and the network operates in network operation mode I, then if in the MS the timer T3212 is not already running, the timer T3212 shall be set to its initial value and restarted.

Depending on the received cause code, the MS shall act as follows:

2 (IMSI unknown in HLR)

The MS shall set the update status to U3 ROAMING NOT ALLOWED and shall delete any TMSI, LAI and ciphering key sequence number. The new MM state is MM IDLE. The SIM shall be considered as invalid for non-GPRS services until switching off or the SIM is removed.

A GPRS MS operating in MS operation mode A or B in network operation mode I, is still IMSI attached for GPRS services in the network.

3 (Illegal MS); or

6 (Illegal ME)

The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED (and shall store it according to section 4.1.3.2) and shall delete any P-TMSI, P-TMSI signature, RAI and GPRS ciphering key sequence number. The new GMM state is GMM-DEREGISTERED. The SIM shall be considered as invalid for GPRS services until switching off or the SIM is removed.

A GPRS MS operating in MS operation mode A or B shall in addition set the update status to U3 ROAMING NOT ALLOWED, shall delete any TMSI, LAI and ciphering key sequence number. The new MM state is MM idle. The SIM shall be considered as invalid also for non-GPRS services until switching off or the SIM is removed.

7 (GPRS services not allowed)

The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED (and shall store it according to section 4.1.3.2) and shall delete any P-TMSI, P-TMSI signature, RAI and GPRS ciphering key sequence number. The SIM shall be considered as invalid for GPRS services until switching off or the SIM is removed. The new state is GMM-DEREGISTERED.

A GPRS MS operating in MS operation mode A or B in network operation mode I, is still IMSI attached for CS services in the network.

8 (GPRS services and non-GPRS services not allowed)

The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED and the update status to U3 ROAMING NOT ALLOWED (and shall store it according to section 4.1.3.2). Furthermore, it shall delete any P-TMSI, P-TMSI signature, TMSI, RAI, LAI, ciphering key sequence number and GPRS ciphering key sequence number and shall consider the SIM as invalid for GPRS and non-GPRS services until switching off or the SIM is removed.

11 (PLMN not allowed);

12 (Location area not allowed); or

13 (Roaming not allowed in this location area)

The MS shall delete any RAI or LAI, P-TMSI, P-TMSI signature and GPRS ciphering key sequence number, shall set the GPRS update status to GU3 ROAMING NOT ALLOWED (and shall store it according to section 4.1.3.2).

A GPRS MS operating in MS operation mode A or B shall in addition set the update status to U3 ROAMING NOT ALLOWED and shall delete any TMSI, LAI and ciphering key sequence number. The new MM state is MM IDLE.

The MS shall store the LAI or the PLMN identity in the appropriate forbidden list, i.e. in the “forbidden PLMN list” for cause #11, in the list of “forbidden location areas for regional provision of service” for cause #12 or in the list of “forbidden location areas for roaming” for cause #13. If #11or #13 was received, the MS shall perform a PLMN selection instead of a cell selection.

Other cause values shall not impact the update status. Further actions of the MS are implementation dependent.

4.7.4.2.3 Network initiated GPRS detach procedure completion by the network

The network shall, upon receipt of the DETACH ACCEPT message, stop timer T3322 and shall change state to GMM-DEREGISTERED.

4.7.4.2.4 Abnormal cases on the network side

The following abnormal cases can be identified:

a) T3322 time-out

On the first expiry of the timer, the network shall retransmit the DETACH REQUEST message and shall start timer T3322. This retransmission is repeated four times, i.e. on the fifth expiry of timer T3322, the GPRS detach procedure shall be aborted and the network changes to state GMM-DEREGISTERED.

b) Low layer failure

The GPRS detach procedure is aborted and the network changes to state GMM-DEREGISTERED.

c) GPRS detach procedure collision

If the network receives a DETACH REQUEST message with “switching off” indicated, before the network initiated GPRS detach procedure has been completed, both procedures shall be considered completed.

If the network receives a DETACH REQUEST message without “switching off” indicated, before the network initiated GPRS detach procedure has been completed, the network shall send a DETACH ACCEPT message to the MS.

d) GPRS detach and GPRS attach procedure collision

If the network receives an ATTACH REQUEST message before the network initiated GPRS detach procedure has been completed, the network shall ignore the ATTACH REQUEST message, except when the detach type IE value, sent in the DETACH REQUEST message, indicated that the MS shall perform a GPRS attach procedure. In this case, the detach procedure is aborted and the GPRS attach procedure shall be progressed after the PDP contexts have been deleted.

e) GPRS detach and routing area updating procedure collision

GPRS detach containing detach type "re-attach required" or "re-attach not required":

If the network receives a ROUTING AREA UPDATE REQUEST message before the network initiated GPRS detach procedure has been completed, the detach procedure shall be progressed, i.e. the ROUTING AREA UPDATE REQUEST message shall be ignored.

GPRS detach containing detach type "IMSI detach":

If the network receives a ROUTING AREA UPDATE REQUEST message before the network initiated GPRS detach procedure has been completed, the network shall abort the detach procedure and shall progress the routing area update procedure.

f) GPRS detach and service request procedure collision

If the network receives a SERVICE REQUEST message before the network initiated GPRS detach procedure has been completed, the network shall ignore the SERVICE REQUEST message.

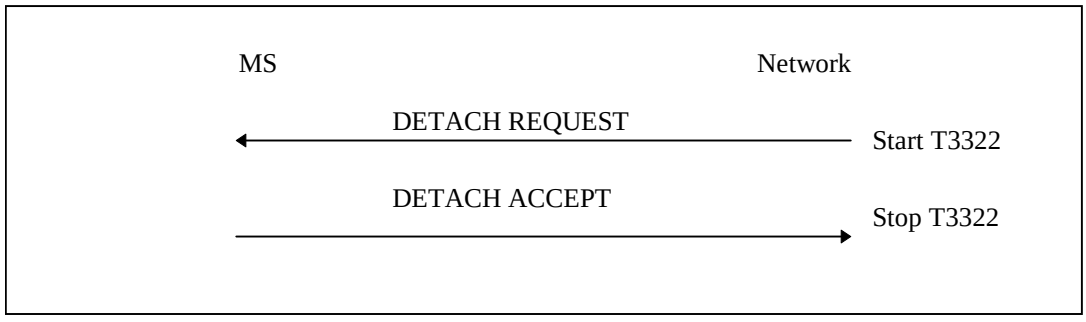


Figure 4.7.4/2 TS 24.008: Network initiated GPRS detach procedure

***** New Modification *****

9.4.5 Detach request

9.4.5.1 Detach request (mobile terminated detach)

This message is sent by the network to request the release of a GMM context. See table 9.4.5.1/TS 24.008.

Message type: DETACH REQUEST

Significance: dual

Direction: network to MS

Table 9.4.5.1/TS 24.008:DETACH REQUEST message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Skip indicator	Skip indicator 10.3.1	M	V	1/2
	Detach request message identity	Message type 10.4	M	V	1
	Detach type	Detach type 10.5.5.5	M	V	1/2
	Force to standby	Force to standby 10.5.5.7	M	V	1/2
25	GMM cause	GMM cause 10.5.5.14	O	TV	2

9.4.5.1.1 GMM cause

This IE shall be included in case the detach reason has to be indicated to the MS, e.g. due to a failed IMEI check.

9.4.5.2 Detach request (mobile originating detach)

This message is sent by the MS to request the release of a GMM context. See table 9.4.5.2/TS 24.008.

Message type: DETACH REQUEST

Significance: dual

Direction: MS to network

Table 9.4.5.2/TS 24.008:DETACH REQUEST message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Skip indicator	Skip indicator 10.3.1	M	V	1/2
	Detach request message identity	Message type 10.4	M	V	1
	Detach type	Detach type 10.5.5.5	M	V	1/2
	Spare half octet	Spare half octet 10.5.1.8	M	V	1/2
18	P-TMSI	Mobile identity 10.5.1.4	O	TLV	7
19	P-TMSI signature	P-TMSI signature 10.5.5.8	O	TLV	5

9.4.5.2.1 P-TMSI

This IE shall be included by the MS.

9.4.5.2.2 P-TMSI signature

This IE shall be included if the MS has a valid P-TMSI signature.

9.4.6 Detach accept

9.4.6.1 Detach accept (mobile terminated detach)

This message is sent by the MS to indicate that the detach procedure has been completed. See table 9.4.6.1/TS 24.008.

Message type: DETACH ACCEPT

Significance: dual

Direction: MS to network

Table 9.4.6.1/TS 24.008:DETACH ACCEPT message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Skip indicator	Skip indicator 10.3.1	M	V	1/2
	Detach accept message identity	Message type 10.4	M	V	1

9.4.6.2 Detach accept (mobile originating detach)

This message is sent by the network to indicate that the detach procedure has been completed. See table 9.4.6.2/TS 24.008.

Message type: DETACH ACCEPT

Significance: dual

Direction: network to MS

Table 9.4.6.2/TS 24.008:DETACH ACCEPT message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Skip indicator	Skip indicator 10.3.1	M	V	1/2
	Detach accept message identity	Message type 10.4	M	V	1
	Force to standby	Force to standby 10.5.5.7	M	V	1/2
	Spare half octet	Spare half octet 10.5.1.8	M	V	1/2

3GPP/SMG Meeting TSG-CN1#9
Bad Abling, Germany, 30 Nov-3 Dec 1999

***Document* N1-99E44**
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	080	Current Version:	3.1.0

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

For submission to:	TSGN#6	For approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic		

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

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

Source: Ericsson **Date:** 99-11-26

Subject: Identity procedure

Work item: GSM-UMTS Interworking

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

Reason for change: The collision case of an identification procedure with a service request procedure needs to be described.

Clauses affected: 4.7.8.4

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

Other comments:

4.7.8 Identification procedure

The identification procedure is used by the network to request an MS to provide specific identification parameters to the network e.g. International Mobile Subscriber Identity, International Mobile Equipment Identity (see TS 23.003). For the presentation of the IMEI, the requirements of GSM 02.09 apply.

4.7.8.1 Identification initiation by the network

The network initiates the identification procedure by transferring an IDENTITY REQUEST message to the MS and starts the timer T3370. The IDENTITY REQUEST message specifies the requested identification parameters in the identity type information element.

4.7.8.2 Identification response by the MS

An MS that has been attached to GPRS shall be ready to respond to an IDENTITY REQUEST message at any time.

Upon receipt of the IDENTITY REQUEST message the MS sends back an IDENTITY RESPONSE message. The IDENTITY RESPONSE message shall contain the identification parameters as requested by the network.

4.7.8.3 Identification completion by the network

Upon receipt of the IDENTITY RESPONSE the network shall stop timer T3370.

4.7.8.4 Abnormal cases on the network side

The following abnormal cases can be identified:

a) Lower layer failure

Upon detection of a lower layer failure before the IDENTITY RESPONSE is received, the network shall abort any ongoing GMM procedure.

b) Expiry of timer T3370

The identification procedure is supervised by the network by the timer T3370. The network shall, on the first expiry of the timer T3370, retransmit the IDENTITY REQUEST message and reset and restart the timer T3370. This retransmission is repeated four times, i.e. on the fifth expiry of timer T3370, the network shall abort the identification procedure and any ongoing GMM procedure.

c) Collision of an identification procedure with a GPRS attach procedure

If the network receives an ATTACH REQUEST message before the ongoing identification procedure has been completed and no GPRS attach procedure is pending on the network (i.e. no ATTACH ACCEPT/REJECT message has still to be sent as an answer to an ATTACH REQUEST message), the network shall proceed with the GPRS attach procedure.

d) Collision of an identification procedure with a GPRS attach procedure when the identification procedure has been caused by a GPRS attach procedure

If the network receives an ATTACH REQUEST message before the ongoing identification procedure has been completed and a GPRS attach procedure is pending (i.e. an ATTACH ACCEPT/REJECT message has to be sent as an answer to an earlier ATTACH REQUEST message), then:

- If one or more of the information elements in the ATTACH REQUEST message differs from the ones received within the previous ATTACH REQUEST message, the network shall proceed with the GPRS attach procedure; or

- If the information elements do not differ, then the network shall not treat any further this new ATTACH REQUEST.

Collision of an identification procedure with an MS initiated GPRS detach procedure

GPRS detach containing cause "power off":

If the network receives a DETACH REQUEST message before the ongoing identification procedure has been completed, the network shall abort the identification procedure and shall progress the GPRS detach procedure.

GPRS detach containing other causes than "power off":

If the network receives a DETACH REQUEST message before the ongoing identification procedure has been completed, the network shall complete the identification procedure and shall respond to the GPRS detach procedure as described in section 4.7.4.

e) Collision of an identification procedure with a routing area updating procedure

If the network receives a ROUTING AREA UPDATE REQUEST message before the ongoing identification procedure has been completed, the network shall progress both procedures.

f) Collision of an identification procedure with a service request procedure

If the network receives a SERVICE REQUEST message before the ongoing identification procedure has been completed, the network shall progress both procedures.

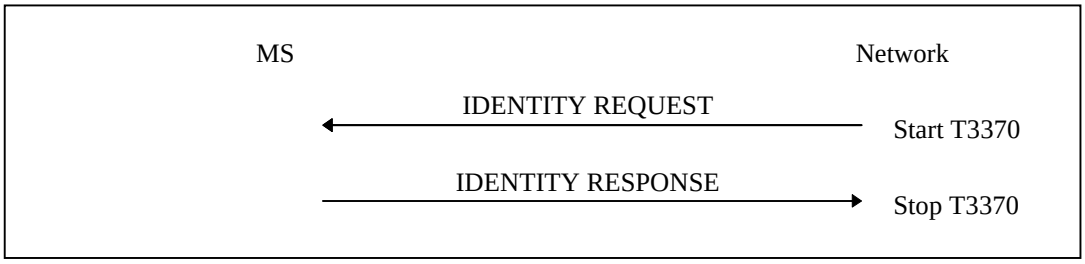


Figure 4.7.8/1 TS 24.008: Identification procedure

****** For Information ******

9.4.12 Identity request

This message is sent by the network to the MS to request submission of the MS identity according to the specified identity type. See table 9.4.12/GSM 04.08.

Message type: IDENTITY REQUEST

Significance: dual

Direction: network to MS

Table 9.4.12/GSM 04.08: IDENTITY REQUEST message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Skip indicator	Skip indicator 10.3.1	M	V	1/2
	Identity request message identity	Message type 10.4	M	V	1
	Identity type	Identity type 2 10.5.5.9	M	V	1/2
	Force to standby	Force to standby 10.5.5.7	M	V	1/2

9.4.13 Identity response

This message is sent by the MS to the network in response to an *identity request* message providing the requested identity. See table 9.4.13/GSM 04.08.

Message type: IDENTITY RESPONSE

Significance: dual

Direction: MS to network

Table 9.4.13/GSM 04.08: IDENTITY RESPONSE message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Skip indicator	Skip indicator 10.3.1	M	V	1/2
	Identity response message identity	Message type 10.4	M	V	1
	Mobile identity	Mobile identity 10.5.1.4	M	LV	4 - 10

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Bad Abling, Germany, 30 Nov-3 Dec 1999

Document N1-99E40
Revision of IW-99027

CHANGE REQUEST

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24.008	**CR**	**061 r1**	Current Version:	3.1.0

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

For submission to:	TSGN#6	For approval	X	strategic		*(for SMG use only)*
list expected approval meeting # here ↑		for information		non-strategic		

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

Proposed change affects: *(at least one should be marked with an X)*

(U)SIM		ME	X	UTRAN / Radio		Core Network	X

Source: Ericsson **Date:** 99-11-26

Subject: MS modes of operation in UMTS

Work item: GSM-UMTS Interworking

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

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

Reason for change:

This CR introduces two MS modes of operation in UMTS:
- PS/CS mode of operation; and
- PS mode of operation.

This CR also proposes that in network operation mode I and II:
- an MS in PS/CS mode of operation shall use the same procedures as for a GPRS MS operating in MS operation mode A; and
- an MS in PS mode of operation shall use the same procedures as for a GPRS MS operating in MS operation mode C;

unless it is explicitly stated for GSM only or UMTS only.

In addition a clarification is added that the network operation mode III is not applicable for UMTS.

Clauses affected: 1.7.2, 1.7.2.1 (new section), 1.7.2.2 (new section)

Other specs affected:

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

Other comments:

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

1.7.2 General Packet Radio Service (GPRS)

1.7.2.1 Packet services in GSM (GSM only)

For mobile stations supporting the General Packet Radio Service (GPRS), it is explicitly mentioned throughout the technical specification if a certain procedure is applicable only for such a service and, if necessary, how mobile stations not supporting such a service shall behave.

A GPRS MS may operate in one of the following MS operation modes, see 03.60 [74]:

- MS operation mode A;
- MS operation mode B; or
- MS operation mode C.

The MS operation mode depends on the services that the MS is attached to, i.e., only GPRS or both GPRS and non-GPRS services, and upon the MS's capabilities to operate GPRS and other GSM services simultaneously. Mobile stations that are capable to operate GPRS services are referred to as GPRS MSs.

NOTE: Other GSM technical specifications may refer to the MS operation modes A, B, and C as GPRS class-A MS, GPRS class-B MS, and GPRS class-C MS.

It should be noted that it is possible that for a GPRS MS, the GMM procedures currently described in the ETS do not support combinations of VGCS, VBS and GPRS. The possible interactions are not studied yet.

1.7.2.2 Packet services in UMTS (UMTS only)

An MS attached to packet switched domain may operate in one of the following MS operation modes, see 23.060 [74]:

- PS/CS mode of operation; or
- PS mode of operation.

The terms ‘PS/CS mode of operation’ and ‘PS mode of operation’ are not used in this specification with some exceptions. Instead the terms ‘MS operation mode A’ and ‘MS operation mode C’ are used.

In network operation mode I and II (see 23.060 [74]), an MS in PS/CS mode of operation shall use the same procedures as for a GPRS MS operating in MS operation mode A, unless it is explicitly stated for GSM only or UMTS only.

In network operation mode I and II, an MS in PS mode of operation shall use the same procedures as for a GPRS MS operating in MS operation mode C, unless it is explicitly stated for GSM only or UMTS only.

NOTE: Network operation mode III is not applicable for UMTS, see 23.060 [74].

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***Document* N1-99E62**
e.g. for 3GPP use the format TP-99xxx
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24.008	CR	085	Current Version:	3.1.0

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

For submission to:	CN#9	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: Nokia **Date:** 99-11-12

Subject: Paging for R99

Work item: GSM/UMTS interworking

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

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

Reason for change: The paging description in the chapter 4.7.9 is aligned with 3GPP 23.060 specification.

Clauses affected: 4.7.9

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:

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4.7.9 Paging procedure

4.7.9.1 Paging for GPRS services

In GSM, ~~P~~paging is used by the network to identify the cell the MS has currently selected, or to prompt the mobile to re-attach if necessary as a result of network failure. If the MS is not GPRS attached when it receives a paging for GPRS services, the MS shall ignore the paging.

In UMTS, paging is used by the network to request the establishment of PS signaling connection or to prompt the mobile to re-attach if necessary as a result of network failure. If the MS is not GPRS attached when it receives a paging for GPRS services, the MS shall ignore the paging.

4.7.9.1.1 Paging for GPRS services using P-TMSI

The network shall initiate the paging procedure for GPRS services using P-TMSI when GMM signalling messages or user data is pending to be sent to the MS while the Mobile Reachable timer is running. The network may page only GPRS MSs which are GMM-REGISTERED and identified by a local P-TMSI.

To initiate the procedure the GMM entity requests the RR sublayer to start paging (see GSM 04.18~~chapter 3 and~~, GSM 04.60 [75], 3GPP TS 25.331 and 3GPP TS 25.413) and starts timer T3313. Upon reception of a paging indication, the MS shall respond to the paging (see ~~GSM~~ 3GPP TS ~~0~~2~~4~~4.00~~7~~7 [20]~~ and~~, 3GPP TS 23.060 [74], 3GPP TS 25.331 and 3GPP TS 25.413).

The network shall stop timer T3313 when a response is received from the MS. When the timer T3313 expires the network may reinitiate paging.

In GSM, ~~The~~ the network shall stop timer T3313 when a response is received from the MS and shall start the READY timer. When the timer T3313 expires the network may reinitiate paging.

4.7.9.1.2 Paging for GPRS services using IMSI

Paging for GPRS services using IMSI is an abnormal procedure used for error recovery in the network.

The network may initiate paging using IMSI if the P-TMSI is not available due to a network failure.

To initiate the procedure the GMM entity in the network requests the RR sublayer to start paging (see GSM 04.18~~chapter 3~~, ~~and~~ GSM 04.60 [75], 3GPP TS 25.331 and 3GPP TS 25.413).

Upon reception of a paging indication for GPRS services using IMSI, the MS shall locally deactivate any active PDP contexts and locally detach from GPRS. The local detach includes deleting any RAI, P-TMSI, P-TMSI signature and GPRS ciphering key sequence number stored, setting the GPRS update status to GU2 NOT UPDATED and changing state to GMM-DEREGISTERED.

After performing the local detach, the MS shall then perform a GPRS attach or combined GPRS attach procedure. After performing the attach, a MS should activate PDP context(s) to replace any previously active PDP context(s).

NOTE: In some cases, user interaction may be required and then the MS cannot activate the PDP context(s) automatically.

NOTE: The MS does not respond to the paging except with the Attach Request. Hence timer T3313 in the network is not used when paging with IMSI.

NOTE: Paging without DRX parameters may require a considerable extension of the paging duration.

4.7.9.2 Paging for non-GPRS services

The network may initiate the paging procedure for non-GPRS services when the MS is IMSI attached for non-GPRS services. To initiate the procedure the GMM entity requests the RR sublayer to initiate paging (see GSM 04.18~~chapter 3 and~~, GSM 04.60 [75], 3GPP TS 25.331 and 3GPP TS 25.413) for non-GPRS services. The MS identity used for paging shall be the allocated TMSI if acknowledged by the MS, otherwise the IMSI.

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Revision of IW-99022

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24.008	CR	056 r1	Current Version:	3.1.0

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

For submission to:	TSG-N1#6	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic		

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

Proposed change affects: *(at least one should be marked with an X)*

(U)SIM		ME	X	UTRAN / Radio		Core Network	X

Source: Ericsson **Date:** 1999-11-26

Subject: Periodic RA Update Timer function and Mobile Reachable Timer function for UMTS and clarification that the substate SUSPENDED is applicable for GSM only.

Work item: GSM-UMTS Interworking

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

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

Reason for change:

The Periodic Routing Area Update Timer and the Mobile Reachable Timer in GSM uses the READY timer as a trigger. As the READY timer applies for GSM only, new text is needs to be added for the UMTS cases.

This CR also clarifies that the substate SUSPENDED for GMM.REGISTERED and GMM.DEREGISTERED is applicable for GSM only.

The two modes PMM-IDLE and PMM-CONNECTED are used in the description of Periodic Routing Area Timer function and Mobile Reachable Timer function. A new section is proposed with a definition of these modes.

Handling of *Force to standby* information element in UMTS is clarified.

The heading of 4.7.2 is edited to fit with the additions.

The description in the Routing Area Update procedure of resuming GPRS services after dedicated mode was left is only applicable for GSM.

Clauses affected: 4.1.3.1.2.8, 4.1.3.1.3.2, 4.1.3.3.2.2, 4.2.4.2.8, 4.2.5.1.2, 4.7.2.2, 4.7.5, 4.7.2, 4.7.2.3 (new section) , 4.7.2.4 (new section), 10.5.5.7, 11.2.2

Other specs affected:

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

Other comments:

4.1.3.1.2.8 GMM-DEREGISTERED.SUSPENDED (GSM only)

The MS shall enter this substate when entering dedicated mode and the MS limitations make it unable to communicate on GPRS channels. The MS shall leave this substate when leaving dedicated mode.

***** Next Modification *****

4.1.3.1.3.2 GMM-REGISTERED.SUSPENDED (GSM only)

The MS shall enter this substate when entering dedicated mode and when the MS limitations makes it unable to communicate on GPRS channels... In this substate, no user data should be sent and no signalling information shall be sent. The MS shall leave this substate when leaving dedicated mode.

***** Next Modification *****

4.1.3.3.2.2 GMM-REGISTERED.SUSPENDED (GSM only)

In this substate, the lower layers shall be prevented of sending user data or signalling information.

***** Next Modification *****

4.2.4.2.8 Substate, SUSPENDED (GSM only)

The MS :

- shall not send any user data ; and
- shall not send any signalling information.

***** Next Modification *****

4.2.5.1.2 Substate, SUSPENDED (GSM only)

The MS:

- shall not send any user data ;
- shall not send any signalling information; and
- shall not perform cell-updates..

***** Next Modification *****

4.7.2 GPRS Mobility management timers and UMTS PS signalling connection control

***** Next Modification *****

4.7.2.2 Periodic routing area updating

Periodic routing area updating is used to periodically notify the availability of the MS to the network. The procedure is controlled in the MS by the periodic RA update timer, T3312. The value of timer T3312 is sent by the network to the MS in the messages ATTACH ACCEPT and ROUTING AREA UPDATE ACCEPT. The value of the timer T3312 shall be unique within a RA.

In GSM, ~~T~~the timer T3312 is reset and started with its ~~the~~ initial value, when the READY timer is stopped or expires. The timer T3312 is stopped and shall be set to its initial value for the next start when the READY timer is started. If after a READY timer negotiation the READY timer value is set to zero, timer T3312 is reset and started with its ~~the~~ initial value .If the initial READY timer value is zero, the timer T3312 is reset and started with its ~~the~~ initial value, when the ROUTING AREA UPDATE REQUEST message is transmitted.

In UMTS, the timer T3312 is reset and started with its initial value, when the MS goes from PMM-CONNECTED to PMM-IDLE mode. The timer T3312 is stopped when the MS enters PMM-CONNECTED mode.

When timer T3312 expires, the periodic routing area updating procedure shall be started and the timer shall be set to its initial value for the next start.

If the MS is in other state than GMM-REGISTERED.NORMAL-SERVICE when the timer expires the periodic routing area updating procedure is delayed until the MS returns to GMM-REGISTERED.NORMAL-SERVICE.

In GSM, ~~I~~if the MS in MS operation mode B is in the state GMM-REGISTERED.SUSPENDED when the timer expires the periodic routing area updating procedure is delayed until the state is left.

The network supervises the periodic routing area updating procedure by means of the Mobile Reachable timer. The Mobile Reachable timer shall be longer than the periodic RA update timer. When the Mobile Reachable timer expires, typically the network stops sending paging messages to the mobile and may take other appropriate actions.

In GSM, ~~T~~the Mobile Reachable timer is reset and started with its ~~the~~ initial value, when the READY timer is stopped or expires. The Mobile Reachable timer is stopped and shall be set to its initial value for the next start when the READY timer is started.

In GSM, ~~I~~if after a READY timer negotiation the READY timer value is set to zero the Mobile Reachable timer is reset and started with its ~~the~~ initial value. If the initial READY timer value is zero, the Mobile Reachable is reset and started with its ~~the~~ initial value, when the ROUTING AREA UPDATE REQUEST message is received.

In UMTS, the Mobile Reachable timer is reset and started with its initial value, when the MS goes from PMM-CONNECTED to PMM-IDLE mode. The Mobile Reachable timer is stopped when the MS enters PMM-CONNECTED mode.

If the MS is both IMSI attached for GPRS and non-GPRS services , and if the MS lost coverage of the registered PLMN and timer T3312 expires, then:

a) if the MS returns to coverage in a cell that supports GPRS and that indicates that the network is in network operation mode I, then the MS shall either perform the combined routing area update procedure indicating "combined RA/LA updating with IMSI attach"; or

b) if the MS returns to coverage in a cell in the same RA that supports GPRS and that indicates that the network is in network operation mode II or III, then the MS shall perform the periodic routing area updating procedure indicating "Periodic updating" and shall perform the periodic location updating procedure ; or

c) if the MS returns to coverage in a cell that does not support GPRS, then, depending upon the LA of the cell, the MS shall either perform the periodic location updating procedure or a normal location updating procedure. In addition, the MS shall perform a combined routing area update procedure indicating "combined RA/LA

updating with IMSI attach" when the MS enters a cell that supports GPRS and that indicates that the network is in network operation mode I; or

d) if the MS returns to coverage in a new RA the description given in section 4.7.5 applies.

If the MS is both IMSI attached for GPRS and non-GPRS services in a network that operates in network operation mode I, and if the MS has camped on a cell that does not support GPRS, and timer T3312 expires, then the MS shall start an MM location updating procedure. In addition, the MS shall perform a combined routing area update procedure indicating "combined RA/LA updating with IMSI attach" when the MS enters a cell that supports GPRS and indicates that the network is in operation mode I.

In GSM, ~~T~~timer T3312 shall not be stopped when a GPRS MS enters state GMM-REGISTERED.SUSPENDED.

4.7.2.3 PMM-IDLE mode and PMM-CONNECTED mode (UMTS only)

An MS shall enter PMM-CONNECTED mode when a PS signalling connection for packet switched domain is established between the MS and the network. The MS shall not perform periodic routing area update in PMM-CONNECTED mode.

An MS shall enter PMM-IDLE mode when the PS signalling connection for packet switched domain between the MS and the network has been released. The MS shall perform periodic routing area update in PMM-IDLE mode.

4.7.2.4 Handling of *Force to standby* in UMTS (UMTS only)

Force to standby is not applicable for UMTS.

The network shall always indicate *Force to standby not indicated* in the *Force to standby* information element.

The *Force to standby* information element shall be ignored by the MS.

***** Next Modification *****

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 section 3.4.13.1.1.

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.

***** Next Modification *****

10.5.5.7 Force to standby

The purpose of the *force to standby* information element is to force the MS to stop the READY timer in order to prevent the MS to perform cell updates.

In UMTS, the network shall always indicate *force to standby not indicated* in the *force to standby* information element.

The *force to standby* is a type 1 information element.

The *force to standby* information element is coded as shown in figure 10.5.123/TS 24.008 and table 10.5.140/TS 24.008.

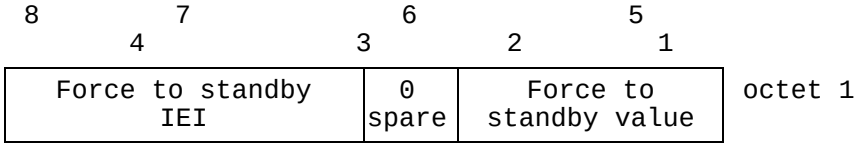

Figure 10.5.123/TS 24.008: *Force to standby* information element

***** Next Modification *****

11.2.2 Timers of GPRS mobility management

Table 11.3/TS 24.008: GPRS Mobility management timers - MS side

TIMER NUM.	TIMER VALUE	STATE	CAUSE OF START	NORMAL STOP	ON THE 1st, 2nd, 3rd, 4th EXPIRY Note 3
T3310	15s	GMM-REG-INIT	ATTACH REQ sent	ATTACH ACCEPT received ATTACH REJECT received	Retransmission of ATTACH REQ
T3311	15s	GMM-DEREG ATTEMPTING TO ATTACH or GMM-REG ATTEMPTING TO UPDATE	ATTACH REJ with other cause values as described in chapter 'GPRS Attach' ROUTING AREA UPDATE REJ with other cause values as described in chapter 'Routing Area Update' Low layer failure	Change of the routing area	Restart of the Attach or the RAU procedure with updating of the relevant attempt counter
T3321	15s	GMM-DEREG-INIT	DETACH REQ sent	DETACH ACCEPT received	Retransmission of the DETACH REQ
T3330	15s	GMM-ROUTING-UPDATING-INITIATED	ROUTING AREA UPDATE REQUEST sent	ROUTING AREA UPDATE ACC received ROUTING AREA UPDATE REJ received	Retransmission of the ROUTING AREA UPDATE REQUEST message

Table 11.3a/TS 24.008: GPRS Mobility management timers – MS side

TIMER NUM.	TIMER VALUE	STATE	CAUSE OF START	NORMAL STOP	ON EXPIRY
T3302	T3212 Note 4	GMM-DEREG or GMM-REG	At attach failure and the attempt counter is greater than or equal to 5. At routing area updating failure and the attempt counter is greater than or equal to 5.	At successful attach At successful routing area updating	On every expiry, initiation of the GPRS attach procedure or RAU procedure
T3312	Default 54 min Note1	GMM-REG	In GSM, ~~W~~when READY state is left. In UMTS, when PMM-CONNECTED mode is left.	When entering state GMM-DEREG	Initiation of the Periodic RAU procedure
T3314 READY	Default 44 sec Note 2	All except GMM-DEREG	Transmission of a PTP PDU	Forced to Standby	No cell-updates are performed
T3316 AA-READY	Default 44 sec Note 2	-	Transmission of a PTP PDU	-	-

NOTE 1: The value of this timer is used if the network does not indicate another value in a GMM signalling procedure.

NOTE 2: The default value of this timer is used if neither the MS nor the Network send another value, or if the Network sends this value, in a signalling procedure.

NOTE 3: Typically, the procedures are aborted on the fifth expiry of the relevant timer. Exceptions are described in the corresponding procedure description.

NOTE 4: T3302 is loaded with the same value which is used to load T3212.

Table 11.4/TS 24.008: GPRS Mobility management timers - network side

TIMER NUM.	TIMER VALUE	STATE	CAUSE OF START	NORMAL STOP	ON THE 1st , 2nd, 3rd , 4th EXPIRY Note 3
T3322	6s	GMM-DEREG-INIT	DETACH REQ sent	DETACH ACCEPT received	Retransmission of DETACH REQUEST
T3350	6s	GMM-COMMON-PROC-INIT	ATTACH ACCEPT sent with P-TMSI and/or TMSI RAU ACCEPT sent with P-TMSI and/or TMSI P-TMSI REALLOC COMMAND sent	ATTACH COMPLETE received RAU COMPLETE received P-TMSI REALLOC COMPLETE received	Retransmission of the same message type, i.e. ATTACH ACCEPT, RAU ACCEPT or REALLOC COMMAND
T3360	6s	GMM-COMMON-PROC-INIT	AUTH AND CIPH REQUEST sent	AUTH AND CIPH RESPONSE received	Retransmission of AUTH AND CIPH REQUEST
T3370	6s	GMM-COMMON-PROC-INIT	IDENTITY REQUEST sent	IDENTITY RESPONSE received	Retransmission of IDENTITY REQUEST

Table 11.4a/TS 24.008: GPRS Mobility management timers - network side

TIMER NUM.	TIMER VALUE	STATE	CAUSE OF START	NORMAL STOP	ON EXPIRY
T3313	Note1	GMM_REG	Paging procedure initiated	Paging procedure completed	Network dependent
T3314 READY	Default 44 sec Note 2	All except GMM-DEREG	Receipt of a PTP PDU	Forced to Standby	The network shall page the MS if a PTP PDU has to be sent to the MS
T3316 AA-READY	Default 44 sec Note 2	-	Receipt of a PTP PDU	-	-
Mobile Reachable	Default 4 min greater than T3312	All except GMM-DEREG	In GSM, ~~C~~change from READY to STANDBY state In UMTS, change from PMM-CONNECTED mode to PMM-IDLE mode.	PTP PDU received	Network dependent but typically paging is halted on 1st expiry

NOTE 1: The value of this timer is network dependent.

NOTE 2: The default value of this timer is used if neither the MS nor the Network send another value, or if the Network sends this value, in a signalling procedure. The value of this timer should be slightly shorter in the network than in the MS, this is a network implementation issue.

NOTE 3: Typically, the procedures are aborted on the fifth expiry of the relevant timer. Exceptions are described in the corresponding procedure description.

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Bad Abling, Germany, 30 Nov-3 Dec 1999

***Document* N1-99E65**
Revision of WI-99023

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24.008	CR	057r1	Current Version:	3.1.0

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

For submission to:	TSG-N1#9	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: Ericsson **Date:** 1999-11-29

Subject: P-TMSI reallocation procedure

Work item: GSM-UMTS Interworking

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

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

Reason for change: The existing procedure for P-TMSI reallocation is valid for GSM only. This CR introduces some changes to make the text valid for both GSM and UMTS.

Clauses affected: 4.7.6.3, 4.7.6.4

Other specs affected:

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

Other comments:

4.7.6 P-TMSI reallocation procedure

A temporary mobile station identity for GPRS services, the Packet-TMSI (P-TMSI), is used for identification within the radio interface signalling procedures. The structure of the P-TMSI is specified in TS 23.003 [10]. The P-TMSI has significance only within a routing area. Outside the routing area it has to be combined with the routing area identification (RAI) to provide for an unambiguous identity.

The purpose of the P-TMSI reallocation procedure is to provide identity confidentiality, i.e. to protect a user against being identified and located by an intruder (see GSM 02.09 [5] and 03.20 [34]).

Usually, P-TMSI reallocation is performed at least at each change of a routing area. (Such choices are left to the network operator).

The reallocation of a P-TMSI is performed by the unique procedure defined in this section. This procedure can only be initiated by the network in state GMM-REGISTERED.

P-TMSI can also be implicitly reallocated in the attach or routing area updating procedures. The implicit reallocation of a P-TMSI is described in the corresponding sections.

NOTE : Normally, the P-TMSI reallocation will take place in conjunction with another GMM procedure, e.g. at routing area updating (see TS 29.002 [37]).

4.7.6.1 P-TMSI reallocation initiation by the network

The network initiates the P-TMSI reallocation procedure by sending a P-TMSI REALLOCATION COMMAND message to the MS and starts the timer T3350.

The P-TMSI REALLOCATION COMMAND message contains a new combination of P-TMSI, RAI and optionally a P-TMSI signature allocated by the network.

The network shall not send any user data during the P-TMSI reallocation procedure.

4.7.6.2 P-TMSI reallocation completion by the MS

Upon receipt of the P-TMSI REALLOCATION COMMAND message, the MS stores the Routing Area Identifier (RAI) and the P-TMSI and sends a P-TMSI REALLOCATION COMPLETE message to the network.

If a P-TMSI signature is present in the P-TMSI REALLOCATION COMMAND message, the MS shall store the new P-TMSI signature and shall if available delete the old P-TMSI signature. If no P-TMSI signature is present in the P-TMSI REALLOCATION COMMAND message, the old P-TMSI signature, if available, shall be kept.

4.7.6.3 P-TMSI reallocation completion by the network

Upon receipt of the P-TMSI REALLOCATION COMPLETE message, the network stops the timer T3350 and considers the new P-TMSI as valid and the old one as invalid.

In GSM, ~~T~~the GMM layer shall notify the LLC layer that the P-TMSI has been changed (see GSM 04.64 [76]).

4.7.6.4 Abnormal cases on the network side

The following abnormal cases can be identified:

a) Lower layer failure

If a lower layer failure is detected before the P-TMSI REALLOCATION COMPLETE message is received, the old and the new P-TMSI shall be considered as occupied until the old P-TMSI can be considered as invalid by the network (see section 4.7.1.5).

During this period the network:

may first use the old P-TMSI for paging for an implementation dependent number of paging attempts in the case of network originated transactions. Upon response from the MS, the network may re-initiate the P-TMSI reallocation. If no response is received to the paging attempts, the network may use the new P-TMSI for paging for an implementation dependent number of paging attempts. Upon response from the MS the network shall

consider the new P-TMSI as valid and the old P-TMSI as invalid. If no response is received to the paging attempts, the network may use the IMSI for paging. for an implementation dependent number of paging attempts;

NOTE: Paging with IMSI causes the MS to re-attach as described in section 4.7.9.1.

- shall consider the new P-TMSI as valid if it is used by the MS (see section 4.7.1.5); or
- may use the identification procedure followed by a new P-TMSI reallocation if the MS uses the old P-TMSI.

b) Expiry of timer T3350

The P-TMSI reallocation procedure is supervised by the timer T3350. The network shall, on the first expiry of timer T3350, reset and restart timer T3350 and shall retransmit the P-TMSI REALLOCATION COMMAND. This retransmission is repeated four times, i.e. on the fifth expiry of timer T3350, the network shall abort the reallocation procedure and shall follow the rules for case a as described above.

c) P-TMSI reallocation and GPRS attach procedure collision

If the network receives an ATTACH REQUEST message before the ongoing P-TMSI reallocation procedure has been completed the network shall proceed with the GPRS attach procedure after deletion of the GMM context.

d) P-TMSI reallocation and an MS initiated GPRS detach procedure collision

If the network receives a DETACH REQUEST message before the ongoing P-TMSI reallocation procedure has been completed, the network shall abort the P-TMSI reallocation procedure and shall progress the GPRS detach procedure.

e) P-TMSI reallocation and a routing area updating procedure collision

If the network receives a ROUTING AREA UPDATE REQUEST message before the ongoing P-TMSI reallocation procedure has been completed, the network shall abort the P-TMSI reallocation procedure and shall progress the routing area updating procedure. The network may then perform a new P-TMSI reallocation.

f) P-TMSI reallocation and a service request procedure collision

If the network receives a SERVICE REQUEST message before the ongoing P-TMSI reallocation procedure procedure has been completed, the network shall progress both procedures.

If there are different new P-TMSI included in subsequent P-TMSI REALLOCATION COMMAND messages, due to an aborted or repeated P-TMSI reallocation procedure, the MS always regards the newest and its existing P-TMSI as valid for the recovery time.

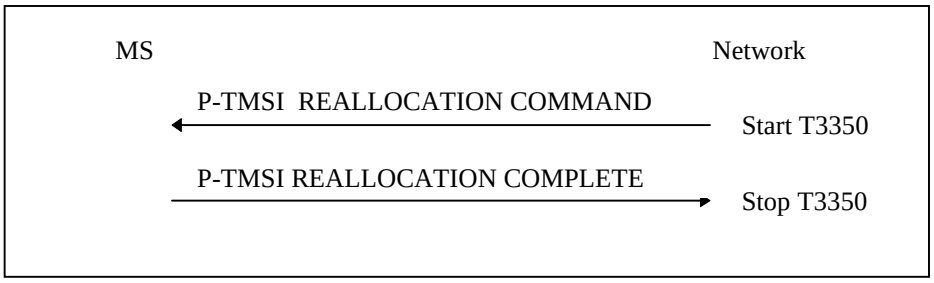

Figure 4.7.6/1 TS 24.008: P-TMSI reallocation procedure

3GPP/SMG Meeting TSG-CN1
Bad Abling, Germany, 30 Nov-3 Dec 1999

Document N1-99F34
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx
Revision of N1-99F20

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24.008	CR	054 r3	Current Version:	3.1.0

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

For submission to: TSG-N1#6					
list expected approval meeting # here ↑	for approval	X	strategic		*(for SMG use only)*
	for information		non-strategic		

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

Proposed change affects: *(at least one should be marked with an X)*

(U)SIM		ME	X	UTRAN / Radio		Core Network	X

Source: Ericsson **Date:** 1999-12-03

Subject: READY timer not applicable for UMTS

Work item: GSM-UMTS Interworking

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

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

Reason for change:

As the READY timer is not applicable for UMTS, this CR clarifies that the corresponding subclause is for GSM only.

In addition this CR clarifies the handling of the READY timer value in the Attach procedure and the Routing Area Update procedure for an MS in UMTS.

Clauses affected: 4.7.2.1.1 (new section), 4.7.2.1.2 (new section), 11.2.2

Other specs Affected:

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

Other comments:

4.7.2.1 READY timer behaviour

4.7.2.1.1 READY timer behaviour (GSM only)

The READY timer, T3314 is used in the MS and in the network per each assigned P-TMSI to control the cell updating procedure.

When the READY timer is running or has been deactivated the MS shall perform cell update each time a new cell is selected (see TS 23.022 [14]). If a routing area border is crossed, a routing area updating procedure shall be performed instead of a cell update.

When the READY timer has expired the MS shall:

- perform the routing area updating procedure when a routing area border is crossed;
- not perform a cell update when a new cell is selected.

All other GMM procedures are not affected by the READY timer.

The READY timer is started:

- in the MS when the GMM entity receives an indication from lower layers that an LLC frame has been transmitted on the radio interface; and
- in the network when the GMM entity receives an indication from lower layers that an LLC frame has been successfully received by the network.

Within GMM signalling procedures the network includes a ‘force to standby’ information element, in order to indicate whether or not the READY timer shall be stopped when returning to the GMM-REGISTERED state. If the ‘force to standby’ information element is received within more than one message during a ongoing GMM specific procedure, the last one received shall apply. If the READY timer is deactivated and the network indicates 'force to standby' with the ‘force to standby’ information element, this shall not cause a modification of the READY timer.

The READY timer is not affected by state transitions to and from the GMM-REGISTERED.SUSPENDED sub-state.

The value of the READY timer may be negotiated between the MS and the network using the GPRS attach or GPRS routing area updating procedure.

- If the MS wishes to indicate its preference for a READY timer value it shall include the preferred values into the ATTACH REQUEST and/or ROUTING AREA UPDATE REQUEST messages. The preferred values may be smaller, equal to or greater than the default values or may be equal to the value requesting the READY Timer function to be deactivated.
- Regardless of whether or not a timer value has been received by the network in the ATTACH REQUEST or ROUTING AREA UPDATE REQUEST messages, the network may include a timer value for the READY timer (different or not from the default value) into the ATTACH ACCEPT or ROUTING AREA UPDATE ACCEPT messages, respectively. If the READY Timer value was included, it shall be applied for the GMM context by the network and by the MS.
- When the MS proposes a READY Timer value and the Network does not include any READY Timer Value in its answer, then the value proposed by the MS shall be applied for the GMM context by the Network and by the MS.
- When neither the MS nor the Network proposes a READY Timer value into the ATTACH ACCEPT or ROUTING AREA UPDATE ACCEPT message, then the default value shall be used.

If the negotiated READY timer value indicates that the ready timer function is deactivated, the READY timer shall always run without expiry. If the negotiated READY timer value indicates that the ready timer function is deactivated, and within the same procedure the network indicates 'force to standby' with the ‘force to standby’ information element, the READY timer shall always run without expiry. If the negotiated READY timer value is set to zero, READY timer shall be stopped immediately.

To account for the LLC frame uplink transmission delay, the READY timer value should be slightly shorter in the network than in the MS. This is a network implementation issue.

If a new READY timer value is negotiated, the MS shall upon the reception of the ATTACH ACCEPT or ROUTING AREA UPDATE ACCEPT message perform a initial cell update (either by transmitting a LLC frame or, if required, a ATTACH COMPLETE or ROUTING AREA UPDATE COMPLETE message), in order to apply the new READY timer value immediately. If the new READY timer value is set to zero or if the network indicates 'force to standby' with the 'force to standby' IE, the initial cell update should not be done.

4.7.2.1.2 Handling of READY timer in UMTS (UMTS only)

The READY timer is not applicable for UMTS.

An MS may indicate a READY timer value to the network in the ATTACH REQUEST and the ROUTING AREA UPDATE REQUEST messages.

If a READY timer value is received by an MS capable of both UMTS and GSM in the ATTACH ACCEPT or the ROUTING AREA UPDATE ACCEPT messages, then the received value shall be stored by the MS in order to be used at an intersystem change from UMTS to GSM.

***** Next Modification *****

11.2.2 Timers of GPRS mobility management

Table 11.3/TS 24.008: GPRS Mobility management timers - MS side

TIMER NUM.	TIMER VALUE	STATE	CAUSE OF START	NORMAL STOP	ON THE 1st , 2nd, 3rd , 4th EXPIRY Note 3
T3310	15s	GMM-REG-INIT	ATTACH REQ sent	ATTACH ACCEPT received ATTACH REJECT received	Retransmission of ATTACH REQ
T3311	15s	GMM-DEREG ATTEMPTING TO ATTACH or GMM-REG ATTEMPTING TO UPDATE	ATTACH REJ with other cause values as described in chapter 'GPRS Attach' ROUTING AREA UPDATE REJ with other cause values as described in chapter 'Routing Area Update' Low layer failure	Change of the routing area	Restart of the Attach or the RAU procedure with updating of the relevant attempt counter
T3321	15s	GMM-DEREG-INIT	DETACH REQ sent	DETACH ACCEPT received	Retransmission of the DETACH REQ
T3330	15s	GMM-ROUTING-UPDATING-INITIATED	ROUTING AREA UPDATE REQUEST sent	ROUTING AREA UPDATE ACC received ROUTING AREA UPDATE REJ received	Retransmission of the ROUTING AREA UPDATE REQUEST message

Table 11.3a/TS 24.008: GPRS Mobility management timers – MS side

TIMER NUM.	TIMER VALUE	STATE	CAUSE OF START	NORMAL STOP	ON EXPIRY
T3302	T3212 Note 4	GMM-DEREG or GMM-REG	At attach failure and the attempt counter is greater than or equal to 5. At routing area updating failure and the attempt counter is greater than or equal to 5.	At successful attach At successful routing area updating	On every expiry, initiation of the GPRS attach procedure or RAU procedure
T3312	Default 54 min Note1	GMM-REG	When READY state is left.	When entering state GMM-DEREG	Initiation of the Periodic RAU procedure
T3314 READY (GSM only)	Default 44 sec Note 2	All except GMM-DEREG	Transmission of a PTP PDU	Forced to Standby	No cell-updates are performed
T3316 AA-READY	Default 44 sec Note 2	-	Transmission of a PTP PDU	-	-

NOTE 1: The value of this timer is used if the network does not indicate another value in a GMM signalling procedure.

NOTE 2: The default value of this timer is used if neither the MS nor the Network send another value, or if the Network sends this value, in a signalling procedure.

NOTE 3: Typically, the procedures are aborted on the fifth expiry of the relevant timer. Exceptions are described in the corresponding procedure description.

NOTE 4: T3302 is loaded with the same value which is used to load T3212.

Table 11.4/TS 24.008: GPRS Mobility management timers - network side

TIMER NUM.	TIMER VALUE	STATE	CAUSE OF START	NORMAL STOP	ON THE 1^{st}, 2^{nd}, 3^{rd}, 4^{th} EXPIRY Note 3
T3322	6s	GMM-DEREG-INIT	DETACH REQ sent	DETACH ACCEPT received	Retransmission of DETACH REQUEST
T3350	6s	GMM-COMMON-PROC-INIT	ATTACH ACCEPT sent with P-TMSI and/or TMSI RAU ACCEPT sent with P-TMSI and/or TMSI P-TMSI REALLOC COMMAND sent	ATTACH COMPLETE received RAU COMPLETE received P-TMSI REALLOC COMPLETE received	Retransmission of the same message type, i.e. ATTACH ACCEPT, RAU ACCEPT or REALLOC COMMAND
T3360	6s	GMM-COMMON-PROC-INIT	AUTH AND CIPH REQUEST sent	AUTH AND CIPH RESPONSE received	Retransmission of AUTH AND CIPH REQUEST
T3370	6s	GMM-COMMON-PROC-INIT	IDENTITY REQUEST sent	IDENTITY RESPONSE received	Retransmission of IDENTITY REQUEST

Table 11.4a/TS 24.008: GPRS Mobility management timers - network side

TIMER NUM.	TIMER VALUE	STATE	CAUSE OF START	NORMAL STOP	ON EXPIRY
T3313	Note1	GMM_REG	Paging procedure initiated	Paging procedure completed	Network dependent
T3314 READY (GSM only)	Default 44 sec Note 2	All except GMM-DEREG	Receipt of a PTP PDU	Forced to Standby	The network shall page the MS if a PTP PDU has to be sent to the MS
T3316 AA-READY	Default 44 sec Note 2	-	Receipt of a PTP PDU	-	-
Mobile Reachable	Default 4 min greater than T3312	All except GMM-DEREG	Change from READY to STANDBY state	PTP PDU received	Network dependent but typically paging is halted on 1st expiry

NOTE 1: The value of this timer is network dependent.

NOTE 2: The default value of this timer is used if neither the MS nor the Network send another value, or if the Network sends this value, in a signalling procedure. The value of this timer should be slightly shorter in the network than in the MS, this is a network implementation issue.

NOTE 3: Typically, the procedures are aborted on the fifth expiry of the relevant timer. Exceptions are described in the corresponding procedure description.

3GPP TSG-CN WG1 Meeting
Bad Aibling, Germany, 30.11.- 3.12.1999

***Document* N1-99F08**
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

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24.008	CR	083r1	Current Version:	3.1.0

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

For submission to: CN#6 *list expected approval meeting # here ↑*	for approval	X	strategic		*(for SMG use only)*
	for information		non-strategic		

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

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

Source: Nokia **Date:** 99-11-12

Subject: Routing Area updating procedure for R99

Work item: GSM/UMTS interworking

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: This CR proposes changes in the Routing Area updating procedure in order to align the procedure with the TS 23.060.

Clauses affected: Chapter 4.7.5

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

Other comments:


help.doc

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

4.7.5 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~~section 3.4.13.1.1~~.

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~~ 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~~ the normal routing area updating procedure is initiated when the MS detects a change of the routing area in state GMM-REGISTERED, ~~or~~ or when the MS determines that GPRS resumption shall be performed~~ or in the inter-system change from UMTS to GSM if a MS enters GSM cell while having a PS signaling connection in the UMTS~~. 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".~~

In UMTS, the normal routing area updating procedure is initiated when the MS detects a change of the routing area in state GMM-REGISTERED ~~or in the inter system change from GSM to UMTS if a MS enters UMTS cell while READY timer is running in GSM~~. 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".

4.7.5.1.1 Normal and periodic routing area updating procedure initiation

To initiate the normal 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-AREA-UPDATING-INITIATED. The message ROUTING AREA UPDATE REQUEST shall contain the P-TMSI signature when received within a previous ATTACH ACCEPT or ROUTING AREA UPDATE ACCEPT message.

4.7.5.1.2 GMM Common procedure initiation

The network may initiate GMM common procedures, e.g. the GMM authentication and ciphering procedure.

4.7.5.1.3 Normal and periodic routing area updating procedure accepted by the network

If the routing area updating request has been accepted by the network, a ROUTING AREA UPDATE ACCEPT message shall be sent to the MS. The network may assign a new P-TMSI and/or a new P-TMSI signature for the MS. If a new P-TMSI and/or P-TMSI signature have been assigned to the MS, it/they shall be included in the ROUTING AREA UPDATE ACCEPT message together with the routing area identification. The network shall change to state GMM-COMMON-PROCEDURE-INITIATED and shall start the supervision timer T3350 as described in section 4.7.6.

If the LAI or PLMN identity contained in the ROUTING AREA UPDATE ACCEPT message is a member of any of the "forbidden" lists then any such entry shall be deleted.

Upon receipt of a ROUTING AREA UPDATE ACCEPT message, the MS stores the received routing area identification, stops timer T3330, shall reset the routing area updating attempt counter and sets the GPRS update status to GU1 UPDATED. If the message contains a P-TMSI, the MS shall use this P-TMSI as new temporary identity for GPRS services and shall store the new P-TMSI. If no P-TMSI was included by the network in the ROUTING AREA UPDATING ACCEPT message, the old P-TMSI shall be kept. Furthermore, the MS shall store the P-TMSI signature if received in the ROUTING AREA UPDATING ACCEPT message. If no P-TMSI signature was included in the message, the old P-TMSI signature, if available, shall be deleted.

A ROUTING AREA UPDATE COMPLETE message shall be returned to the network if the ROUTING AREA UPDATE ACCEPT message contained:

- a P-TMSI; and/or
- Receive N-PDU Numbers (see 04.65 [78] and TS 25.322).

In this case the Receive N-PDU Numbers values valid in the MS, shall be included in the ROUTING AREA UPDATE COMPLETE message.

NOTE: In UMTS, after a routing area updating procedure, the mobile station can initiate Service Request procedure to request the resource reservation for the active PDP contexts if the resources have been released by the network or send upper layer message (e.g. ACTIVATE PDP CONTEXT REQUEST) to the network via the existing PS signaling connection.

4.7.5.1.4 Normal and periodic routing area updating procedure not accepted by the network

If the routing area updating cannot be accepted, the network sends a ROUTING AREA UPDATE REJECT message to the MS. An MS that receives a ROUTING AREA UPDATE REJECT message stops timer T3330 . The MS shall then take different actions depending on the received reject cause value:

3 (Illegal MS); or

6 (Illegal ME)

The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED (and shall store it according to section 4.1.3.2) and enter the state GMM-DEREGISTERED. Furthermore, it shall delete any P-TMSI, P-TMSI signature, RAI and GPRS ciphering key sequence number and shall consider the SIM as invalid for GPRS services until switching off or the SIM is removed.

If the MS is IMSI attached via MM procedures, the MS shall in addition set the update status to U3 ROAMING NOT ALLOWED, shall delete any TMSI, LAI and ciphering key sequence number. The new MM state is MM IDLE. The SIM shall be considered as invalid also for non-GPRS services until switching off or the SIM is removed.

7 (GPRS services not allowed)

The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED (and shall store it according to section 4.1.3.2.9) and shall delete any P-TMSI, P-TMSI signature, RAI and GPRS ciphering key sequence number. The SIM shall be considered as invalid for GPRS services until switching off or the SIM is removed. The new state is GMM-DEREGISTERED.

9 (MS identity cannot be derived by the network)

The MS shall set the GPRS update status to GU2 NOT UPDATED (and shall store it according to section 4.1.3.2), enter the state GMM-DEREGISTERED, and shall delete any P-TMSI, P-TMSI signature, RAI and GPRS ciphering key sequence number. Subsequently, the MS may automatically initiate the GPRS attach procedure.

10 (Implicitly detached)

The MS shall change to state GMM-DEREGISTERED.NORMAL-SERVICE. The MS shall then perform a new attach procedure. The MS should also activate PDP context(s) to replace any previously active PDP contexts.

NOTE: In some cases, user interaction may be required and then the MS cannot activate the PDP context(s) automatically.

11 (PLMN not allowed);

12 (Location area not allowed); or

13 (Roaming not allowed in this location area)

- The MS shall delete any RAI, P-TMSI, P-TMSI signature and GPRS ciphering key sequence number, shall set the GPRS update status to GU3 ROAMING NOT ALLOWED (and shall store it according to section 4.1.3.2) and enter the state GMM-DEREGISTERED.

  If the MS is IMSI attached via MM procedures, the MS shall in addition set the update status to U3 ROAMING NOT ALLOWED and shall delete any TMSI, LAI and ciphering key sequence number and shall reset the location update attempt counter. The new MM state is MM IDLE.

  The MS shall store the LAI or the PLMN identity in the appropriate forbidden list, i.e. in the “forbidden PLMN list” for cause #11, in the list of “forbidden location areas for regional provision of service” for cause #12 or in the list of “forbidden location areas for roaming” for cause #13. If #11or #13 was received, the MS shall perform a PLMN selection instead of a cell selection.

Other values are considered as abnormal cases. The specification of the MS behaviour in those cases is described in section 4.7.5.1.5.

4.7.5.1.5 Abnormal cases in the MS

The following abnormal cases can be identified:

a) Access barred because of access class control

The routing area updating procedure shall not be started. The MS stays in the current serving cell and applies the normal cell reselection process. The procedure is started as soon as possible and if still necessary, i.e. when the barred state is removed or because of a cell change.

b) Lower layer failure before the ROUTING AREA UPDATE ACCEPT or ROUTING AREA UPDATE REJECT message is received

The procedure shall be aborted. The MS shall proceed as described below.

c) T3330 time-out

The procedure is restarted four times, i.e. on the fifth expiry of timer T3330, the MS shall abort the procedure. The MS shall proceed as described below.

d) ROUTING AREA UPDATE REJECT, other causes than those treated in section 4.7.5.1.4

The MS shall proceed as described below.

e) If a routing area border is crossed, when the MS is in state GMM-ROUTING-AREA-UPDATE-INITIATED, the routing area updating procedure shall be aborted and re-initiated immediately. The MS shall set the GPRS update status to GU2 NOT UPDATED.

f) In GSM, ~~If~~ if a cell change occurs within the same RA, when the MS is in state GMM-ROUTING-AREA-UPDATE-INITIATED, the cell update procedure is performed, before completion of the routing area updating procedure. ~~This applies to GPRS only.~~

g) Routing area updating and detach procedure collision

GPRS detach containing detach type "GPRS detach" or "combined GPRS/IMSI detach":

If the MS receives a DETACH REQUEST message before the routing area updating procedure has been completed, the routing area updating procedure shall be aborted and the GPRS detach procedure shall be progressed.

GPRS detach containing detach type "IMSI detach":

If the MS receives a DETACH REQUEST message before the routing area updating procedure has been completed, the routing area updating procedure shall be progressed, i.e. the DETACH REQUEST message shall be ignored.

h) Routing area updating and P-TMSI reallocation procedure collision

If the MS receives a P-TMSI REALLOCATION REQUEST message before the routing area updating procedure has been completed, the P-TMSI reallocation procedure shall be aborted and the routing area updating procedure shall be progressed.

In cases b, c and d the MS shall proceed as follows:

Timer T3330 shall be stopped if still running. The routing area updating attempt counter shall be incremented.

If the routing area updating attempt counter is less than 5, and the stored RAI is equal to the RAI of the current serving cell and the GMM update status is equal to GU1 UPDATED:

- the MS shall keep the GMM update status to GU1 UPDATED and changes state to GMM-REGISTERED.NORMAL-SERVICE. The MS shall start timer T3311. When timer T3311 expires the routing area updating procedure is triggered again.

If the routing area updating attempt counter is less than 5, and the stored RAI is different to the RAI of the current serving cell or the GMM update status is different to GU1 UPDATED:

- the MS shall start timer T3311, shall set the GPRS update status to GU2 NOT UPDATED and changes state to GMM-REGISTERED.ATTEMPTING-TO-UPDATE.

If the routing area updating attempt counter is greater than or equal to 5:

- the MS shall start timer T3302, shall set the GPRS update status to GU2 NOT UPDATED and shall change to state GMM-REGISTERED.ATTEMPTING-TO-UPDATE or optionally to GMM-REGISTERED.PLMN-SEARCH(see 4.2.4.1.2).

4.7.5.1.6 Abnormal cases on the network side

The following abnormal cases can be identified:

a) If a lower layer failure occurs before the message ROUTING AREA UPDATE COMPLETE has been received from the MS and a P-TMSI and/or PTMSI signature has been assigned, the network shall abort the procedure and shall consider both, the old and new P-TMSI and the corresponding P-TMSI signatures as valid until the old P-TMSI can be considered as invalid by the network (see section 4.7.1.5). During this period the network may use the identification procedure followed by a P-TMSI reallocation procedure if the old P-TMSI is used by the MS in a subsequent message.

NOTE: Optionally, paging with IMSI may be used if paging with old and new P-TMSI fails. Paging with IMSI causes the MS to re-attach as described in section 4.7.9.1.

b) Protocol error

If the ROUTING AREA UPDATE REQUEST message has been received with a protocol error, the network shall return a ROUTING AREA UPDATE REJECT message with one of the following reject causes:

#96: Mandatory information element error;

#99: Information element non-existent or not implemented;

#100: Conditional IE error;

#111: Protocol error, unspecified.

c) T3350 time-out

On the first expiry of the timer, the network shall retransmit the ROUTING AREA UPDATE ACCEPT message and shall reset and restart timer T3350. The retransmission is performed four times, i.e. on the fifth expiry of timer T3350, the routing area updating procedure is aborted. Both, the old and the new P-TMSI and the corresponding P-TMSI signatures shall be considered as valid until the old P-TMSI can be considered as invalid by the network(see section 4.7.1.5). During this period the network acts as described for case a above.

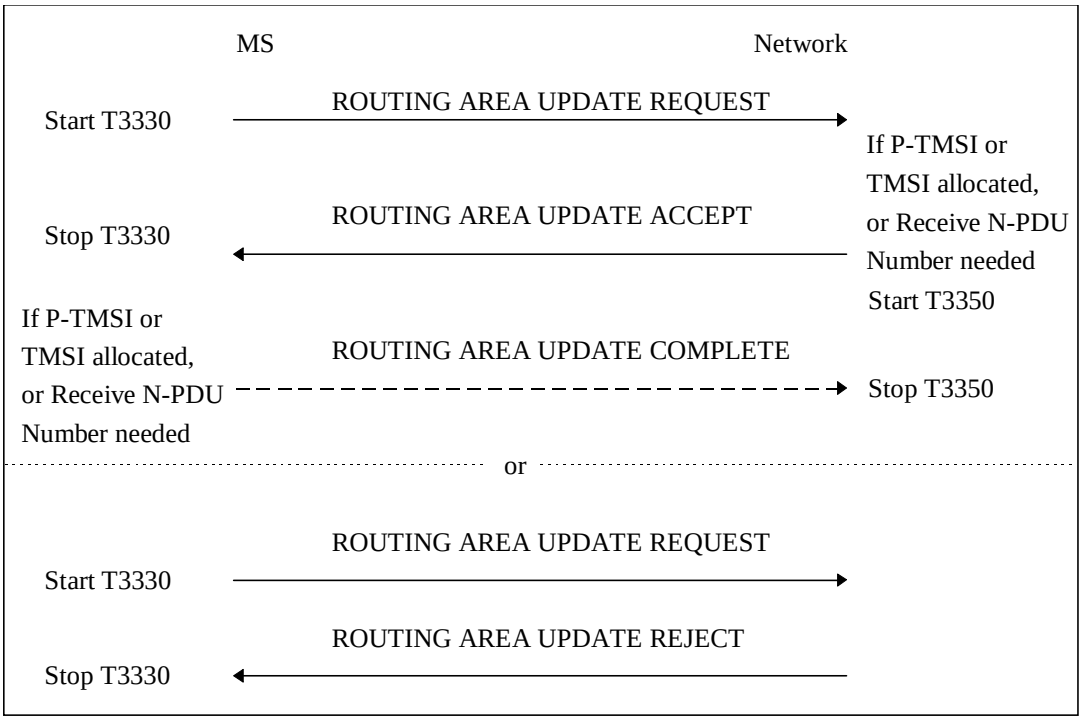

Figure 4.7.5/1 TS 24.008: Routing and combined routing area updating procedure

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

In GSM, ~~The~~ 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.

4.7.5.2.2 GMM Common procedure initiation

The network may initiate GMM common procedures, e.g. the GMM authentication and ciphering procedure.

4.7.5.2.3 Combined routing area updating procedure accepted by the network

Depending on the value of the update result IE received in the ROUTING AREA UPDATE ACCEPT message, two different cases can be distinguished:

Case 1) The update result IE value indicates “combined RA/LA”: Routing and location area updating is successful;

Case 2) The update result IE value indicates “RA only”: Routing area updating is successful, but location area updating is not successful.

A ROUTING AREA UPDATE COMPLETE message shall be returned to the network if the ROUTING AREA UPDATE ACCEPT message contains:

- a P-TMSI and/or a TMSI; and/or
- Receive N-PDU Numbers (see 04.65 [78] and TS 25.322).

In the latter case, the Receive N-PDU Numbers that are valid in the MS shall be included in the ROUTING AREA UPDATE COMPLETE message.

4.7.5.2.3.1 Combined routing area updating successful

The description for normal routing area update as specified in section 4.7.5.1.3 shall be followed. In addition, the following description for location area updating applies.

The handling at the receipt of the ROUTING AREA UPDATE ACCEPT depends on the value received in the update result IE as specified below.

The TMSI reallocation may be part of the combined routing area updating procedure. The TMSI allocated is then included in the ROUTING AREA UPDATE ACCEPT message together with the location area identification (LAI). The network shall, in this case, change to state GMM-COMMON-PROCEDURE-INITIATED and shall start the timer T3350 as described in section 4.7.6.

The MS, receiving a ROUTING AREA UPDATE ACCEPT message, stores the received location area identification, stops timer T3330, enters state MM IDLE, reset the location update attempt counter and sets the update status to U1 UPDATED. If the ROUTING AREA UPDATE ACCEPT message contains an IMSI, the mobile station is not allocated any TMSI, and shall delete any TMSI accordingly. If the ROUTING AREA UPDATE ACCEPT message contains a TMSI, the MS shall use this TMSI as new temporary identity. The MS shall delete its old TMSI and shall store the new TMSI. In this case, an ROUTING AREA UPDATE COMPLETE message is returned to the network. If neither a TMSI nor an IMSI has been included by the network in the ROUTING AREA UPDATE ACCEPT message, the old TMSI, if any is available, shall be kept.

Any timer used for triggering the location updating procedure (e.g. T3211, T3212) shall be stopped if running.

The network receiving a ROUTING AREA UPDATE COMPLETE message stops timer T3350, changes to GMM-REGISTERED state and considers the new TMSI as valid.

4.7.5.2.3.2 Combined routing are updating successful for GPRS services only

The description for normal routing area update as specified in section 4.7.5.1.3 shall be followed. In addition, the following description for location area updating applies.

The MS receiving the ROUTING AREA UPDATE ACCEPT message takes one of the following actions depending on the reject cause:

2 (IMSI unknown in HLR)

The MS shall set the update status to U3 ROAMING NOT ALLOWED and shall delete any TMSI, LAI and ciphering key sequence number. The new MM state is MM IDLE. The SIM shall be considered as invalid for non-GPRS services until switching off or the SIM is removed.

#16 (MSC temporarily not reachable);
#17 (Network failure); or
#22 (Congestion)

The MS shall change to state GMM-REGISTERED.ATTEMPTING-TO-UPDATE-MM. Timer T3330 shall be stopped if still running. The routing area updating attempt counter shall be incremented. If the routing area updating attempt counter is less than 5, and the stored RAI is equal to the RAI of the current serving cell and the GMM update status is equal to GU1 UPDATED:

- the MS shall keep the GMM update status GU1 UPDATED and changes state to GMM-REGISTERED.ATTEMPTING-TO-UPDATE-MM. The MS shall start timer T3311. When timer T3311 expires the combined routing area update procedure indicating “combined RA/LA updating with IMSI attach” is triggered again.

If the routing area updating attempt counter is greater than or equal to 5:

- the MS shall start timer T3302 and shall change to state GMM-REGISTERED.ATTEMPTING-TO-UPDATE-MM;

- a GPRS MS operating in MS operation mode A shall then proceed with appropriate MM specific procedure; a GPRS MS operating in MS operation mode B may then proceed with appropriate MM specific procedures. The MM sublayer shall act as in network operation mode II as long as the combined GMM procedures are not successful and no new RA is entered. The new MM state is IDLE.

Other values are considered as abnormal cases. The combined routing area updating shall be considered as failed for GPRS and non-GPRS services. The specification of the MS behaviour in those cases is specified in section 4.7.5.2.5.

4.7.5.2.4 Combined routing area updating not accepted by the network

If the combined routing area updating cannot be accepted, the network sends a ROUTING AREA UPDATE REJECT message to the MS. An MS that receives a ROUTING AREA UPDATE REJECT message stops timer T3330 and enters state MM IDLE. The MS shall then take different actions depending on the received reject cause:

3 (Illegal MS);

6 (Illegal ME); or
8 (GPRS services and non GPRS services not allowed)

The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED and the update status to U3 ROAMING NOT ALLOWED (and shall store it according to section 4.1.3.2) and enter the state GMM-DEREGISTERED. Furthermore, it shall delete any P-TMSI, P-TMSI signature, TMSI, RAI, LAI, ciphering key sequence number and GPRS ciphering key sequence number and shall consider the SIM as invalid for GPRS and non GPRS services until switching off or the SIM is removed.

7 (GPRS services not allowed)

The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED (and shall store it according to section 4.1.3.2) and shall delete any P-TMSI, P-TMSI signature, RAI and GPRS ciphering key sequence number. The SIM shall be considered as invalid for GPRS services until switching off or the SIM is removed. The new state is GMM-DEREGISTERED. If in the MS the timer T3212 is not already running, the timer shall be set to its initial value and restarted.

A GPRS MS operating in MS operation mode A or B in network operation mode I, is still IMSI attached for CS services in the network.

9 (MS identity cannot be derived by the network)

The MS shall set the GPRS update status to GU2 NOT UPDATED (and shall store it according to section 4.1.3.2), enter the state GMM-DEREGISTERED, and shall delete any P-TMSI, P-TMSI signature, RAI and GPRS ciphering key sequence number. Subsequently, the MS may automatically initiate the GPRS attach procedure.

A GPRS MS operating in MS operation mode A or B in network operation mode I, is still IMSI attached for CS services in the network.

10 (Implicitly detached)

A GPRS MS operating in MS operation mode A or B in network operation mode I, is IMSI detached for both GPRS and CS services in the network.

The MS shall change to state GMM-DEREGISTERED.NORMAL-SERVICE. The MS shall then perform a new attach procedure. The MS should also activate PDP context(s) to replace any previously active PDP contexts.

NOTE: In some cases, user interaction may be required and then the MS cannot activate the PDP context(s) automatically.

11 (PLMN not allowed);

12 (Location area not allowed); or

13 (Roaming not allowed in this location area)

The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED and the update status to U3 ROAMING NOT ALLOWED (and shall store it according to section 4.1.3.2) and enter the state GMM-DEREGISTERED. Furthermore, it shall delete any P-TMSI, P-TMSI signature, TMSI, RAI, LAI, ciphering key sequence number GPRS ciphering key sequence number, and reset the location update attempt counter.

The MS shall store the LAI or the PLMN identity in the appropriate forbidden list, i.e. in the "forbidden PLMN list" for cause #11, in the list of "forbidden location areas for regional provision of service" for cause #12 or in the list of "forbidden location areas for roaming" for cause #13. If #11 or #13 was received, the MS shall then perform a PLMN selection instead of a cell selection.

Other values are considered as abnormal cases. The specification of the MS behaviour in those cases is described in section 4.7.5.2.5.

4.7.5.2.5 Abnormal cases in the MS

The abnormal cases specified in section 4.7.5.1.5 apply with the following modification:

If the GPRS routing area updating counter is less than 5, the MM state remains MM LOCATION UPDATING PENDING.

If the GPRS routing area updating attempt counter is incremented according to section 4.7.5.1.5 the next actions depend on the Location Area Identities (stored on SIM and the one of the current serving cell) and the value of the routing area updating attempt counter.

- if the update status is U1 UPDATED, and the stored LAI is equal to the one of the current serving cell and the routing area updating attempt counter is smaller than 5, then the mobile station shall keep the update status to U1 UPDATED, the new MM state is MM IDLE substate NORMAL SERVICE, or

- if the update status is different from U1 UPDATED, or the stored LAI is different from the one of the current serving cell, or the routing area updating attempt counter is greater or equal to 5, the mobile station shall delete any LAI, TMSI, ciphering key sequence number stored in the SIM and set the update status to U2 NOT UPDATED. The new MM state is MM IDLE substate ATTEMPTING TO UPDATE.

4.7.5.2.6 Abnormal cases on the network side

The abnormal cases specified in section 4.7.5.1.6 apply with the exceptions for cases a and c in which in addition to the P-TMSI and P-TMSI signature the old TMSI shall be considered occupied until the new TMSI is used by the MS in a subsequent message.

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/TS 24.008.

Message type: ROUTING AREA UPDATE REQUEST

Significance: dual

Direction: MS to network

Table 9.4.14/TS 24.008: ROUTING AREA UPDATE REQUEST message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Skip indicator	Skip indicator 10.3.1	M	V	1/2
	Routing area update request message identity	Message type 10.4	M	V	1
	Update type	Update type 10.5.5.18	M	V	1/2
	GPRS ciphering key sequence number	Ciphering key sequence number 10.5.1.2	M	V	1/2
	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 - 31
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
18	P-TMSI	Mobile identity 10.5.1.4	O	TLV	7

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.

9.4.14.5 P-TMSI (UMTS only)

This IE shall be included by the MS.

9.4.15 Routing area update accept

This message is sent by the network to the MS to provide the MS with GPRS mobility management related data in response to a *routing area update request* message . See table 9.4.15/TS 24.008.

Message type: ROUTING AREA UPDATE ACCEPT

Significance: dual

Direction: network to MS

Table 9.4.15/TS 24.008: ROUTING AREA UPDATE ACCEPT message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Skip indicator	Skip indicator 10.3.1	M	V	1/2
	Routing area update accept message identity	Message type 10.4	M	V	1
	Force to standby	Force to standby 10.5.5.7	M	V	1/2
	Update result	Update result 10.5.5.17	M	V	1/2
	Periodic RA update timer	GPRS Timer 10.5.7.3	M	V	1
	Routing area identification	Routing area identification 10.5.5.15	M	V	6
19	P-TMSI signature	P-TMSI signature 10.5.5.8	O	TV	4
18	Allocated P-TMSI	Mobile identity 10.5.1.4	O	TLV	7
23	MS identity	Mobile identity 10.5.1.4	O	TLV	7
26	List of Receive N-PDU Numbers	Receive N-PDU Number list 10.5.5.11	O	TLV	4 - 17
17	Negotiated READY timer value	GPRS Timer 10.5.7.3	O	TV	2
25	GMM cause	GMM cause 10.5.5.14	O	TV	2

9.4.15.1 P-TMSI signature

This IE may be included to assign an identity to the MS's GMM context.

9.4.15.2 Allocated P-TMSI

This IE may be included to assign a P-TMSI to an MS in case of a GPRS or combined routing area updating procedure.

9.4.15.3 MS identity

This IE may be included to assign or unassign a TMSI to a MS in case of a combined routing area updating procedure.

9.4.15.4 List of Receive N-PDU Numbers

This IE shall be included in case of an inter SGSN routing area updating, if there are PDP contexts that have been activated in acknowledged transfer mode.

9.4.15.5 Negotiated READY timer value

This IE may be included to indicate a value for the READY timer.

9.4.15.6 GMM cause

This IE shall be included if IMSI attach was not successful for non-GPRS services during a combined GPRS routing area updating procedure.

9.4.16 Routing area update complete

This message shall be sent by the MS to the network in response to a *routing area update accept message* if a P-TMSI and/or a TMSI has been assigned and/or if there are established LLC connections. See table 9.4.16/TS 24.008.

Message type: ROUTING AREA UPDATE COMPLETE

Significance: dual

Direction: MS to network

Table 9.4.16/TS 24.008: ROUTING AREA UPDATE COMPLETE message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Skip indicator	Skip indicator 10.3.1	M	V	1/2
	Routing area update complete message identity	Message type 10.4	M	V	1
26	List of Receive N-PDU Numbers	Receive N-PDU Number list 10.5.5.11	O	TLV	4 - 17

9.4.16.1 List of Receive N-PDU Numbers

This IE shall be included if the *routing area update accept message* contained this IE.

9.4.17 Routing area update reject

This message is sent by the network to the MS in order to reject the routing area update procedure. See table 9.4.17/TS 24.008.

Message type: ROUTING AREA UPDATE REJECT

Significance: dual

Direction: network to MS

Table 9.4.17/TS 24.008: ROUTING AREA UPDATE REJECT message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Skip indicator	Skip indicator 10.3.1	M	V	1/2
	Routing area update reject message identity	Message type 10.4	M	V	1
	GMM cause	GMM cause 10.5.5.14	M	V	1
	Force to standby	Force to standby 10.5.5.7	M	V	1/2
	Spare half octet	Spare half octet 10.5.1.8	M	V	1/2

3GPP TSG-CN WG1 meeting #8
Kobe, Japan, 25-29 October 1999

***Document* N1-99F52**
Rev of N1-99F38

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**	**089 rev1**	Current Version:	3.1.0

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

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

for approval [X]
for information [ ]

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

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

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

Source: Ericsson **Date:** 02-Dec-99

Subject: Transaction Identifier Extension

Work item: TEI

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

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

Release:

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

Reason for change: To increase the number of simultaneous sessions from the present 7, the TI value needs to be increased. The Error Handling section needs appropriate modification

The session management protocol needs to define that it can use the extended TI mechanism

Clauses affected: 8.3.2

Other specs affected:

Other 3G core specifications	[X]	→ List of CRs:	24.007 CR 001 rev 4
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: Related to N1-99E64

help.doc

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

6.1 GPRS Session management

6.1.1 General

The main function of the session management (SM) is to support PDP context handling of the user terminal. The SM comprises procedures for

- identified PDP context activation, deactivation and modification; and
- anonymous PDP context activation and deactivation.

SM procedures for identified access can only be performed if a GMM context has been established between the MS and the network. If no GMM context has been established, the MM sublayer has to initiate the establishment of a GMM context by use of the GMM procedures as described in chapter 4. After GMM context establishment, SM uses services offered by GMM (see GSM 04.07 [20]). Ongoing SM procedures are suspended during GMM procedure execution.

For anonymous access no GMM context is established.

For the session management protocol, the extended TI mechanism may be used (see 24.007)

8.3.2 Session Management

The mobile station and network shall reject a session management message other than SM-STATUS received with TI ~~value "111"~~EXT bit = 0 by immediately sending an SM-STATUS message using the received 2 octet TI value encoding. ~~with TI value "111". For a session management message received with TI different from "111"~~,Otherwise, the following procedures shall apply:

a) Whenever any session management message except ACTIVATE PDP CONTEXT REQUEST, ACTIVATE AA PDP CONTEXT REQUEST or SM-STATUS is received by the network specifying a transaction identifier which is not recognized as relating to an active context or to a context that is in the process of activation or deactivation or has been [recently] deactivated, the network should send a SM-STATUS message with cause #81 "invalid transaction identifier value" using the received transaction identifier value and remain in the PDP-INACTIVE state.

b) Whenever any session management message except REQUEST PDP CONTEXT ACTIVATION or SM-STATUS is received by the MS specifying a transaction identifier which is not recognized as relating to an active context or to a context that is in the process of activation or deactivation or has been [recently] deactivated, the MS shall send a SM-STATUS message with cause #81 "invalid transaction identifier value" using the received transaction identifier value and remain in the PDP-INACTIVE state.

c) When an ACTIVATE AA PDP CONTEXT REQUEST or REQUEST PDP CONTEXT ACTIVATION message is received with a transaction identifier flag set to "1", this message shall be ignored.

d) When an ACTIVATE PDP CONTEXT REQUEST message is received specifying a transaction identifier which is not recognized as relating to a context that is in the process of activation, and with a transaction identifier flag set to "1", this message shall be ignored.

e) Whenever an ACTIVATE PDP CONTEXT REQUEST or ACTIVATE AA PDP CONTEXT REQUEST message is received by the network specifying a transaction identifier relating to a PDP context not in state PDP-INACTIVE, the network shall deactivate the old PDP context relating to the received transaction identifier without notifying the MS. Furthermore, the network shall continue with the activation procedure of a new PDP context as indicated in the received message.

f) Whenever a REQUEST PDP CONTEXT ACTIVATION message is received by the MS specifying a transaction identifier relating to a PDP context not in state PDP-INACTIVE, the MS shall locally deactivate the old PDP context relating to the received transaction identifier. Furthermore, the MS shall continue with the activation procedure of a new PDP context as indicated in the received message.

10.3.2 Transaction identifier

Bits 5 to 8 of the first octet of every message belonging to the protocols “Call Control; call related SS messages” and “Session Management”contain the transaction identifier (TI). The transaction identifier and its use are defined in TS 24.007 [20].

For the session management protocol, the extended TI mechanism may be used (see 24.007)

3GPP CN1
Bad Aibling, Deutschland, 29 Nov-3 Dec 1999

Document N1-99F36
Revision of N1-99F02

CHANGE REQUEST

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24.008	CR	059r2	Current Version:	3.1.0

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

For submission to: TSG#6	for approval	X	strategic	X	*(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: Ericsson **Date:** 1999-12-01

Subject: UMTS <-> GPRS Intersystem change (handover)

Work item: GSM-UMTS Interworking

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

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

Release:

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

Reason for change: This CR introduces the UMTS <-> GPRS intersystem change as specified in stage 2 TS 23.060.
Both the intersystem change scenarios at RA change and at cell change whithin the same RA are considered.

Clauses affected:

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: Linked to the CR “Change of Network Mode of Operation”

help.doc

<--------- 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.

- UMTS to GSM and for GSM to UMTS intersystem change. Four cases are distinguished:

    - An MS that uses the GSM radio interface in an RA and moves to a new RA in UMTS or an MS that uses the UMTS radio interface in an RA and moves to a new RA in GSM, shall initiate the normal or combined routing area update procedure, as specified in section 4.7.1.6.

    - An MS that uses the GSM radio interface in a cell and moves to a new UMTS cell within the same RA or an MS that uses the UMTS radio interface in a cell and moves to a new GSM cell within the same RA, shall selectively initiate the routing area update procedure as specified in section 4.7.1.6.

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.

4.7.5.3 Selective routing area update procedure

The selective routing area updating procedure is used at UMTS to GSM and GSM to UMTS intersystem change at cell change within the same RA.

4.7.5.3.1 Uplink signalling / data transmission

In GPRS STANDBY or PMM-IDLE mode, the MS shall not perform a RA update procedure (as long as the MS stays within the same RA) until up-link user data or signalling information is to be sent from the MS.

- If the MS is in the same access network as when it last sent user data or signalling messages, the procedures defined for that access system shall be followed. This shall be sending of an LLC PDU in a GPRS cell or initiating the SERVICE REQUEST procedure in a UMTS cell.
- If the MS is in a different access network as when it last sent user data or signalling messages, the RA update procedure shall be performed before the sending of user data or signalling messages.
- If the periodic routing area update timer expires the MS shall initiate the periodic routing area update procedure.

4.7.5.3.2 Downlink signalling / data transmission

If the 2G/3G-SGSN receives user data for an MS in GPRS STANDBY or PMM-IDLE, the SGSN shall page the RA where the MS is located. This may include both GPRS and UMTS cells.

- If the MS receives this page in the same access network as when it last sent user data or signalling messages, the procedures defined for that access system shall be followed. This shall be sending of an LLC PDU in a GPRS cell or initiating the SERVICE REQUEST procedure in a UMTS cell.
- If the MS receives this page in a different access network as when it last sent user data or signalling message, the RA update procedure shall be performed.

3GPP/SMG Meeting #9
Bad Aibling, Germany, 30 Nov.- 3-Dec. 1999

Document ***N1-99F05***
revised N1-99E03

CHANGE REQUEST

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24.008	**CR**	**033 r5**	Current Version:	3.1.0

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

For submission to:	TSG CN#6	for approval	X	strategic		*(for SMG use only)*
list expected approval meeting # here ↑		for information		non-strategic		

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

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

Source: Nokia, Ericsson, Siemens AG, Fujitsu **Date:** 01.12.99

Subject: Updating Session Management (SM) for R99

Work item: GSM/UMTS Interworking

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

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

Release:

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

Reason for change: This CR proposes modifications and new features for R99 UMTS/GPRS to align SM stage 3 with R99 requirements.

Clauses affected: 6.1.2, 6.1.3, 8.3.2, 9.5, 10.4, 10.5.6, 11.2.3

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: Anonymous access has not been considered in this CR and therefore marked as FFS for UMTS.

6 Support for packet services

This chapter contains the description of the procedures for the session management of GPRS point-to-point data services at the radio interface (Reference point Uu and $U_{m)}$

6.1 GPRS Session management

6.1.1 General

The main function of the session management (SM) is to support PDP context handling of the user terminal. The SM comprises procedures for

- identified PDP context activation, deactivation and modification; and
- anonymous PDP context activation and deactivation. (FFS in UMTS)

SM procedures for identified access can only be performed if a GMM context has been established between the MS and the network. If no GMM context has been established, the MM sublayer has to initiate the establishment of a GMM context by use of the GMM procedures as described in chapter 4. After GMM context establishment, SM uses services offered by GMM (see ~~GSM~~ TS 0~~2~~4.0~~0~~7 [20]). Ongoing SM procedures are suspended during GMM procedure execution.

For anonymous access no GMM context is established.

6.1.1.1 Radio resource sublayer address handling for anonymous access (FFS in UMTS)

In the case of anonymous access, no P-TMSI shall be used by the MS or by the network. The MS shall use a randomly selected random TLLI for transmission of the ACTIVATE AA PDP CONTEXT REQUEST message in order to activate the AA PDP context.

Upon receipt of the ACTIVATE AA PDP CONTEXT REQUEST message, the network assigns an auxiliary TLLI (A-TLLI) to the AA PDP context and transmits the assigned A-TLLI to the MS. After receipt of the assigned A-TLLI, the MS shall use it for further data transmission to the network for the lifetime of the AA PDP context.

6.1.2 Session management states

In this section, the SM states are described for one SM entity (see ~~GSM~~ TS 0~~2~~4.0~~0~~7 [20]). Each SM entity is associated with one PDP context. Section 6.1.2.1 describes the SM states in the MS and section 6.1.2.2 describes the SM states on the network side.

6.1.2.1 Session management states in the MS

In this section, the possible states of an SM entity in the mobile station are described. As illustrated in figure 6.1/TS 24.008 there are ~~four~~five SM states in the MS.

6.1.2.1.1 PDP-INACTIVE

This state indicates that no PDP context exists.

6.1.2.1.2 PDP-ACTIVE-PENDING

This state exists when PDP context activation was requested by the MS.

6.1.2.1.3 PDP-INACTIVE-PENDING

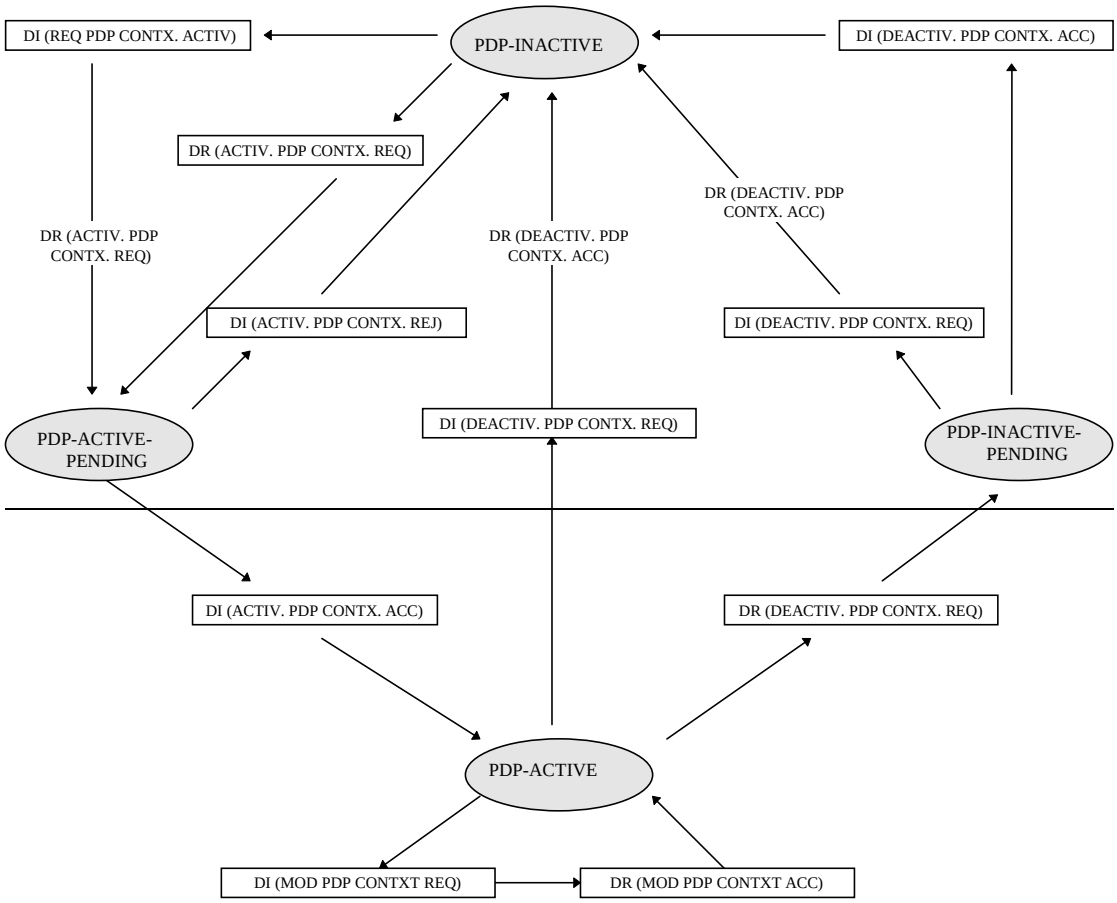
This state exists when deactivation of the PDP contexts was requested by the MS.

6.1.2.1.4 PDP-ACTIVE

This state indicates that the PDP context is active.

6.1.2.1.5 PDP-MODIFY PENDING

This state exists when modification of the PDP context was requested by the MS.



DR: GMMSM-DATA-REQUEST (Message), i.e. message sent by an MS
DI: GMMSM-DATA-INDICATION (Message), i.e. message received by an MS

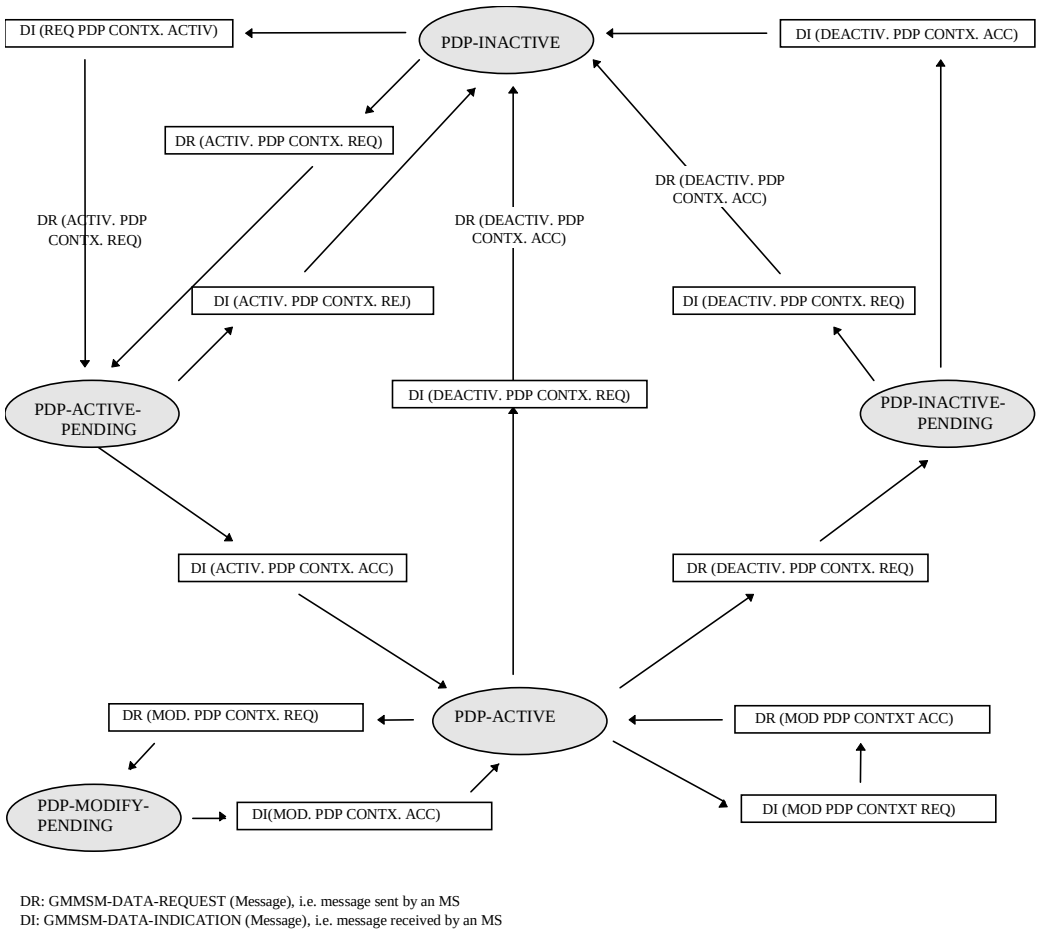


Figure 6.1/TS 24.008: Session management states in the MS (overview)

It shall be noted, that Figure 6.1/TS 24.008 applies to both primary and secondary PDP contexts, though the distinction in messages regarding the activation of primary and secondary PDP contexts is not shown here for simplicity.

6.1.2.2 Session management states on the network side

In this section, the possible states of an SM entity on the network side are described. As illustrated in figure 6.2/TS 24.008 there are five SM states on the network side.

6.1.2.2.1 PDP-INACTIVE

This state indicates that the PDP context is not active.

6.1.2.2.2 PDP-ACTIVE-PENDING

This state exists when the PDP context activation was initiated by the network.

6.1.2.2.3 PDP-INACTIVE-PENDING

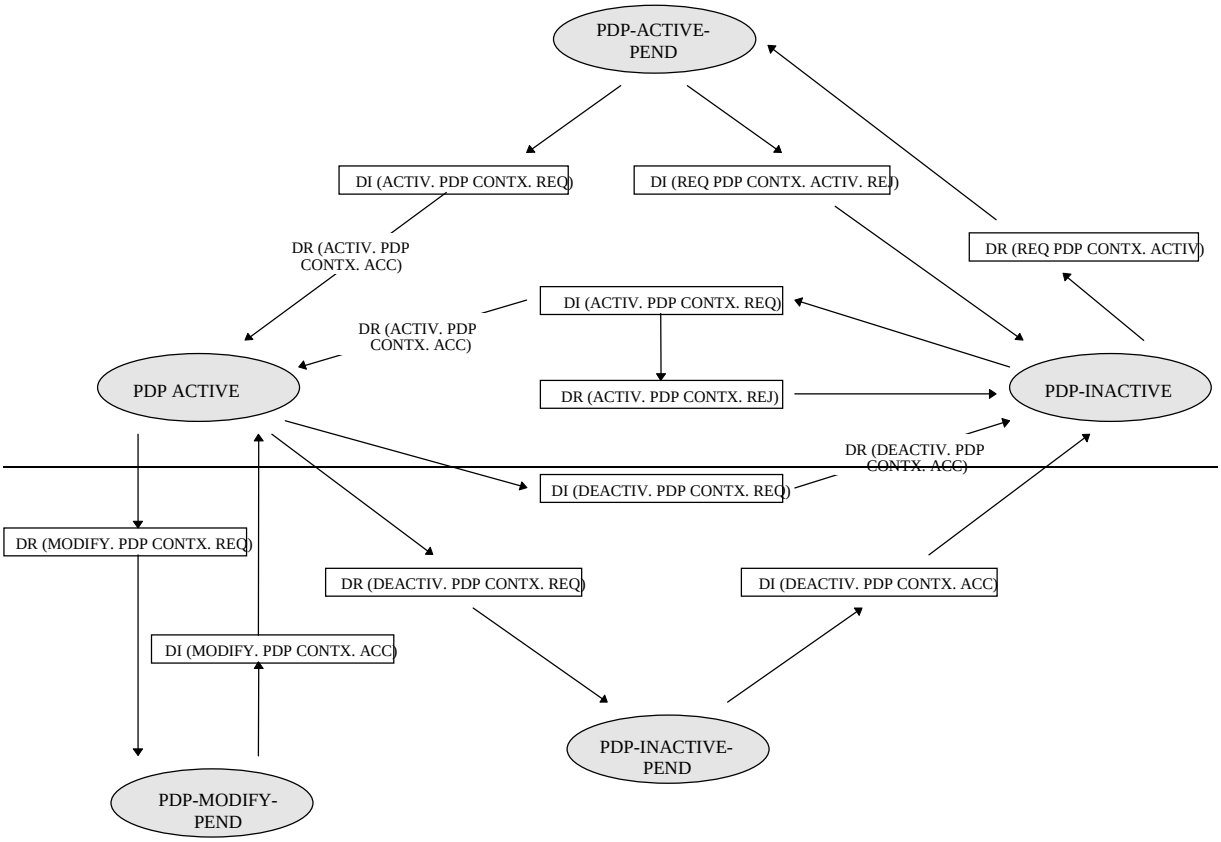
This state exists when deactivation of the PDP context was requested by the network.

6.1.2.2.4 PDP-ACTIVE

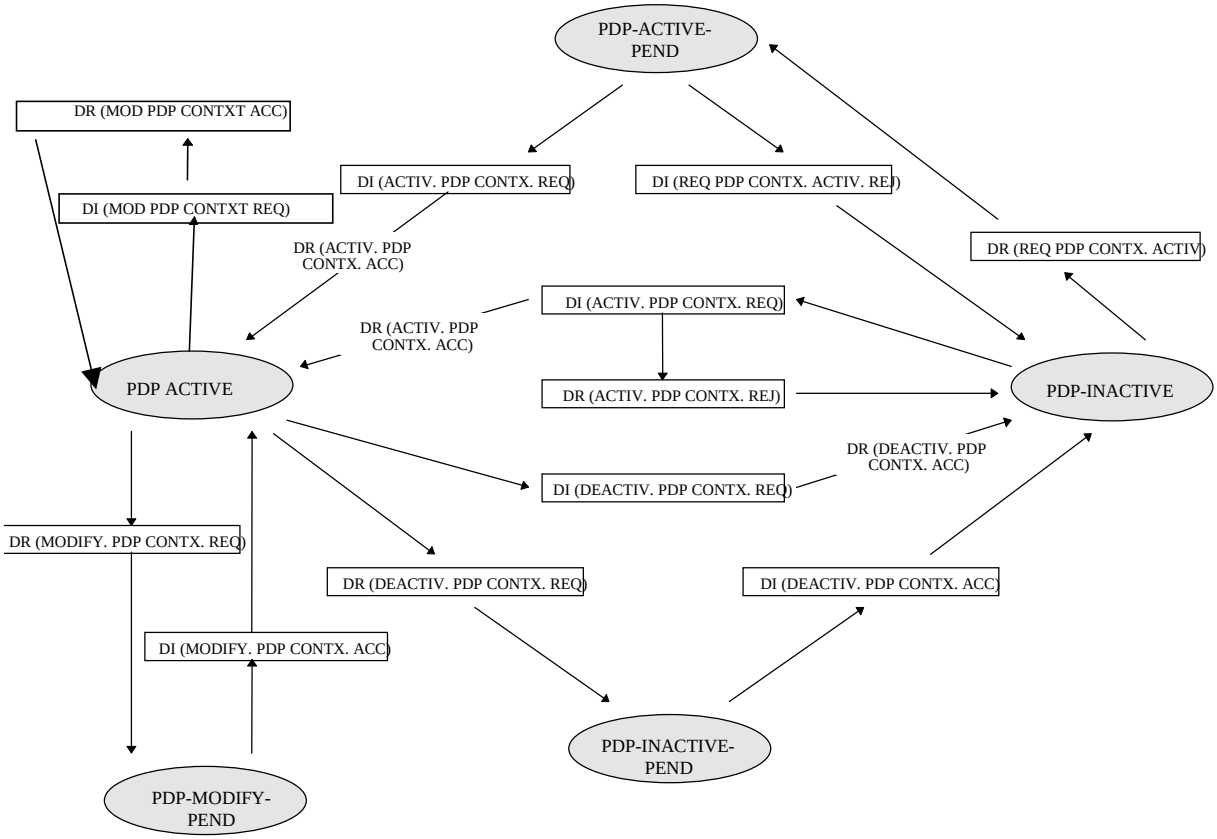
This state indicates that the PDP context is active.

6.1.2.2.5 PDP-MODIFY-PENDING

This state exists when modification of the PDP context was requested by the network.



DR: GMMSM-DATA-REQUEST (Message), i.e. message sent by network
DI: GMMSM-DATA-INDICATION (Message), i.e. message received by the network



DR: GMMSM-DATA-REQUEST (Message), i.e. message sent by network
DI: GMMSM-DATA-INDICATION (Message), i.e. message received by the network

Figure 6.2/TS 24.008: Session management states on the network side (overview)

It shall be noted, that Figure 6.2/TS 24.008 applies to both primary and secondary PDP contexts, though the distinction in messages regarding the activation of primary and secondary PDP contexts is not shown here for simplicity.

6.1.3 Session Management procedures

6.1.3.1 PDP context activation

The purpose of this procedure is to establish a PDP context between the MS and the network for a specific QoS on a specific NSAPI. The PDP context activation may be initiated by the MS or the initiation may be requested by the network.

Each PDP address may be described by one or more PDP contexts in the MS or the network. The first PDP context activated for a PDP address is called the primary context, whereas all additional contexts associated to the same PDP address are called secondary contexts. When more than one PDP contexts are associated to a PDP address, there shall be a Traffic Flow Template (TFT) for each additional context. The TFT shall be sent transparently via the SGSN to the GGSN to enable packet classification and policing for downlink data transfer (see TS 23.060).

6.1.3.1.1 Successful PDP context activation initiated by the mobile station

In order to request a PDP context activation, the MS sends an ACTIVATE PDP CONTEXT REQUEST message to the network, enters the state PDP-ACTIVE-PENDING and starts timer T3380. The message contains the selected NSAPI, PDP type, requested QoS and, if the MS requests a static address, the PDP address. The MS shall ensure that the selected NSAPI is not currently being used by another Session Management entity in the MS.

Upon receipt of an ACTIVATE PDP CONTEXT REQUEST message, the network selects a radio priority level based on the QoS negotiated and may reply with an ACTIVATE PDP CONTEXT ACCEPT message. Upon receipt of the message ACTIVATE PDP CONTEXT ACCEPT the MS shall stop timer T3380, shall enter the state PDP-ACTIVE-. If the offered QoS parameters received from the network differ from the QoS requested by the MS, the MS shall either accept the negotiated QoS or initiate the PDP context deactivation procedure.

In GSM the MS shall initiate establishment of the logical link for the LLC SAPI indicated by the network with the offered QoS and selected radio priority level if no logical link has been already established for that SAPI. If the offered QoS parameters received from the network differ from the QoS requested by the MS, the MS shall either accept the negotiated QoS or initiate the PDP context deactivation procedure. If the LLC SAPI indicated by the network can not be supported by the MS, the MS shall initiate the PDP context deactivation procedure.

In UMTS, both the network and the MS shall store the LLC SAPI and the radio priority in the PDP context. If a UMTS to GMS system change is performed, the new SGSN shall initiate establishment of the logical link using the negotiated QoS profile, the negotiated LLC SAPI, and selected radio priority level stored in the PDP context as in a GSM to GMS Routing Area Update.

An MS, which is capable of operating in both GSM and UMTS, shall use a valid LLC SAPI, while an MS which is capable of operating only in UMTS shall indicate the LLC SAPI value as "LLC SAPI not assigned" in order to avoid unnecessary value range checking and any other possible confusion in the network.

NOTE: The radio priority level and the LLC SAPI parameters, though not used in UMTS, shall be included in the messages, in order to support handover between UMTS and GSM networks.

6.1.3.1.2 Successful PDP context activation requested by the network

In order to request a PDP context activation, the network sends a REQUEST PDP CONTEXT ACTIVATION message to the MS and starts timer T3385. If available, the APN shall be included in the REQUEST PDP CONTEXT ACTIVATION message.

Upon receipt of a REQUEST PDP CONTEXT ACTIVATION message, the MS shall than either initiate the PDP context activation procedure as described in the previous section or shall reject the activation request by sending a REQUEST PDP CONTEXT ACTIVATION REJECT message as described in section 6.1.3.1.4. The value of the reject cause IE of the REQUEST PDP CONTEXT ACTIVATION REJECT message shall indicate the reason for rejection, e.g. “insufficient resources to activate another context”.

The ACTIVATE PDP CONTEXT REQUEST message sent by the MS in order to initiate the PDP context activation procedure shall contain the PDP address requested by the network in the REQUEST PDP CONTEXT ACTIVATION

message and the APN, if it was included by the network. The value of the APN included in PDP CONTEXT ACTIVATION message shall be the value received with the REQUEST PDP CONTEXT ACTIVATION message.

Upon receipt of the ACTIVATE PDP CONTEXT REQUEST message, the network shall stop timer T3385.

The same procedures apply as described for MS initiated PDP context activation.

6.1.3.1.3 Unsuccessful PDP context activation initiated by the MS

Upon receipt of an ACTIVATE PDP CONTEXT REQUEST message the network may reject the MS initiated PDP context activation by sending an ACTIVATE PDP CONTEXT REJECT message to the MS. The message shall contain a cause code that typically indicates one of the following causes:

26: insufficient resources;
27: missing or unknown APN;
28: unknown PDP address or PDP type;
29: user authentication failed;
30: activation rejected by GGSN;
31: activation rejected, unspecified;
32: service option not supported;
33: requested service option not subscribed;
34: service option temporarily out of order;
35: NSAPI already used; or
95 - 111: protocol errors.

Upon receipt of an ACTIVATE PDP CONTEXT REJECT message, the MS shall stop timer T3380 and enter/remain in state PDP-INACTIVE.

6.1.3.1.4 Unsuccessful PDP context activation requested by the network

Upon receipt of the REQUEST PDP CONTEXT ACTIVATION message, the MS may reject the network requested PDP context activation by sending the REQUEST PDP CONTEXT ACTIVATION REJECT message to the network. The message contains the same TI as included in the REQUEST PDP CONTEXT ACTIVATION and an additional cause code that typically indicates one of the following causes:

26: insufficient resources;
31: activation rejected, unspecified;
40: feature not supported; or
95 - 111: protocol errors.

The network shall stop timer T3385 and enter state PDP-INACTIVE.

6.1.3.1.5 Abnormal cases

The following abnormal cases can be identified:

a) Expiry of timers

In the mobile station:

On the first expiry of the timer T3380, the MS shall resent the ACTIVATE PDP CONTEXT REQUEST and shall reset and restart timer T3380. This retransmission is repeated four times, i.e. on the fifth expiry of timer T3380, the MS shall release all resources possibly allocated for this invocation and shall abort the procedure; no automatic PDP context activation re-attempt shall be performed.

On the network side:

On the first expiry of the timer T3385, the network shall resent the message REQUEST PDP CONTEXT ACTIVATION and shall reset and restart timer T3385. This retransmission is repeated four times, i.e. on the fifth expiry of timer T3385, the network shall release possibly allocated resources for this activation and shall abort the procedure.

b) Collision of MS initiated and network requested PDP context activation

Dynamic PDP address collision case:

If the MS uses dynamic PDP addressing that turns out to collide with the network requested PDP address, then there is no detection of collision specified but left for network implementation.

Static PDP address collision detected within the mobile station:

A collision of an MS initiated and a network requested PDP context activation procedure is identified by the MS if a REQUEST PDP CONTEXT ACTIVATION message is received from the network after the MS has sent an ACTIVATE PDP CONTEXT REQUEST message, and both messages contain the same static PDP address, and the MS has not yet received an ACTIVATE PDP CONTEXT ACCEPT or ACTIVATE PDP CONTEXT REJECT message.

The MS then discards the REQUEST PDP CONTEXT ACTIVATION message and waits for the network response to its ACTIVATE PDP CONTEXT REQUEST message.

Static PDP address collision detected on the network side:

A collision is detected by the network in case an ACTIVATE PDP CONTEXT REQUEST message is received from the MS with the same static PDP address as the REQUEST PDP CONTEXT ACTIVATION message sent to the MS.

The network shall terminate the network requested PDP context activation and proceed with the MS initiated ACTIVATE PDP CONTEXT REQUEST message.

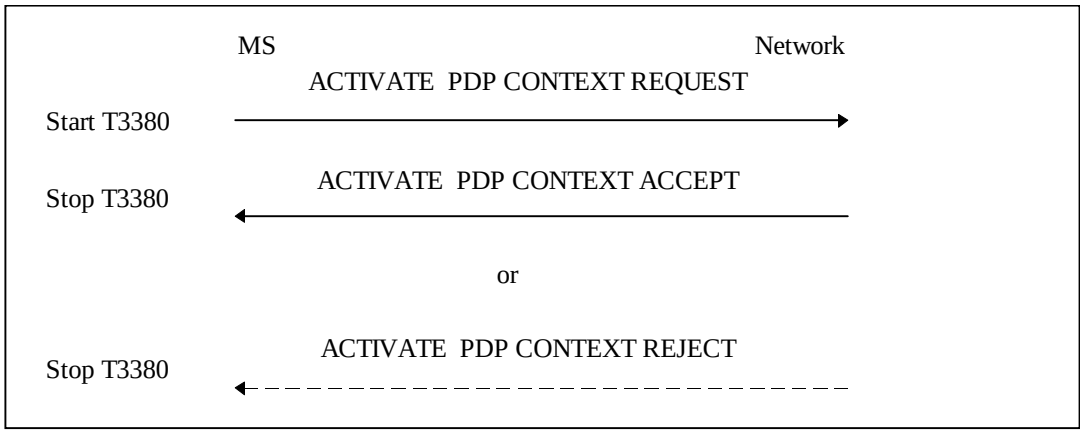


Figure 6.3/TS 24.008: MS initiated PDP context activation procedure

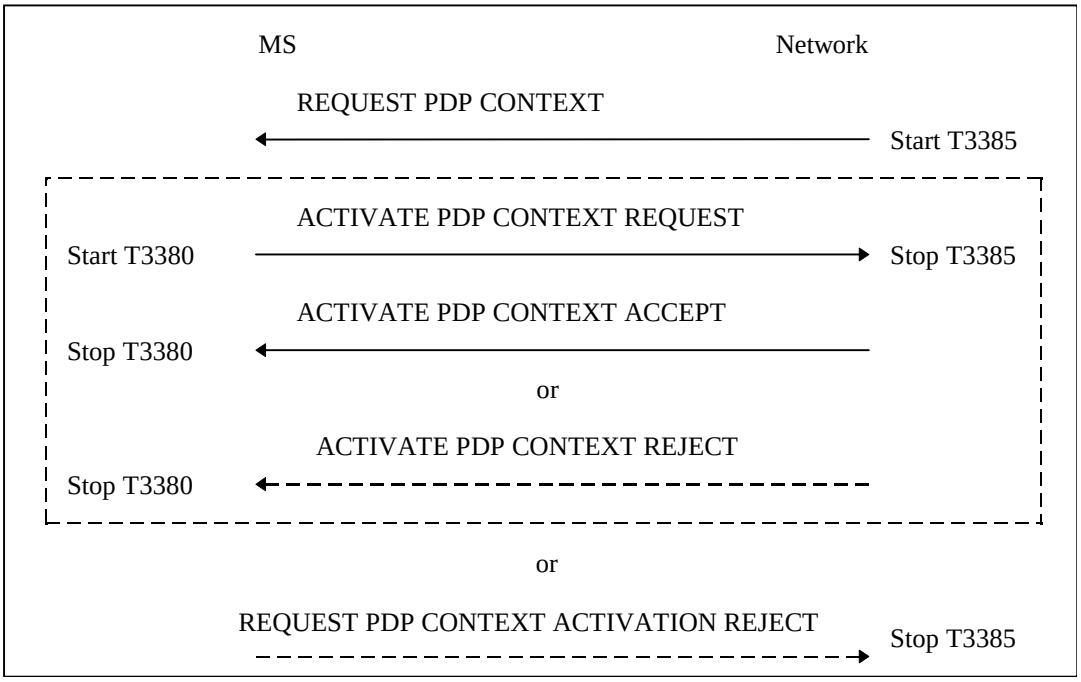


Figure 6.4/TS 24.008: Network initiated PDP context activation procedure

6.1.3.2 Secondary PDP Context Activation Procedure

The purpose of this procedure is to establish a secondary PDP context between the MS and the network for a specific Traffic Flow Template (TFT) and QoS profile on a specific NSAPI, when one or more PDP contexts has/have already been established for the particular PDP address. For each secondary PDP context, a different QoS profile and TFT shall be requested.

6.1.3.2.1 Successful Secondary PDP Context Activation Initiated by the MS

In order to request a secondary PDP context activation, the MS shall send an ACTIVATE SECONDARY PDP CONTEXT REQUEST message to the network, enter the state PDP-ACTIVE-PENDING and start timer T3380. The message shall contain the selected NSAPI. The MS shall ensure that the selected NSAPI is not currently being used by another Session Management entity in the MS. The message shall also include a QoS profile, a TFT, a requested LLC SAPI and the Linked TI. The QoS profile is the requested QoS. The TFT shall be sent transparently through the SGSN to the GGSN to enable packet classification and policing for downlink data transfer.

Upon receipt of an ACTIVATE SECONDARY PDP CONTEXT REQUEST, the network shall validate the message by verifying the TI given in the Linked TI IE. The same GGSN address shall be used by the SGSN as for the already established PDP context(s) for that PDP address. The network shall select a radio priority level based on the QoS negotiated and shall reply with an ACTIVATE SECONDARY PDP CONTEXT ACCEPT message, if the request can be accepted.

Upon receipt of the message ACTIVATE SECONDARY PDP CONTEXT ACCEPT, the MS shall stop timer T3380 and enter the state PDP-ACTIVE. If the offered QoS parameters received from the network differ from the QoS requested by the MS, the MS shall either accept the negotiated QoS or initiate the PDP context deactivation procedure.

In GSM the MS shall initiate establishment of the logical link for the LLC SAPI indicated by the network with the offered QoS and selected radio priority level if no logical link has been already established for that SAPI. If the LLC SAPI indicated by the network can not be supported by the MS, the MS shall initiate the PDP context deactivation procedure.

In UMTS, both SGSN and MS shall store the LLC SAPI and the radio priority in the PDP context. If a UMTS to GSM Routing Area Update is performed, the new SGSN shall initiate establishment of the logical link using the negotiated LLC SAPI, the negotiated QoS profile and selected radio priority level stored in the PDP context as in a GSM to GSM Routing Area Update.

An MS, which is capable of operating in both GSM and UMTS, shall use a valid LLC SAPI, while an MS which is capable of operating only in UMTS shall indicate the LLC SAPI value as "LLC SAPI not assigned" in order to avoid unnecessary value range checking and any other possible confusion in the network.

NOTE: The radio priority level and the LLC SAPI parameters, though not used in UMTS, shall be included in the messages, in order to support handover between UMTS and GSM networks.

6.1.3.2.2 Unsuccessful Secondary PDP Context Activation initiated by the MS

Upon receipt of an ACTIVATE SECONDARY PDP CONTEXT REQUEST message, the network may reject the MS initiated secondary PDP context activation by sending an ACTIVATE SECONDARY PDP CONTEXT REJECT message to the MS. The message shall contain a cause code that typically indicates one of the following:

26: insufficient resources;
30: activation rejected by GGSN;
31: activation rejected, unspecified;
32: service option not supported;
33: requested service option not subscribed;
34: service option temporarily out of order;
35: NSAPI already used;
41: TFT already used;
42: invalid TFT;
43: unknown PDP context;
95 - 111: protocol errors.

Upon receipt of an ACTIVATE SECONDARY PDP CONTEXT REJECT message, the MS shall stop timer T3380 and enter the state PDP-INACTIVE.

6.1.3.2.3 Abnormal cases

The following abnormal cases can be identified:

a) Expiry of timers

On the first expiry of the timer T3380, the MS shall resent the ACTIVATE SECONDARY PDP CONTEXT REQUEST and shall reset and restart timer T3380. This retransmission is repeated four times, i.e. on the fifth expiry of timer T3380, the MS shall release all resources possibly allocated for this invocation and shall abort the procedure; no automatic PDP context activation re-attempt shall be performed.

b) MS initiated Secondary PDP context activation for an already activated Secondary PDP context (On the network side)

If all parameters of the new ACTIVATE SECONDARY PDP CONTEXT REQUEST message match with those of a previously activated PDP context, the network shall reply with an ACTIVATE SECONDARY PDP CONTEXT ACCEPT message.

Otherwise, the network shall check the parameters as follows:

The SGSN shall first check whether there is an activated PDP context for the TI given in the Linked TI IE in the ACTIVATE SECONDARY PDP CONTEXT REQUEST message. If there is no active PDP context for the specified TI, the network shall reply with an ACTIVATE SECONDARY PDP CONTEXT REJECT message, cause code indicating "unknown PDP context". If there exists a PDP context for the given TI, then the requested NSAPI is checked. If there exists an active PDP context with the same NSAPI, the network shall reject the activation with cause "NSAPI already used". Otherwise, the TFT in the request message is checked. If the TFT is invalid, the network shall reject the activation request with cause "Invalid TFT". If the TFT is valid but it is already used by another context of the same PDP address, the network shall reject the activation request with cause "TFT already used". Otherwise, the network shall accept the activation request by replying to the MS with an ACTIVATE SECONDARY PDP CONTEXT ACCEPT message.

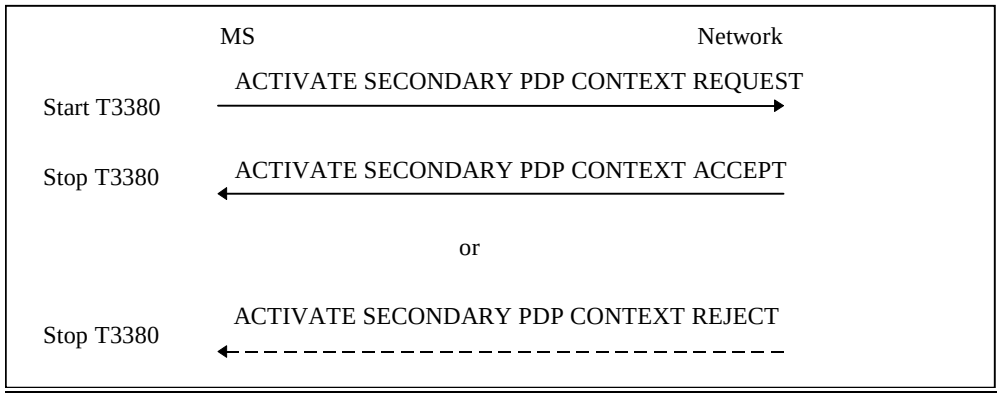


Figure 6.5/TS 24.008: MS initiated secondary PDP context activation procedure

~~6.1.3.2~~ 6.1.3.3 PDP context modification procedure

The PDP context modification procedure is invoked by the network or by the MS, in order to change the QoS negotiated, the Radio priority level, or the TFT, negotiated during the PDP context activation procedure, the secondary PDP context activation procedure or at previously performed PDP context modification procedures. The procedure can be initiated by the network or the MS at any time when a PDP context is active.

The network requested PDP context modification procedure may also be used to update the PDP address when external PDN address allocation is performed, in which case the MS receives the PDP address in the MODIFY PDP CONTEXT REQUEST (Network to MS direction) message.

NOTE: The procedure may be initiated by the network due to an inter-SGSN Routing Area Updating when a PDP context is active.

6.1.3.3.1 Network initiated PDP Context Modification

In order to initiate the procedure, the network sends the MODIFY PDP CONTEXT REQUEST message to the MS and starts timer T3386. The message shall contain the new QoS and the radio priority level and LLC SAPI that shall be used by the MS in GSM at the lower layers for the transmission of data related to the PDP context.

Upon receipt of this message the MS shall reply with the MODIFY PDP CONTEXT ACCEPT message, if the MS accepts the new QoS and the indicated LLC SAPI.

If the MS does not accept the new QoS or the indicated LLC SAPI, the MS shall initiate the PDP context deactivation procedure for the PDP context - the reject cause IE value of the DEACTIVATE PDP CONTEXT REQUEST message shall indicate “QoS not accepted”.

The network shall upon receipt of the MODIFY PDP CONTEXT ACCEPT message stop timer T3386.

In GSM, the network shall establish, reconfigure or continue using the logical link with the new QoS for the LLC SAPI indicated in the MODIFY PDP CONTEXT REQUEST message.

In UMTS, the network shall establish, reconfigure or continue using the Radio Access Bearer with the new QoS indicated in the MODIFY PDP CONTEXT REQUEST message.

6.1.3.3.2 MS initiated PDP Context Modification accept by the network

In order to initiate the procedure, the MS sends the MODIFY PDP CONTEXT REQUEST message to the network, enters the state PDP-MODIFY-PENDING and starts timer T3381. The message may contain the requested new QoS and/or the TFT and the requested LLC SAPI (used in GSM).

Upon receipt of the MODIFY PDP CONTEXT REQUEST message, the network may reply with the MODIFY PDP CONTEXT ACCEPT message in order to accept the context modification. The reply message may contain the negotiated QoS and the radio priority level based on the new QoS profile and the negotiated LLC SAPI, that shall be used in GSM by the logical link.

Upon receipt of the MODIFY PDP CONTEXT ACCEPT message, the MS shall stop the timer T3381. If the offered QoS parameters received from the network differs from the QoS requested by the MS, the MS shall either accept the negotiated QoS or initiate the PDP context deactivation procedure.

Note: When modification of QoS was requested by the MS, if the network does not accept the MS request, being unable to provide the requested QoS, it should maintain the QoS negotiated as previously negotiated or propose a new QoS. Therefore, the network would not reject the MS initiated PDP context modification request due to the unavailability of the required QoS.

6.1.3.3.3 MS initiated PDP Context Modification not accept by the network

Upon receipt of a MODIFY PDP CONTEXT REQUEST message, the network may reject the MS initiated PDP context modification request by sending a MODIFY PDP CONTEXT REJECT message to the MS. The message shall contain a cause code that typically indicates one of the following:

26: insufficient resources;

83: invalid TFT;
95 - 111: protocol errors.

Upon receipt of a MODIFY PDP CONTEXT REJECT message, the MS shall stop timer T3381 and enter the state PDP-ACTIVE.

6.1.3.32. 41 Abnormal cases

a) Expiry of timers

On the network side:

On the first expiry of timer T3386, the network shall resend the MODIFY PDP CONTEXT REQUEST message reset and restart timer T3386. This retransmission is repeated four times, i.e. on the fifth expiry of timer T3386, the

network may continue to use the previously negotiated QoS or it may initiate the PDP context deactivation procedure.

In the MS:

On the first expiry of timer T3381, the MS shall resend the MODIFY PDP CONTEXT REQUEST message reset and restart timer T3381. This retransmission is repeated four times, i.e. on the fifth expiry of timer T3381, the MS may continue to use the previously negotiated QoS or it may initiate the PDP context deactivation procedure.

b) Collision of MS and Network initiated PDP Context Modification Procedures

A collision of a MS and network initiated PDP context modification procedures is identified by the MS if a MODIFY PDP CONTEXT REQUEST message is received from the network after the MS has sent a MODIFY PDP CONTEXT REQUEST message itself, and both messages contain the same TI and the MS has not yet received a MODIFY PDP CONTEXT ACCEPT message from the network.

A collision is detected by the network in case a MODIFY PDP CONTEXT REQUEST message is received from the MS with the same TI as the MODIFY PDP CONTEXT REQUEST message sent to the MS.

In the case of such a collision, the network initiated PDP context modification shall take precedence over the MS initiated PDP context modification. The MS shall terminate internally the MS initiated PDP context modification procedure, enter the state PDP-Active and proceed with the network initiated PDP context modification procedure by sending a MODIFY PDP CONTEXT ACCEPT message. The network shall ignore the MODIFY PDP CONTEXT REQUEST message received in the state PDP-MODIFY-PENDING. The network shall proceed with the network initiated PDP context modification procedure as if no MODIFY PDP CONTEXT REQUEST message was received from the MS.

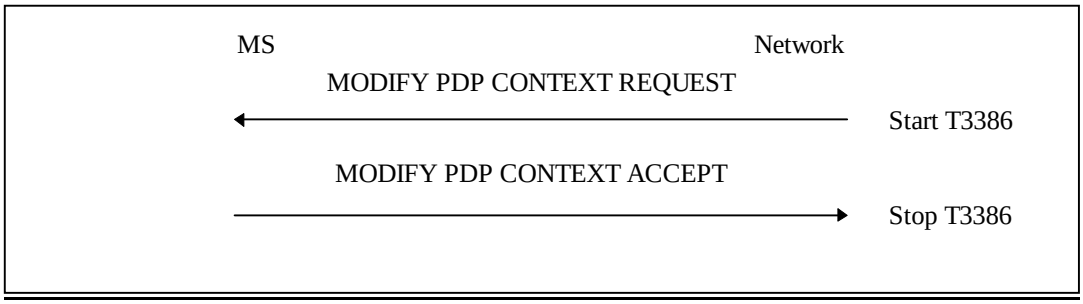


Figure 6.~~5~~6/TS 24.008: Network initiated PDP context modification procedure

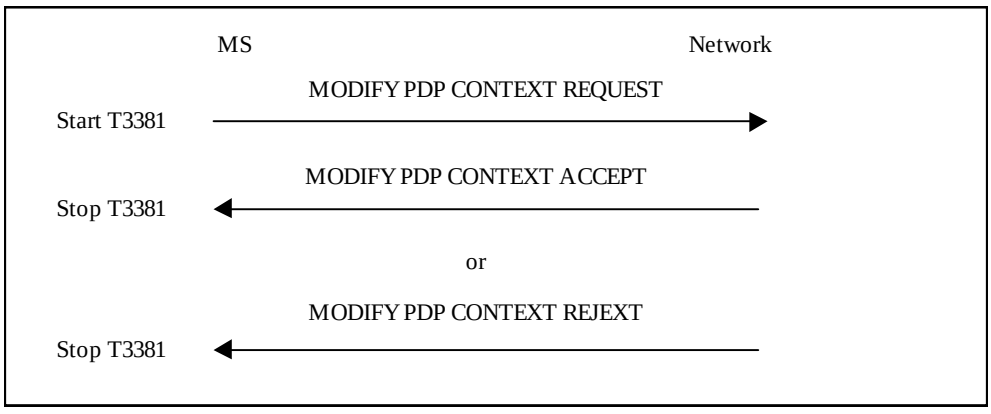


Figure 6.7/TS 24.008: MS initiated PDP context modification procedure

~~6.1.3.3~~6.1.3.4 PDP context deactivation procedure

The purpose of this procedure is to deactivate an existing PDP context between the MS and the network. The PDP context deactivation may be initiated by the MS or by the network. This procedure can also be used to deactivate secondary PDP contexts. The *tear down indicator* information element may be included in the DEACTIVATE PDP

CONTEXT REQUEST message in order to indicate whether only the PDP context associated with this specific TI or all active PDP contexts sharing the same PDP address as the PDP context associated with this specific TI shall be deactivated. If the *tear down indicator* information element is not included in the DEACTIVATE PDP CONTEXT REQUEST message, only the PDP context associated with this specific TI shall be deactivated.

~~6.1.3.3.1~~6.1.3.4.1 PDP context deactivation initiated by the MS

In order to deactivate a PDP context, the MS sends a DEACTIVATE PDP CONTEXT REQUEST message to the network, enters the state PDP-INACTIVE-PENDING and starts timer T3390. The message contains the transaction identifier (TI) in use for the PDP context or secondary PDP context to be deactivated and a cause code that typically indicates one of the following causes:

#25: LLC or SNDCP failure(GSM only);

26: insufficient resources;
36: regular PDP context deactivation; or
37: QoS not accepted.

The network shall reply with the DEACTIVATE PDP CONTEXT ACCEPT message. Upon receipt of the DEACTIVATE PDP CONTEXT ACCEPT message, the MS shall stop timer T3390. In GSM, b~~B~~oth the MS and the network shall initiate local release of the logical link if it is not used by another PDP context. In UMTS, the network shall initiate the release of Radio Access Bearer associated with this PDP context.

~~6.1.3.3.2~~6.1.3.4.2 PDP context deactivation initiated by the network

In order to deactivate a PDP context, the network sends a DEACTIVATE PDP CONTEXT REQUEST message to the MS and starts timer T3395. The message contains the transaction identifier in use for the PDP context to be deactivated and a cause code that typically indicates one of the following causes:

#25: LLC or SNDCP failure(GSM only);

36: regular PDP context deactivation;
38: network failure; or

39: reactivation requested.

The MS shall, upon receipt of this message, reply with a DEACTIVATE PDP CONTEXT ACCEPT message. Upon receipt of the DEACTIVATE PDP CONTEXT ACCEPT message, the network shall stop the timer T3395. In GSM, b~~B~~oth the MS and the network shall initiate local release of the logical link if it is not used by another PDP context. In UMTS, the network shall initiate the release of Radio Access Bearer associated with this PDP context.

~~6.1.3.3.3~~6.1.3.4.3 Abnormal cases

The following abnormal cases can be identified:

a) Expiry of timers

In the mobile station:

On the first expiry of timer T3390, the MS shall resent the message DEACTIVATE PDP CONTEXT REQUEST and shall reset and restart the timer T3390. This retransmission is repeated four times, i.e. on the fifth expiry of timer T3390, the MS shall release all resources allocated and shall erase the PDP context related data.

On the network side:

On the first expiry of timer T3395, the network shall resent the message DEACTIVATE PDP CONTEXT REQUEST and shall reset and restart timer T3395. This retransmission is repeated four times, i.e. on the fifth expiry of timer T3395, the network shall erase the PDP context related data for that MS.

b) Collision of MS and network initiated PDP context deactivation requests

If the MS and the network initiated PDP context deactivation requests collide, the MS and the network shall each reply with the messages DEACTIVATE PDP CONTEXT ACCEPT and shall stop timer T3390 and T3395, respectively.

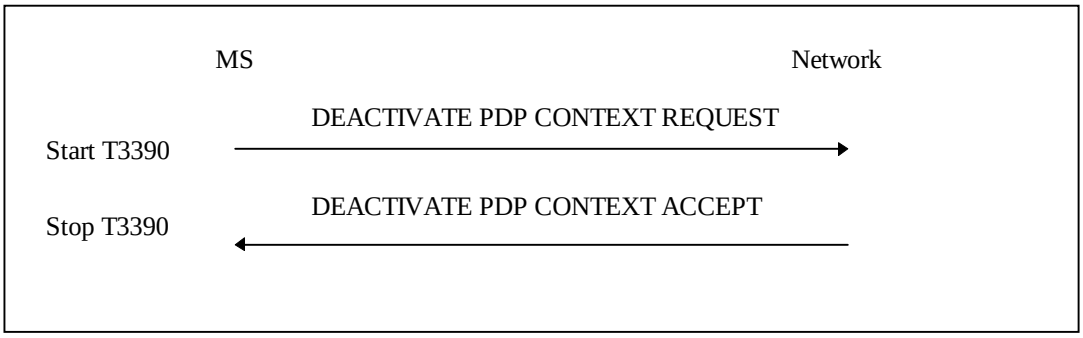


Figure 6.~~6~~8/TS 24.008: MS initiated PDP context deactivation procedure

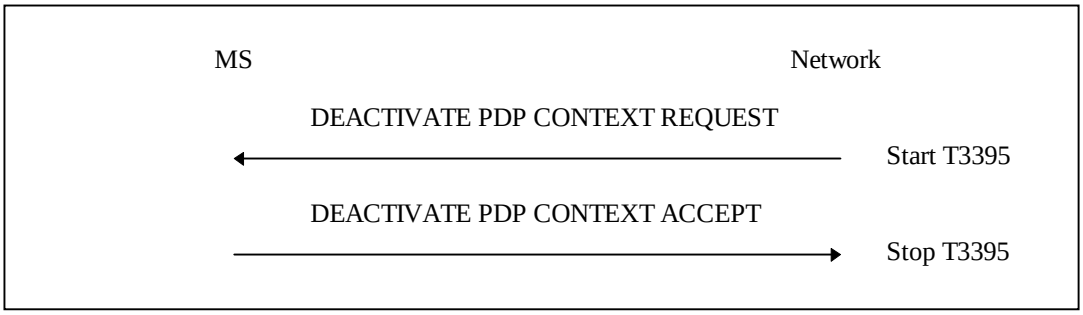


Figure 6.~~7~~9/TS 24.008: Network initiated PDP context deactivation procedure

6.1.3.4 AA PDP context activation (FFS in UMTS)

The purpose of this procedure is to anonymously establish a PDP context between the MS and the network for a specific QoS on a specific NSAPI. The AA PDP context activation shall only be initiated by the MS.

6.1.3.4.1 Successful AA PDP context activation initiated by the mobile station

In order to activate an anonymous PDP context, the MS sends an ACTIVATE AA PDP CONTEXT REQUEST message to the network, enters the state PDP-ACTIVE-PENDING and starts timer T3380. As long as no auxiliary TLLI is allocated to the MS, a random TLLI is used for addressing on lower layers.

Upon receipt of an ACTIVATE AA PDP CONTEXT REQUEST message, the network selects a radio priority level based on the QoS negotiated, assigns a AA-TID to the PDP context and sends an ACTIVATE AA PDP CONTEXT ACCEPT message to the MS. The message shall contain a the selected radio priority level and negotiated QoS allocated by the network. If the offered QoS parameters received from the network differ from the QoS requested by the MS, the MS shall accept the QoS offered by the network. If the LLC SAPI indicated by the network can not be supported by the MS, the MS shall initiate the implicit AA PDP context deactivation procedure. Upon receipt of the message ACTIVATE AA PDP CONTEXT ACCEPT, the MS shall stop timer T3380, shall enter the state PDP-ACTIVE and shall initiate establishment of the logical link for the LLC SAPI indicated by the network with the negotiated QoS.

6.1.3.4.2 Unsuccessful AA PDP context activation

Upon receipt of the ACTIVATE AA PDP CONTEXT REQUEST message the network may indicate the failure of the MS initiated AA PDP context activation by sending the ACTIVATE AA PDP CONTEXT REJECT message to the MS. The message contains a cause code that typically indicates one of the following causes:

32: service option not supported;
34: service option temporarily out of order;
90 - 111: protocol errors.

The MS shall stop the timer T3380.

6.1.3.4.3 Abnormal cases

a) Expiry of timers

On the first expiry of timer T3380, the MS shall retransmit the ACTIVATE AA PDP CONTEXT REQUEST message and shall reset and restart timer T3380.

This retransmission is repeated four times, i.e. on the fifth expiry of timer T3380, the MS shall indicate the failure of the AA PDP context activation procedure to the register functions, shall release all resources possibly allocated for this invocation and shall abort the procedure; no automatic AA PDP context activation re-attempt shall be performed.

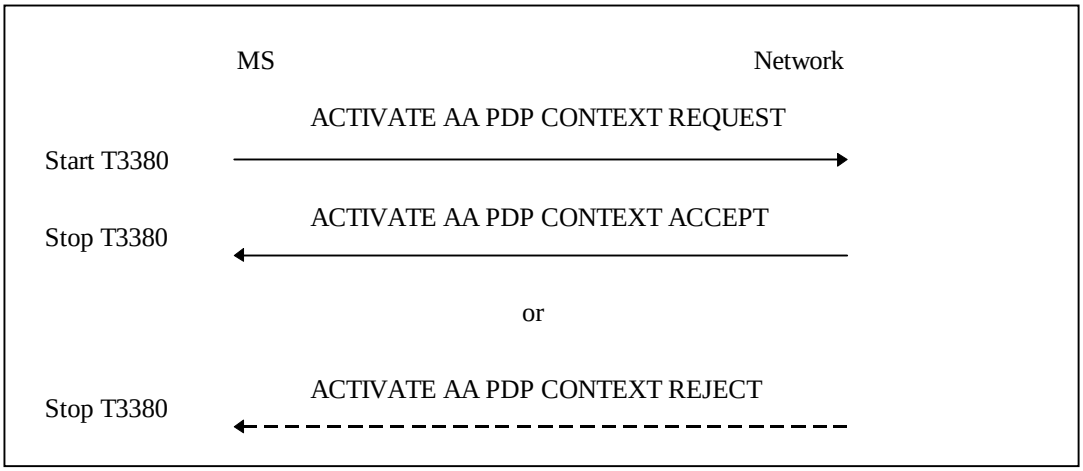


Figure 6.810 TS 24.008: MS initiated AA PDP context activation procedure

6.1.3.5 AA PDP context deactivation

6.1.3.5.1 Implicit AA PDP context deactivation

The implicit deactivation is performed without signalling message exchange as specified below.

The AA PDP context on the network side shall be deactivated when:

- the AA READY timer expires in the GMM-AA entity.

The AA PDP context in the MS shall be deactivated when:

- the AA READY timer expires in the GMM-AA entity;
- the MS changes the routing area;
- the LLC SAPI indicated by the network can not be supported by the MS during activation, or
- user requested.

6.1.3.5.2 Explicit AA PDP context deactivation

An explicit AA PDP context deactivation shall only be initiated by the network. The procedure shall be performed when a misuse of the anonymous PDP context has been detected.

In order to deactivate the AA PDP context, the network sends the message DEACTIVATE AA PDP CONTEXT REQUEST and starts timer T3397. The message shall contain the transaction identifier in use for the AA PDP context to be deactivated. After sending the message the network initiates the release of the logical link.

The MS shall, upon receipt of this message, reply with the DEACTIVATE AA PDP CONTEXT ACCEPT message after the logical link has been released.

Upon receipt of the DEACTIVATE AA PDP CONTEXT ACCEPT message, the network shall stop the timer T3397.

6.1.3.5.3 Abnormal cases

a) Expiry of timers

On the first expiry of timer T3397, the network shall retransmit the message DEACTIVATE AA PDP CONTEXT REQUEST and shall reset and restart timer T3397.

This retransmission is repeated four times, i.e. on the fifth expiry of timer T3397, the network shall release all remaining resources allocated for that MS and shall erase the AA PDP context related data for that MS.

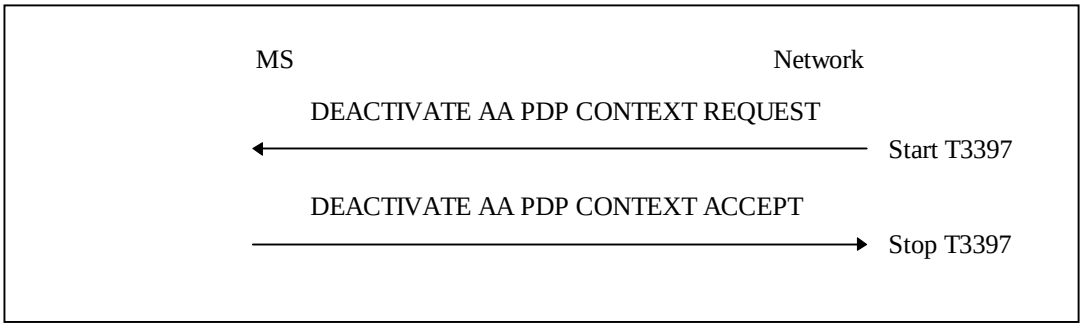


Figure 6.911/TS 24.008: Network initiated AA PDP context deactivation procedure

b) Lower layer failure

If a lower layer failure is indicated before the DEACTIVATE AA PDP CONTEXT ACCEPT message is sent, the MS shall abort the procedure and shall locally de-allocate the P-TMSI from the LLC sublayer.

If a lower layer failure is indicated before the DEACTIVATE AA PDP CONTEXT ACCEPT message is received, the network shall abort the procedure and shall locally de-allocate the P-TMSI from the LLC sublayer.

6.1.3.6 Receiving a SM STATUS message by a SM entity.

If the SM entity of the MS receives a SM STATUS message no state transition and no specific action shall be taken as seen from the radio interface, i.e. local actions are possible.

The actions to be taken on receiving a SM STATUS message in the network are an implementation dependent option.

8.3 Unknown or unforeseen transaction identifier

8.3.2 Session Management

The mobile station and network shall reject a session management message other than SM-STATUS received with TI value "111" by immediately sending an SM-STATUS message with TI value “111”. For a session management message received with TI different from "111", the following procedures shall apply:

a) Whenever any session management message except ACTIVATE PDP CONTEXT REQUEST, ACTIVATE AA PDP CONTEXT REQUEST or SM-STATUS is received by the network specifying a transaction identifier which is not recognized as relating to an active context or to a context that is in the process of activation or deactivation or has been [recently] deactivated, the network should send a SM-STATUS message with cause #81 "invalid transaction identifier value" using the received transaction identifier value and remain in the PDP-INACTIVE state.

b) Whenever any session management message except REQUEST PDP CONTEXT ACTIVATION or SM-STATUS is received by the MS specifying a transaction identifier which is not recognized as relating to an active context or to a context that is in the process of activation or deactivation or has been [recently] deactivated, the MS shall send a SM-STATUS message with cause #81 "invalid transaction identifier value" using the received transaction identifier value and remain in the PDP-INACTIVE state.

c) When an ACTIVATE AA PDP CONTEXT REQUEST or REQUEST PDP CONTEXT ACTIVATION message is received with a transaction identifier flag set to "1", this message shall be ignored.

d) When an ACTIVATE PDP CONTEXT REQUEST message is received specifying a transaction identifier which is not recognized as relating to a context that is in the process of activation, and with a transaction identifier flag set to "1", this message shall be ignored.

e) Whenever an ACTIVATE PDP CONTEXT REQUEST or ACTIVATE AA PDP CONTEXT REQUEST message is received by the network specifying a transaction identifier relating to a PDP context not in state PDP-INACTIVE, the network shall deactivate the old PDP context relating to the received transaction identifier without notifying the MS. Furthermore, the network shall continue with the activation procedure of a new PDP context as indicated in the received message.

f) Whenever a REQUEST PDP CONTEXT ACTIVATION message is received by the MS specifying a transaction identifier relating to a PDP context not in state PDP-INACTIVE, the MS shall locally deactivate the old PDP context relating to the received transaction identifier. Furthermore, the MS shall continue with the activation procedure of a new PDP context as indicated in the received message.

9 Message functional definitions and contents

9.5 GPRS Session Management Messages

9.5.1 Activate PDP context request

This message is sent by the MS to the network to request activation of a PDP context.
See table 9.5.1/TS 24.008.

Message type: ACTIVATE PDP CONTEXT REQUEST

Significance: global

Direction: MS to network

Table 9.5.1/TS 24.008: ACTIVATE PDP CONTEXT REQUEST message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Activate PDP context request message identity	Message type 10.4	M	V	1
	Requested NSAPI	Network service access point identifier 10.5.6.2	M	V	1
	Requested LLC SAPI	LLC service access point identifier 10.5.6.9	M	V	1
	Requested QoS	Quality of service 10.5.6.5	M	LV	4
	Requested PDP address	Packet data protocol address 10.5.6.4	M	LV	3 - 19
28	Access point name	Access point name 10.5.6.1	O	TLV	3 - 102
27	Protocol configuration options	Protocol configuration options 10.5.6.3	O	TLV	3 - 253

9.5.1.1 Access point name

This IE is included in the message when the MS selects a specific external network to be connected to.

9.5.1.2 Protocol configuration options

This IE is included in the message when the MS provides protocol configuration options for the external PDN.

9.5.2 Activate PDP context accept

This message is sent by the network to the MS to acknowledge activation of a PDP context.
See table 9.5.2/TS 24.008.

Message type: ACTIVATE PDP CONTEXT ACCEPT

Significance: global

Direction: network to MS

Table 9.5.2/TS 24.008: ACTIVATE PDP CONTEXT ACCEPT message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Activate PDP context accept message identity	Message type 10.4	M	V	1
	Negotiated LLC SAPI	LLC service access point identifier 10.5.6.9	M	V	1
	Negotiated QoS	Quality of service 10.5.6.5	M	LV	4
	Radio priority	Radio priority 10.5.7.2	M	V	1/2
	Spare half octet	Spare half octet 10.5.1.8	M	V	1/2
2B	PDP address	Packet data protocol address 10.5.6.4	O	TLV	4 - 20
27	Protocol configuration options	Protocol configuration options 10.5.6.3	O	TLV	3 - 253
34	Packet Flow Identifier	Packet Flow Identifier 10.5.6.11	O	TLV	3

9.5.2.1 PDP address

If the MS did not request a static address in the corresponding ACTIVATE PDP CONTEXT REQUEST message, the network shall include the PDP address IE in this ACTIVATE PDP CONTEXT ACCEPT message.

If the MS requested a static address in the corresponding ACTIVATE PDP CONTEXT REQUEST message, the network shall not include the PDP address IE in this ACTIVATE PDP CONTEXT ACCEPT message.

9.5.2.2 Protocol configuration options

This IE is included in the message when the network wishes to transmit protocol configuration options for the external PDN.

9.5.2.3 Packet Flow Identifier

This IE may be included if the network wants to indicate the Packet Flow Identifier associated to the PDP context.

9.5.3 Activate PDP context reject

This message is sent by the network to the MS to reject activation of a PDP context.
See table 9.5.3/TS 24.008.

Message type: ACTIVATE PDP CONTEXT REJECT

Significance: global

Direction: network to MS

Table 9.5.3/TS 24.008: ACTIVATE PDP CONTEXT REJECT message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Activate PDP context reject message identity	Message type 10.4	M	V	1
	SM cause	SM Cause 10.5.6.6	M	V	1
27	Protocol configuration options	Protocol configuration options 10.5.6.3	O	TLV	3 - 253

9.5.3.1 Protocol configuration options

The protocol configuration options IE may only be inserted by the network (see TS 2~~0~~9.0~~6~~0) if the SM Cause indicates "activation rejected by GGSN".

9.5.4 Activate Secondary PDP Context Request

This message is sent by the MS to the network to request activation of a secondary PDP context. See Table 9.5.4/TS 24.008.

Message type: ACTIVATE SECONDARY PDP CONTEXT REQUEST

Significance: global

Direction: MS to network

Table 9.5.4/TS 24.008: ACTIVATE SECONDARY PDP CONTEXT REQUEST message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	½
	Transaction identifier	Transaction identifier 10.3.2	M	V	½
	Activate secondary PDP context request message identity	Message type 10.4	M	V	1
	Requested NSAPI	Network service access point identifier 10.5.6.2	M	V	1
	Requested LLC SAPI	LLC service access point identifier 10.5.6.9	M	V	1
	Requested QoS	Quality of service 10.5.6.5	M	LV	FFS
	TFT	Traffic Flow Template	M	LV	FFS
	Linked TI	Linked TI 10.5.6.7	M	LV	2-3

9.5.5 Activate Secondary PDP Context Accept

This message is sent by the network to the MS to acknowledge activation of a secondary PDP context. See Table 9.5.5/TS 24.008.

Message type: ACTIVATE SECONDARY PDP CONTEXT ACCEPT

Significance: global

Direction: network to MS

Table 9.5.5/TS 24.008: ACTIVATE SECONDARY PDP CONTEXT ACCEPT message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Activate secondary PDP context accept message identity	Message type 10.4	M	V	1
	Negotiated LLC SAPI	LLC service access point identifier 10.5.6.9	M	V	1
	Negotiated QoS	Quality of service 10.5.6.5	M	LV	FFS
	Radio priority	Radio priority	M	V	1/2
	Spare half octet	Spare half octet 10.5.1.8	M	V	1/2
34	Packet Flow Identifier	Packet Flow Identifier 10.5.6.11	O	TLV	3

9.5.5.1 Packet Flow Identifier

This IE may be included if the network wants to indicate the Packet Flow Identifier associated to the PDP context.

9.5.6 Activate Secondary PDP Context Reject

This message is sent by the network to the UE to reject activation of a secondary PDP context. See Table 9.5.6/TS 24.008.

Message type: ACTIVATE SECONDARY PDP CONTEXT REJECT

Significance: global

Direction: network to MS

Table 9.5.6/TS 24.008: ACTIVATE SECONDARY PDP CONTEXT REJECT message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Activate secondary PDP context reject message identity	Message type 10.4	M	V	1
	SM cause	SM Cause 10.5.6.6	M	V	1

~~9.5.4~~ 9.5.7 Request PDP context activation

This message is sent by the network to the MS to initiate activation of a PDP context.
See table 9.5.~~4~~7/TS 24.008.

Message type: REQUEST PDP CONTEXT ACTIVATION

Significance: global

Direction: network to MS

Table 9.5.47/TS 24.008: REQUEST PDP CONTEXT ACTIVATION message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Request PDP context activation message identity	GPRS message type 10.4	M	V	1
	Offered PDP address	Packet data protocol address 10.5.6.4	M	LV	3 - 19
28	Access point name	Access point name 10.5.6.1	O	TLV	3 - 102

9.5.5 9.5.8 Request PDP context activation reject

This message is sent by the MS to the network to reject initiation of a PDP context activation.
See table 9.5.58/TS 24.008.

Message type: REQUEST PDP CONTEXT ACTIVATION REJECT

Significance: global

Direction: MS to network

Table 9.5.58/ 24.008: REQUEST PDP CONTEXT ACTIVATION REJECT message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Request PDP context act. reject message identity	Message type 10.4	M	V	1
	SM cause	SM cause 10.5.6.6	M	V	1

9.5.69.5.9 Modify PDP context request (Network to MS direction)

This message is sent by the network to the MS to request modification of an active PDP context. See table 9.5.69/TS 24.008.

Message type: MODIFY PDP CONTEXT REQUEST (NETWORK TO MS DIRECTION)

Significance: global

Direction: network to MS

Table 9.5.6~~9~~/TS 24.008: MODIFY PDP CONTEXT REQUEST (NETWORK TO MS DIRECTION) message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Modify PDP context request message identity	Message type 10.4	M	V	1
	Radio priority	Radio priority 10.5.7.2	M	V	1/2
	Spare half octet	Spare half octet 10.5.1.8	M	V	1/2
	Requested LLC SAPI	LLC service access point identifier 10.5.6.9	M	V	1
	New QoS	Quality of service 10.5.6.5	M	LV	4
2B	PDP address	Packet data protocol address 10.5.6.4	O	TLV	4-20
34	Packet Flow Identifier	Packet Flow Identifier 10.5.6.11	O	TLV	3

9.5.9.1 PDP address

If the MS requested external PDN address allocation at PDP context activation via an APN and this was confirmed by the network in the ACTIVATE PDP CONTEXT ACCEPT message, then the network shall include the PDP address IE in the MODIFY PDP CONTEXT REQUEST message once the address has been actually allocated, in order to update the PDP context in the MS.

9.5.9.2 Packet Flow Identifier

This IE may be included if the network wants to indicate the Packet Flow Identifier associated to the PDP context.

9.5.10 Modify PDP context request (MS to network direction)

This message is sent by the MS to the network to request modification of an active PDP context. See table 9.5.10/TS 24.008.

Message type: MODIFY PDP CONTEXT REQUEST (MS TO NETWORK DIRECTION)

Significance: global

Direction: MS to network

Table 9.5.10/TS 24.008: MODIFY PDP CONTEXT REQUEST (MS TO NETWORK DIRECTION) message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Modify PDP context request message identity	Message type 10.4	M	V	1
32	Requested LLC SAPI	LLC service access point identifier 10.5.6.9	O	TV	2
30	Requested new QoS	Quality of service 10.5.6.5	O	TLV	FFS
31	New TFT	Traffic Flow Template	O	TLV	FFS

9.5.10.1 Requested LLC SAPI

This IE may be included in the message to request a new LLC SAPI if a new QoS is requested.

9.5.10.2 Requested new QoS

This IE may be included in the message to request a modification of the QoS.

9.5.10.3 New TFT

This IE is included in the message only when the modification applies to a secondary PDP context (FFS), to request modification of the TFT.

~~9.5.7~~ 9.5.11 Modify PDP context accept (MS to network direction)

This message is sent by the MS to the network to acknowledge the modification of an active PDP context. See table 9.5.~~7~~11/TS 24.008.

Message type: MODIFY PDP CONTEXT ACCEPT (MS TO NETWORK DIRECTION)

Significance: global

Direction: MS to network

Table 9.5.~~7~~11/TS 24.008: MODIFY PDP CONTEXT ACCEPT (MS TO NETWORK DIRECTION) message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Modify PDP context accept message identity	Message type 10.4	M	V	1

9.5.12 Modify PDP context accept (Network to MS direction)

This message is sent by the network to the MS to acknowledge the modification of an active PDP context. See table 9.5.12/TS 24.008.

Message type: MODIFY PDP CONTEXT ACCEPT (NETWORK TO MS DIRECTION)

Significance: global

Direction: Network to MS

Table 9.5.12/TS 24.008: MODIFY PDP CONTEXT ACCEPT (NETWORK TO MS DIRECTION) message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Modify PDP context accept message identity	Message type 10.4	M	V	1
30	Negotiated QoS	Quality of service 10.5.6.5	O	TLV	FFS
32	Negotiated LLC SAPI	LLC service access point identifier 10.5.6.9	O	TV	2
33	New radio priority	Radio priority 10.5.7.2	O	TV	1
34	Packet Flow Identifier	Packet Flow Identifier 10.5.6.11	O	TLV	3

9.5.12.1 Negotiated QoS

This IE is included in the message if the network assigns a new QoS.

9.5.12.2 Negotiated LLC SAPI

This IE is included in the message if the network assigns a new LLC SAPI.

9.5.12.3 New radio priority

This IE is included in the message only if the network modifies the radio priority.

9.5.12.4 Packet Flow Identifier

This IE may be included if the network wants to indicate the Packet Flow Identifier associated to the PDP context.

9.5.13 Modify PDP Context Reject

This message is sent by the network to the UE to reject the requested modification of the TFT. The network should not send a MODIFY PDP CONTEXT REJECT message if the requested QoS is not available. See Table 9.5.13/TS 24.008.

Message type: MODIFY PDP CONTEXT REJECT

Significance: global

Direction: network to MS

Table 9.5.13/TS 24.008: MODIFY PDP CONTEXT REJECT message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Modify PDP Context Reject	Message type 10.4	M	V	1
	SM cause	SM Cause 10.5.6.6	M	V	1

~~9.5.8~~ 9.5.14 Deactivate PDP context request

This message is sent to request deactivation of an active PDP context. See table 9.5.~~8~~14/TS 24.008.

Message type: DEACTIVATE PDP CONTEXT REQUEST

Significance: global

Direction: both

Table 9.5.814/TS 24.008: DEACTIVATE PDP CONTEXT REQUEST message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Deactivate PDP context request message identity	Message type 10.4	M	V	1
	SM cause	SM cause 10.5.6.6	M	V	1
35	Tear down indicator	Tear down indicator 10.5.6.10	O	TV	1

9.5.14.1 Tear down indicator

This IE is included in the message in order to indicate whether only the PDP context associated with this specific TI or all active PDP contexts sharing the same PDP address as the PDP context associated with this specific TI shall be deactivated..

9.5.9 9.5.15 Deactivate PDP context accept

This message is sent to acknowledge deactivation of the PDP context requested in the corresponding *Deactivate PDP context request* message. See table 9.5.915/TS 24.008.

Message type: DEACTIVATE PDP CONTEXT ACCEPT

Significance: global

Direction: both

Table 9.5.915/TS 24.008: DEACTIVATE PDP CONTEXT ACCEPT message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Deactivate PDP context accept message identity	Message type 10.4	M	V	1

9.5.10 9.5.16 Activate AA PDP context request

This message is sent by the MS to the network to initiate activation of an AA PDP context.
See table 9.5.1016/TS 24.008.

Message type: ACTIVATE AA PDP CONTEXT REQUEST

Significance: global

Direction: MS to network

Table 9.5.~~10~~16/TS 24.008: ACTIVATE AA PDP CONTEXT REQUEST message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Activate AA PDP context request message identity	Message type 10.4	M	V	1
	Requested NSAPI	Network service access point identifier 10.5.6.2	M	V	1
	Requested LLC SAPI	LLC service access point identifier 10.5.6.9	M	V	1
	Requested QoS	Quality of service 10.5.6. 5	M	LV	4
	Requested packet data protocol address	Packet data protocol address 10.5.6.4	M	LV	3 - 19
28	Access point name	Access point name 10.5.6.1	O	TLV	3 - 102
27	Protocol configuration options	Protocol configuration options 10.5.6.3	O	TLV	3 - 253
29	Requested AA-READY timer value	GPRS Timer 10.5.7.3	O	TV	2

9.5.~~10~~16.1 Access point name

This IE is included in the message when the MS selects a specific external network to be connected to.

9.5.~~10~~16.2 Protocol configuration options

This IE is included in the message when the MS provides protocol configuration options for the external PDN.

9.5.~~10~~16.3 Requested AA-READY timer value

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

~~9.5.11~~ 9.5.17 Activate AA PDP context accept

This message is sent by the network to the MS to acknowledge the activation of an AA PDP context. See table 9.5.~~11~~17/TS 24.008.

Message type: ACTIVATE AA PDP CONTEXT ACCEPT

Significance: global

Direction: network to MS

Table 9.5.~~11~~17/TS 24.008: ACTIVATE AA PDP CONTEXT ACCEPT message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Activate AA PDP context accept message identity	Message type 10.4	M	V	1
	Negotiated LLC SAPI	LLC service access point identifier 10.5.6.9	M	V	1
	Negotiated QoS	Quality of service 10.5.6. 5	M	LV	4
	Allocated P-TMSI	Mobile identity 10.5.1.4	M	LV	6
	Packet data protocol address	Packet data protocol address 10.5.6.4	M	LV	3 - 19
	Radio priority	Radio priority 10.5.7.2	M	V	1/2
	Spare half octet	Spare half octet 10.5.1.8	M	V	1/2
27	Protocol configuration options	Protocol configuration options 10.5.6.3	O	TLV	3 - 253
29	Negotiated AA-Ready timer value	GPRS Timer 10.5.7.3	O	TV	2
34	Packet Flow Identifier	Packet Flow Identifier 10.5.6.11	O	TLV	3

9.5.~~11~~17.1 Protocol configuration options

This IE may be included if the network wishes to transmit protocol configuration options from the external PDN.

9.5.~~11~~17.2 Negotiated AA-Ready timer value

This IE may be included if the network wants to indicate a value for the AA-READY timer.

9.5.17.3 Packet Flow Identifier

This IE may be included if the network wants to indicate the Packet Flow Identifier associated to the PDP context.

~~9.5.12~~ 9.5.18 Activate AA PDP context reject

This message is sent by the network to the MS to reject the activation of an AA PDP context. See table 9.5.~~12~~18/TS 24.008.

Message type: ACTIVATE AA PDP CONTEXT REJECT

Significance: global

Direction: network to MS

Table 9.5.~~12~~18/TS 24.008: ACTIVATE AA PDP CONTEXT REJECT message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Activate AA PDP context reject message identity	Message type 10.4	M	V	1
	SM Cause	SM Cause 10.5.6.6	M	V	1
27	Protocol configuration options	Protocol configuration options 10.5.6.3	O	TLV	3 - 253

9.5.~~12~~18.1 Protocol configuration options

The protocol configuration options IE may only be inserted by the network (see ~~GSM~~ TS 2~~0~~9.0~~6~~0) if the SM Cause indicates "activation rejected by GGSN".

~~9.5.13~~ 9.5.19 Deactivate AA PDP context request

This message is sent to request deactivation of an active AA PDP context. See table 9.5.~~13~~19/TS 24.008.

Message type: DEACTIVATE AA PDP CONTEXT REQUEST

Significance: global

Direction: network to MS

Table 9.5.~~13~~19/TS 24.008: DEACTIVATE AA PDP CONTEXT REQUEST message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Deactivate AA PDP context request message identity	Message type 10.4	M	V	1
	AA deactivation cause	AA deactivation cause 10.5.6.8	M	V	1/2
	Spare half octet	Spare half octet 10.5.1.8	M	V	1/2

~~9.5.14~~ 9.5.20 Deactivate AA PDP context accept

This message is sent to acknowledge deactivation of an AA PDP context requested by the corresponding *Deactivate AA PDP context request* message. See table 9.5.~~14~~20/TS 24.008.

Message type: DEACTIVATE AA PDP CONTEXT ACCEPT

Significance: global

Direction: MS to network

Table 9.5.~~14~~20/TS 24.008: DEACTIVATE AA PDP CONTEXT ACCEPT message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Deactivate AA PDP context accept message identity	Message type 10.4	M	V	1

~~9.5.15~~ 9.5.21 SM Status

This message is sent by the network or the MS to pass information on the status of the indicated context and report certain error conditions (eg. as listed in section 8). See table 9.5.~~15~~21/TS 24.008.

Message type: SM Status

Significance: local

Direction: both

Table 9.5.~~15~~21/TS 24.008: SM STATUS message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	SM Status message identity	Message type 10.4	M	V	1
	SM Cause	SM Cause 10.5.6.6	M	V	1

10 General message format and information elements coding

10.4 Message Type

The message type IE and its use are defined in TS 24.007 [20]. Tables 10.3/TS 24.008, 10.4/TS 24.008, and 10.4a/TS 24.008 define the value part of the message type IE used in the Mobility Management protocol, the Call Control protocol, and Session management protocol.

Table 10.4a/TS 24.008: Message types for GPRS session management

Bits 8 7 6 5 4 3 2 1	
0 1 - - - - - -	Session management messages
0 1 0 0 0 0 0 1	Activate PDP context request
0 1 0 0 0 0 1 0	Activate PDP context accept
0 1 0 0 0 0 1 1	Activate PDP context reject
0 1 0 0 0 1 0 0	Request PDP context activation
0 1 0 0 0 1 0 1	Request PDP context activation rej.
0 1 0 0 0 1 1 0	Deactivate PDP context request
0 1 0 0 0 1 1 1	Deactivate PDP context accept
0 1 0 0 1 0 0 0	Modify PDP context request(Network to MS direction)
0 1 0 0 1 0 0 1	Modify PDP context accept (MS to network direction)
0 1 0 0 1 0 1 0	Modify PDP context request(MS to network direction)
0 1 0 0 1 0 1 1	Modify PDP context accept (Network to MS direction)
0 1 0 0 1 1 0 0	Modify PDP context reject
0 1 0 0 1 1 0 1	Activate secondary PDP context request
0 1 0 0 1 1 1 0	Activate secondary PDP context accept
0 1 0 0 1 1 1 1	Activate secondary PDP context reject
0 1 0 1 0 0 0 0	Activate AA PDP context request
0 1 0 1 0 0 0 1	Activate AA PDP context accept
0 1 0 1 0 0 1 0	Activate AA PDP context reject
0 1 0 1 0 0 1 1	Deactivate AA PDP context request
0 1 0 1 0 1 0 0	Deactivate AA PDP context accept
0 1 0 1 0 1 0 1	SM Status

10.5.6.6 SM cause

The purpose of the *SM cause* information element is to indicate the reason why a session management request is rejected.

The *SM cause* is a type 3 information element with 2 octets length.

The *SM cause* information element is coded as shown in figure 10.5.139/TS 24.008 and table 10.5.157/TS 24.008.

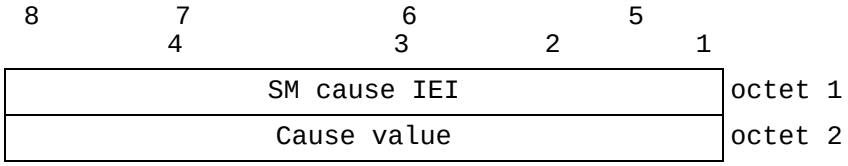


Figure 10.5.139/TS 24.008: *SM cause* information element

Table 10.5.157/TS 24.008: *SM cause* information element

Cause value (octet 2)	
Bits	
8 7 6 5 4 3 2 1	
0 0 0 1 1 0 0 1	LLC or SNDCP failure(GSM only)
0 0 0 1 1 0 1 0	Insufficient resources
0 0 0 1 1 0 1 1	Missing or unknown APN
0 0 0 1 1 1 0 0	Unknown PDP address or PDP type
0 0 0 1 1 1 0 1	User Aauthentication failed
0 0 0 1 1 1 1 0	Activation rejected by GGSN
0 0 0 1 1 1 1 1	Activation rejected, unspecified
0 0 1 0 0 0 0 0	Service option not supported
0 0 1 0 0 0 0 1	Requested service option not subscribed
0 0 1 0 0 0 1 0	Service option temporarily out of order
0 0 1 0 0 0 1 1	NSAPI already used
0 0 1 0 0 1 0 0	Regular deactivation
0 0 1 0 0 1 0 1	QoS not accepted
0 0 1 0 0 1 1 0	Network failure
0 0 1 0 0 1 1 1	Reactivation required
0 0 1 0 1 0 0 1	TFT already used
0 0 1 0 1 0 1 1	Invalid TFT
0 0 1 0 1 1 0 0	Unknown PDP context
0 1 0 1 0 0 0 1	Invalid transaction identifier value
0 1 0 1 1 1 1 1	Semantically incorrect message
0 1 1 0 0 0 0 0	Invalid mandatory information
0 1 1 0 0 0 0 1	Message type non-existent or not implemented
0 1 1 0 0 0 1 0	Message type not compatible with the protocol state
0 1 1 0 0 0 1 1	Information element non-existent or not implemented
0 1 1 0 0 1 0 0	Conditional IE error
0 1 1 0 0 1 0 1	Message not compatible with the protocol state
0 1 1 0 1 1 1 1	Protocol error, unspecified
Any other value received by the mobile station shall be treated as 0010 0010, 'Service option temporarily out of order'. Any other value received by the network shall be treated as 0110 1111, 'Protocol error, unspecified'.	
NOTE: The listed cause values are defined in Annex I	

10.5.6.7 ~~Spare~~ Linked TI

~~This is intentionally left spare.~~

The purpose of the *Linked TI* information element is to specify the active PDP context from which the PDP address for the new PDP context could be derived by the network.

The *Linked TI* is a type 4 information element with a minimum length of 3 octets and a maximum length of 4 octets.

The *Linked TI* information element is coded as shown in figure 10.5.140/TS 24.008.

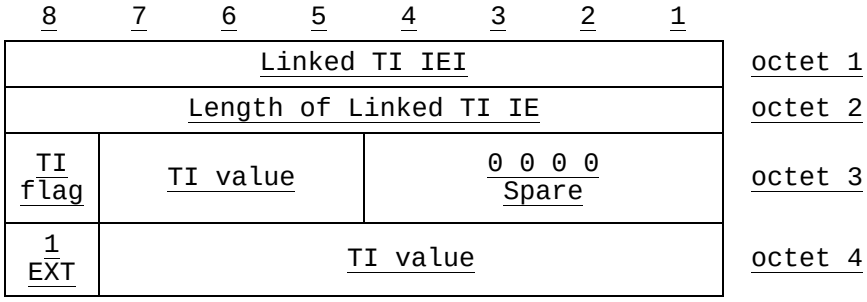


Figure 10.5.140/TS 24.008: *Linked TI* information element

The coding of the TI flag, the TI value and the EXT bit is defined in TS 24.007[20].

10.5.6.9 LLC service access point identifier

The purpose of the *LLC service access point identifier* information element is to identify the service access point that is used for the GPRS data transfer at LLC layer.

The *LLC service access point identifier* is a type 3 information element with a length of 2 octets.

The value part of a *LLC service access point identifier* information element is coded as shown in figure 10.5.141/TS 24.008 and table 10.5.159/TS 24.008.

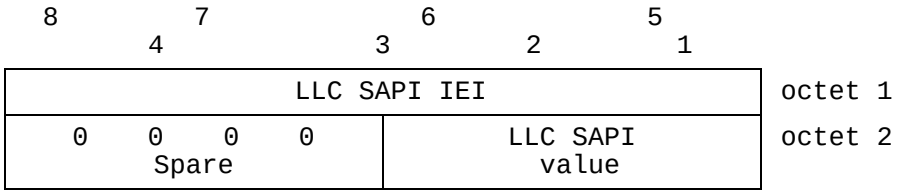


Figure 10.5.141/TS 24.008: *LLC service access point identifier* information element

Table 10.5.159/TS 24.008: *LLC service access point identifier* information element

LLC SAPI value (octet 2)	
Bit 4 3 2 1	
0 0 0 0	LLC SAPI not assigned
0 0 1 1	SAPI 3
0 1 0 1	SAPI 5
1 0 0 1	SAPI 9
1 0 1 1	SAPI 11
All other values are reserved.	

10.5.6.10 Tear down indicator

The purpose of the *tear down indicator* information element is to indicate whether only the PDP context associated with this specific TI or all active PDP contexts sharing the same PDP address as the PDP context associated with this specific TI shall be deactivated.

The *tear down indicator* is a type 1 information element.

The *tear down indicator* information element is coded as shown in figure 10.5.142/TS 24.008 and table 10.5.160/TS 24.008.

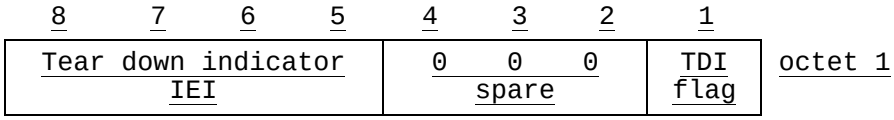


Figure 10.5.142/TS 24.008: *Tear down indicator* information element

Table 10.5.160/GSM 04.08: *Tear down indicator* information element

Tear down indicator(TDI) flag (octet 1)
Bit 1 0 tear down not requested 1 tear down requested

10.5.6.11 Packet Flow Identifier

The *Packet Flow Identifier (PFI)* information element indicates the Packet Flow Identifier for a Packet Flow Context.

The *Packet Flow Identifier* is a a type 4 information element with 3 octets length.

The *Packet Flow Identifier* information element is coded as shown in figure 10.5.143/TS 24.008 and table 10.5.161/TS 24.008.

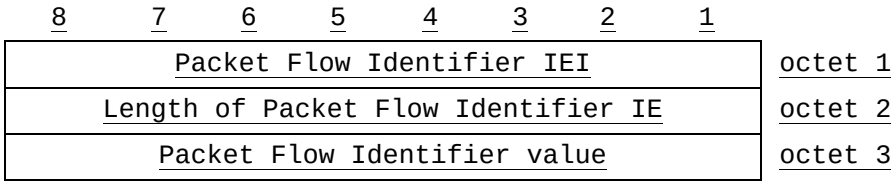


Figure 10.5.143/TS 24.008: *Packet Flow Identifier* information element

Table 10.5.161/TS 24.008: *Packet Flow Identifier* information element

Packet Flow Identifier value (octet 3)	
Bits 8 7 6 5 4 3 2 1	
0 0 0 0 0 0 0 0	Best Effort
0 0 0 0 0 0 0 1	Signaling
0 0 0 0 0 0 1 0	SMS
0 0 0 0 0 0 1 1 to 0 0 0 0 0 1 1 1	reserved
0 0 0 0 1 0 0 0 to 1 1 1 1 1 1 1 1	dynamically assigned

11 List of system parameters

11.2.3 Timers of session management

Table 11.2c/TS 24.008: Session management timers - MS side

TIMER NUM.	TIMER VALUE	STATE	CAUSE OF START	NORMAL STOP	ON THE 1st, 2nd, 3rd, 4th EXPIRY
T3380	30s	PDP-ACTIVE-PEND	ACTIVATE PDP CONTEXT REQUEST or ACTIVATE SECONDARY PDP CONTEXT REQUEST sent	ACTIVATE PDP CONTEXT ACCEPT or ACTIVATE SECONDARY PDP CONTEXT ACCEPT received ACTIVATE PDP CONTEXT REJECT or ACTIVATE SECONDARY PDP CONTEXT REJECT received	Retransmission of ACTIVATE PDP CONTEXT REQ or ACTIVATE SECONDARY PDP CONTEXT REQUEST
T3381	8s	PDP-MODIFY-PENDING	MODIFY PDP CONTEXT REQUEST sent	MODIFY PDP CONTEXT ACCEPT received	Retransmission of MODIFY PDP CONTEXT REQUEST
T3390	8s	PDP-INACT-PEND	DEACTIVATE PDP CONTEXT REQUEST sent	DEACTIVATE PDP CONTEXT ACC received	Retransmission of DEACTIVATE PDP CONTEXT REQUEST

NOTE: Typically, the procedures are aborted on the fifth expiry of the relevant timer. Exceptions are described in the corresponding procedure description.

Table 11.2d/TS 24.008: Session management timers - network side

TIMER NUM.	TIMER VALUE	STATE	CAUSE OF START	NORMAL STOP	ON THE 1st, 2nd, 3rd, 4th EXPIRY
T3385	8s	PDP-ACT-PEND	REQUEST PDP CONTEXT ACTIVATION sent	ACTIVATE PDP CONTEXT REQ received	Retransmission of REQUEST PDP CONTEXT ACTIVATION
T3386	8s	PDP-MOD-PEND	MODIFY PDP CONTEXT REQUEST sent	MODIFY PDP CONTEXT ACC received	Retransmission of MODIFY PDP CONTEXT REQ
T3395	8s	PDP-INACT-PEND	DEACTIVATE PDP CONTEXT REQUEST sent	DEACTIVATE PDP CONTEXT ACC received	Retransmission of DEACTIVATE PDP CONTEXT REQ
T3397	8s	PDP-INACT-PEND	DEACTIVATE AA PDP CONTEXT REQUEST sent	DEACTIVATE AA PDP CONTEXT ACCEPT received	Retransmission of DEACTIVATE AA PDP CONTEXT REQUEST

NOTE: Typically, the procedures are aborted on the fifth expiry of the relevant timer. Exceptions are described in the corresponding procedure description.

Annex I (informative): ~~GSM~~GPRS specific cause values for session management

This annex is informative.

I.1 Causes related to nature of request

Cause value = 25 LLC or SNDCP failure(GSM only)

This cause code is used by the MS indicate that a PDP context is deactivated because of a LLC or SNDCP failure (e.g. if the SM receives a *SNSM-STATUS.request* message with cause "*DM received* " or " *invalid XID response* ", see GSM 04.65 [78])

Cause value = 26 Insufficient resources

This cause code is used by the MS or by the network to indicate that a PDP context activation request, Secondary PDP context activation request or PDP context modification request cannot be accepted due to insufficient resources.

Cause value = 27 Unknown or missing access point name

This cause code is used by the network to indicate that the requested service was rejected by the external packet data network because the access point name was not included although required or if the access point name could not be resolved.

Cause value = 28 Unknown PDP address or PDP type

This cause code is used by the network to indicate that the requested service was rejected by the external packet data network because the PDP address or type could not be recognised.

Cause value = 29 User authentication failed

This cause code is used by the network to indicate that the requested service was rejected by the external packet data network due to a failed user authentication.

Cause value = 30 Activation rejected by GGSN

This cause code is used by the network to indicate that the requested service was rejected by the GGSN.~~.~~

Cause value = 31 Activation rejected, unspecified

This cause code is used by the network to indicate that the requested service was rejected due to unspecified reasons.

Cause value = 32 Service option not supported

This cause code is used by the network when the MS requests a service which is not supported by the PLMN.

Cause value = 33 Requested service option not subscribed

See Annex G, section 4.

Cause value = 34 Service option temporarily out of order

See Annex G, section 4.

Cause value = 35 NSAPI already used

This cause code is used by the network to indicate that the NSAPI requested by the MS in the PDP context activation or Secondary PDP context activation request is already used by another active PDP context of this MS.

Cause value = 36 Regular PDP context deactivation

This cause code is used to indicate a regular MS or network initiated PDP context deactivation.

Cause value = 37 QoS not accepted

This cause code is used by the MS if the new QoS cannot be accepted that were indicated by the network in the PDP Context Modification procedure.

Cause value = 38 Network failure

This cause code is used by the network to indicate that the PDP context deactivation is caused by an error situation in the network.

Cause value = 39 Reactivation requested

This cause code is used by the network to request a PDP context reactivation after a GGSN restart.

Cause value = 40 Feature not supported

This cause code is used by the MS to indicate that the PDP context activation initiated by the network is not supported by the MS.

Cause value = 41 TFT already used

This cause code is used by the network to indicate that the TFT indicated in the secondary PDP context activation request is already used.

Cause value = 42 invalid TFT

This cause code is used by the network to indicate that the TFT indicated in the secondary PDP context activation request is invalid.

Cause value = 43 ~~unknown primary PDP context~~unknown PDP context

This cause code is used by the network to indicate that the primary PDP context specified in the secondary PDP context activation request is not active.

3GPP/SMG Meeting #9
Bad Aibling, Germany, 30 Oct- 3-Dec. 1999

Document N1-99F00

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**	**053r2**	Current Version:	3.1.0

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

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

for approval [X] for information [ ]

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

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

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

Source: Fujitsu **Date:** 2 Dec, 1999

Subject: GMM State Model for UMTS

Work item: GSM/ UMTS interworking

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

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

Release:

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

Reason for change: Reflecting some new UMTS requirements, GMM is updated to adapt to new architecture and to support new features.
Main impact from R99 requirement is Introduction of Service request procedure caused by LLC removal.

Clauses affected:

Other specs affected:

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

Other comments:

help.doc

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

4.1.3 GPRS mobility management (GMM) sublayer states

In this section, the GMM protocol of the MS and the network are described by means of two different state machines. In section 4.1.3.1, the states of the GMM entity in the MS are introduced. The behaviour of the MS depends on a GPRS update status that is described in section 4.1.3.2. The states for the network side are described in section 4.1.3.3.

4.1.3.1 GMM states in the MS

In this section, the possible GMM states are described of a GMM entity in the mobile station. Section 4.1.3.1.1 summarises the main states of a GMM entity, see figure 4.1b/TS 24.008. The substates that have been defined are described in section 4.1.3.1.2 and section 4.1.3.1.3.

However, it should be noted that this section does not include a description of the detailed behaviour of the MS in the single states and does not cover abnormal cases. Thus, figure 4.1b/TS 24.008 is rather intended to give an overview of the state transitions than to be a complete state transition diagram. A detailed description of the behaviour of the MS is given in section 4.2. Especially, with respect to the behaviour of the MS in abnormal cases it is referred to section 4.7.

4.1.3.1.1 Main states

4.1.3.1.1.1 GMM-NULL

The GPRS capability is disabled in the MS. No GPRS mobility management function shall be performed in this state.

4.1.3.1.1.2 GMM-DEREGISTERED

The GPRS capability has been enabled in the MS, but no GMM context has been established. In this state, the MS may establish a GMM context by starting the GPRS attach or combined GPRS attach procedure.

4.1.3.1.1.3 GMM-REGISTERED-INITIATED

A GPRS attach or combined GPRS attach procedure has been started and the MS is awaiting a response from the network.

4.1.3.1.1.4 GMM-REGISTERED

A GMM context has been established, i.e. the GPRS attach or combined GPRS attach procedure has been successfully performed. In this state, the MS may activate PDP contexts, may send and receive user data and signalling information and may reply to a page request. Furthermore, cell and routing area updating are performed.

4.1.3.1.1.5 GMM-DEREGISTERED-INITIATED

The MS has requested release of the GMM context by starting the GPRS detach or combined GPRS detach procedure. This state is only entered if the MS is not being switched off at detach request.

4.1.3.1.1.6 GMM-ROUTING-AREA-UPDATING-INITIATED

A routing area updating procedure has been started and the MS is awaiting a response from the network.

4.1.3.1.1.7 GMM-SERVICE-REQUEST-INITIATED (UMTS only)

A service request procedure has been started and the MS is awaiting a response from the network.

4.1.3.1.2 Substates of state GMM-DEREGISTERED

The GMM-DEREGISTERED state is subdivided into several substates as explained below. The substates pertain to the whole MS (ME alone if no SIM is inserted, or ME plus SIM). The selection of the appropriate substate depends on the GPRS update status, see section 4.1.3.2, and on the selected cell.

4.1.3.1.2.1 GMM-DEREGISTERED.NORMAL-SERVICE

Valid subscriber data is available, the GPRS update status is GU1 or GU2, a cell has been selected. In this state, a request for GPRS attach is performed using the stored temporary mobile subscriber identity for GPRS (P-TMSI), routing area identification (RAI) and GPRS ciphering key sequence number in case of GU1. If the GPRS update status is GU2, the IMSI shall be used to attach for GPRS services.

4.1.3.1.2.2 GMM-DEREGISTERED.LIMITED-SERVICE

Valid subscriber data is available, GPRS update status is GU3, and a cell is selected, which is known not to be able to provide normal service.

4.1.3.1.2.3 GMM-DEREGISTERED.ATTACH-NEEDED

Valid subscriber data is available and for some reason a GPRS attach must be performed as soon as possible. This state is usually of no duration, but can last, e.g. if the access class is blocked.

4.1.3.1.2.4 GMM-DEREGISTERED.ATTEMPTING-TO-ATTACH

The GPRS update status is GU2, a cell is selected, a previous GPRS attach was rejected. The execution of further attach procedures depends on the GPRS attach attempt counter. No GMM procedure except GPRS attach shall be initiated by the MS in this substate.

4.1.3.1.2.5 GMM-DEREGISTERED.NO-IMSI

No valid subscriber data is available (no SIM, or the SIM is not considered valid by the ME) and a cell has been selected.

4.1.3.1.2.6 GMM-DEREGISTERED.NO-CELL-AVAILABLE

No cell can be selected. This substate is entered after a first intensive search failed (substate PLMN SEARCH). Cells are searched for at a low rhythm. No services are offered.

4.1.3.1.2.7 GMM-DEREGISTERED.PLMN-SEARCH

The mobile station is searching for PLMNs. This substate is left either when a cell has been selected (the new substate is NORMAL-SERVICE or LIMITED-SERVICE) or when it has been concluded that no cell is available at the moment (the new substate is NO-CELL-AVAILABLE).

4.1.3.1.2.8 GMM-DEREGISTERED.SUSPENDED (GSM only)

The MS shall enter this substate when entering dedicated mode and the MS limitations make it unable to communicate on GPRS channels. The MS shall leave this substate when leaving dedicated mode.

4.1.3.1.3 Substates of state GMM-REGISTERED

The state GMM-REGISTERED is subdivided into several substate as explained below. The substates pertain to the whole MS (ME alone if no SIM is inserted, or ME plus SIM.).

4.1.3.1.3.1 GMM-REGISTERED.NORMAL-SERVICE

User data and signalling information may be sent and received.

4.1.3.1.3.2 GMM-REGISTERED.SUSPENDED (GSM only)

The MS shall enter this substate when entering dedicated mode and when the MS limitations makes it unable to communicate on GPRS channels... In this substate, no user data should be sent and no signalling information shall be sent. The MS shall leave this substate when leaving dedicated mode.

4.1.3.1.3.3 GMM-REGISTERED.UPDATE-NEEDED

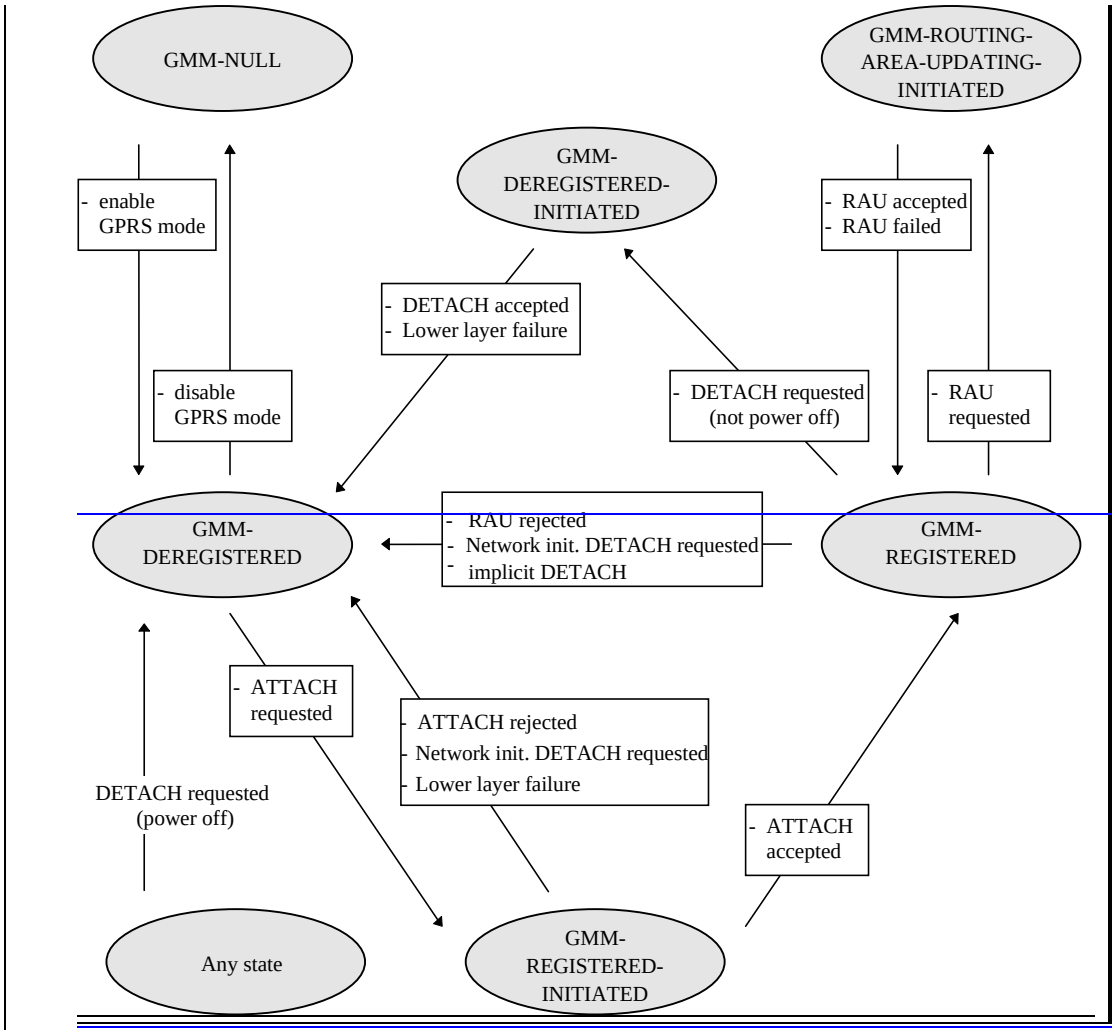
The MS has to perform a routing area updating procedure, but its access class is not allowed in the cell. The procedure will be initiated as soon as access is granted (this might be due to a cell-reselection or due to change of the access class of the current cell). No GMM procedure except routing area updating shall be initiated by the MS in this substate. In this substate, no user data and no signalling information shall be sent.

4.1.3.1.3.4 GMM-REGISTERED.ATTEMPTING-TO-UPDATE

A routing area updating procedure failed due to a missing response from the network. The MS retries the procedure controlled by timers and a GPRS attempt counter. No GMM procedure except routing area updating shall be initiated by the MS in this substate. No data shall be sent or received.

4.1.3.1.3.5 GMM-REGISTERED.NO-CELL-AVAILABLE

GPRS coverage has been lost. In this substate, the MS shall not initiate any GMM procedures except of cell (and PLMN) reselection.


GMM-NULL
GMM-ROUTING-AREA-UPDATING-INITIATED
GMM-DEREGISTERED-INITIATED
- enable GPRS mode
- disable GPRS mode
- DETACH accepted
- Lower layer failure
- DETACH requested (not power off)
- RAU accepted
- RAU failed
- RAU requested
GMM-DEREGISTERED
- RAU rejected
- Network init. DETACH requested
- implicit DETACH
GMM-REGISTERED
- ATTACH requested
- ATTACH rejected
- Network init. DETACH requested
- Lower layer failure
DETACH requested (power off)
- ATTACH accepted
Any state
GMM-REGISTERED-INITIATED

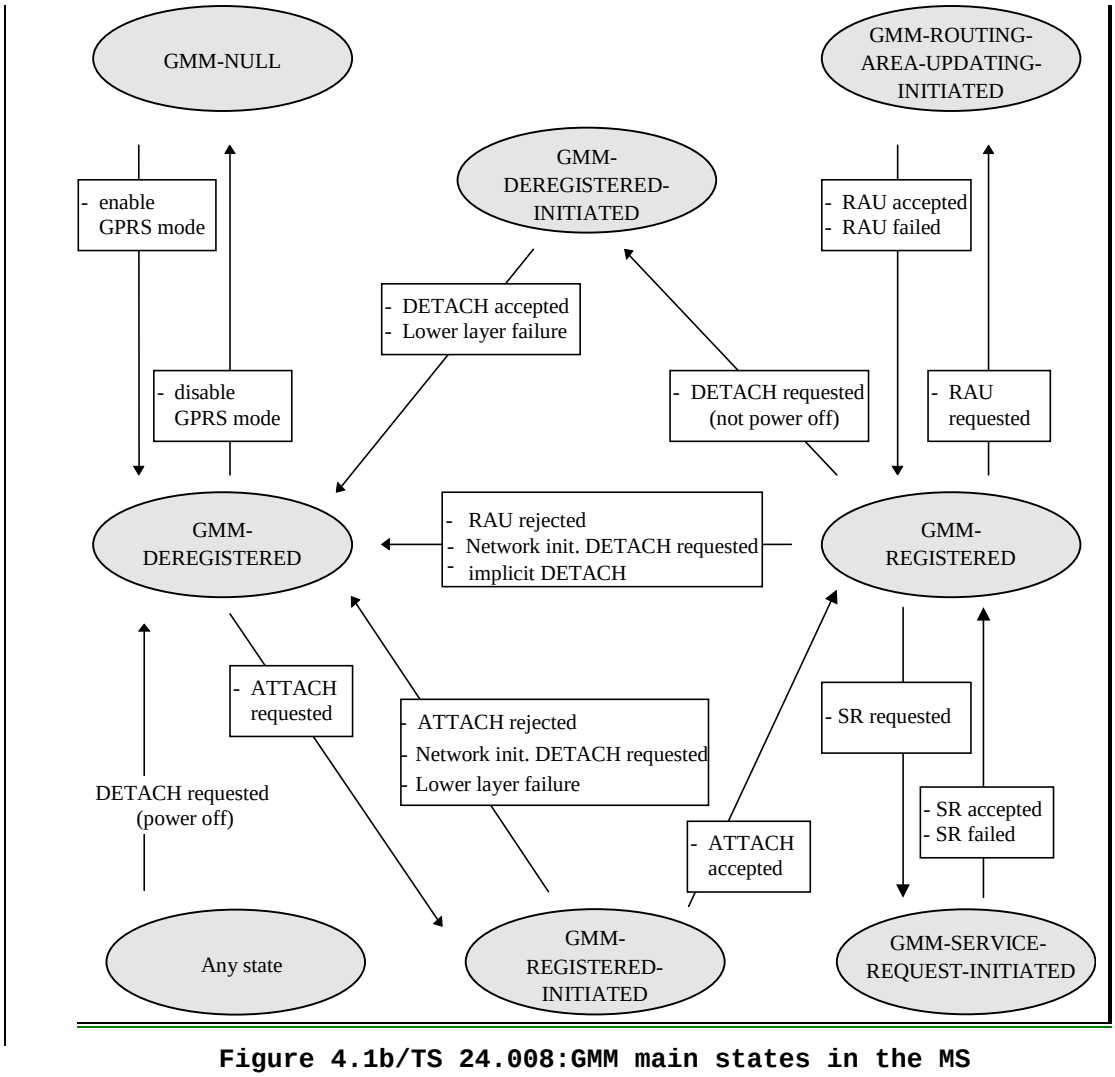


Figure 4.1b/TS 24.008:GMM main states in the MS

4.1.3.1.3.6 GMM-REGISTERED.LIMITED-SERVICE

A cell is selected, which is known not to be able to provide normal service. The MS will remain in this sub-state until a cell is selected which is able to provide normal service.

4.1.3.1.3.7 GMM-REGISTERED.ATTEMPTING-TO-UPDATE-MM

A combined routing area updating procedure or a combined GPRS attach procedure was successful for GPRS services only. The MS retries the procedure controlled by timers and a GPRS attempt counter. User data and signalling information may be sent and received.

4.1.3.2 GPRS update status

In addition to the GMM sublayer states described so far, a GPRS update status exists.

The GPRS update status pertains to a specific subscriber embodied by a SIM. This status is defined even when the subscriber is not activated (SIM removed or connected to a switched off ME). It is stored in a non volatile memory in the SIM. The GPRS update status is changed only after execution of a GPRS attach, network initiated GPRS detach, authentication procedure, or routing area updating procedure.

GU1: UPDATED

The last GPRS attach or routing area updating attempt was successful (correct procedure outcome, and the answer was accepted by the network). The SIM contains the RAI of the routing area (RA) to which the subscriber was attached, and possibly a valid P-TMSI, GPRS ciphering key, GPRS integrity key and GPRS ciphering key sequence number.

GU2: NOT UPDATED

The last GPRS attach or routing area updating attempt failed procedurally, i.e. no response was received from the network. This includes the cases of failures or congestion inside the network.

In this case, the SIM may contain the RAI of the routing area (RA) to which the subscriber was attached, and possibly also a valid P-TMSI, GPRS ciphering key, GPRS integrity key and GPRS ciphering key sequence number. For compatibility reasons, all these fields shall be set to the "deleted" value if the RAI is deleted. However, the presence of other values shall not be considered an error by the MS.

GU3: ROAMING NOT ALLOWED

The last GPRS attach or routing area updating attempt was correctly performed, but the answer from the network was negative (because of roaming or subscription restrictions).

For this status, the SIM does not contain any valid RAI, P-TMSI, GPRS ciphering key or GPRS ciphering key sequence number. For compatibility reasons, all these fields must be set to the value "deleted" at the moment the status is set to ROAMING NOT ALLOWED. However, the presence of other values shall not be considered an error by the MS.

4.1.3.3 GMM mobility management states on the network side

In this subsection, the possible states are described for the GMM on the network side. Section 4.1.3.3.1 summarises the main states. The corresponding substates are described in section 4.1.3.3.2.

However, it should be noted that this section does not include a description of the detailed behaviour of the network in the single states and does not cover abnormal cases. Thus, figure 4.1c/TS 24.008 is rather intended to give an overview of the state transitions than to be a complete state transition diagram. A detailed description of the behaviour of the MS is given in section 4.2. Especially, with respect to the behaviour of the MS in abnormal cases it is referred to section 4.7.

4.1.3.3.1 Main States

4.1.3.3.1.1 GMM-DEREGISTERED

The network has no GMM context or the GMM context is marked as detached, the MS is detached. In this state, the network may answer to a GPRS attach or combined GPRS attach procedure initiated by the MS.

4.1.3.3.1.2 GMM-COMMON-PROCEDURE-INITIATED

A common GMM procedure, as defined in section 4.1.1, has been started. The network is awaiting the answer from the MS.

4.1.3.3.1.3 GMM-REGISTERED

The GMM context has been established and the GPRS attach procedure has been successfully performed.

4.1.3.3.1.4 GMM-DEREGISTERED-INITIATED

The network has started a GPRS detach procedure and is awaiting the answer from the MS.

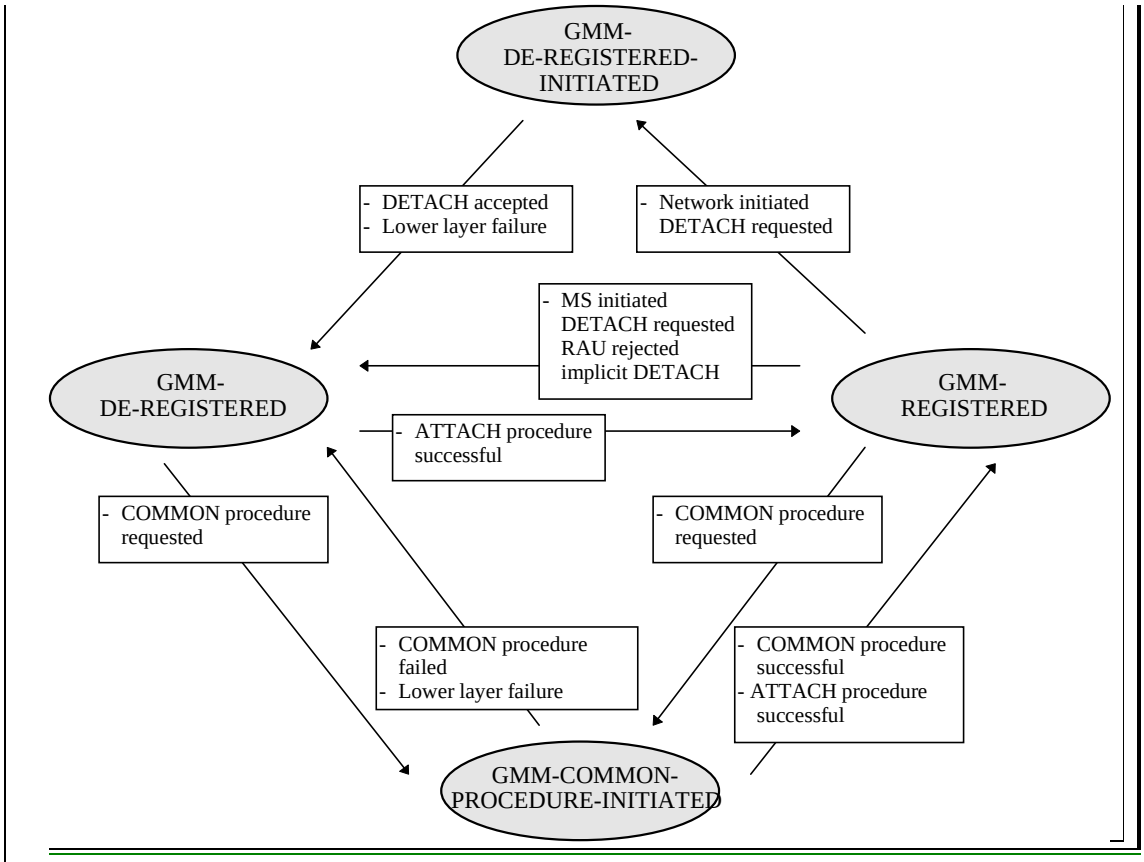


Figure 4.1c/TS 24.008: GMM main states on the network side

4.1.3.3.2 Substates of state GMM-REGISTERED

The state GMM-REGISTERED is subdivided into two substates as explained below.

4.1.3.3.2.1 GMM-REGISTERED.NORMAL-SERVICE

User data and signalling information may be sent and received.

4.1.3.3.2.2 GMM-REGISTERED.SUSPENDED (GSM only)

In this substate, the lower layers shall be prevented of sending user data or signalling information.