

**Source:** TSG CN WG 1  
**Title:** CRs to R99 (with mirror CRs) on Work Item GSM/UMTS interworking towards 24.008, pack 1  
**Agenda item:** 7.15  
**Document for:** APPROVAL

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**Introduction:**

This document contains 3 CRs on **R99 (with mirror CRs)** to Work Item " **GSM/UMTS interworking**", that have been agreed by **TSG CN WG1**, and are forwarded to TSG CN Plenary meeting #14 for approval.

Spec	CR	Rev	Phase	Subject	Cat	Version-Current	Version-New	Doc-2nd-Level
24.008	521	3	R99	Impact of regional roaming restrictions on the GMM context	F	3.9.0	3.10.0	N1-012046
24.008	524	3	Rel-4	Impact of regional roaming restrictions on the GMM context	A	4.4.0	4.5.0	N1-012047
24.008	527	3	Rel-5	Impact of regional roaming restrictions on the GMM context	A	5.1.0	5.2.0	N1-012048

## CHANGE REQUEST

⌘ **TS 24.008 CR 521** ⌘ ev **3** ⌘ Current version: **3.9.0** ⌘

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

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

<b>Title:</b>	⌘ Impact of regional roaming restrictions on the GMM context		
<b>Source:</b>	⌘ T-Mobil, one2one, Siemens AG		
<b>Work item code:</b>	⌘ GSM/UMTS Interworking	<b>Date:</b>	⌘ Nov., 30 <sup>th</sup> 2001
<b>Category:</b>	⌘ <b>F</b>	<b>Release:</b>	⌘ R99
	<i>Use <u>one</u> of the following categories:</i> <b>F</b> (correction) <b>A</b> (corresponds to a correction in an earlier release) <b>B</b> (addition of feature), <b>C</b> (functional modification of feature) <b>D</b> (editorial modification) Detailed explanations of the above categories can be found in 3GPP <a href="#">TR 21.900</a> .		<i>Use <u>one</u> of the following releases:</i> 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) REL-4 (Release 4) REL-5 (Release 5)

**Reason for change:** ⌘ In the current version of 24.008 it is stated that:

- MS shall delete LAI, TMSI and ciphering key sequence number stored in the SIM when reject cause #13 or #15 is received.
- MS shall delete RAI, P-TMSI, P-TMSI signature and GPRS ciphering key sequence number stored in the SIM when reject cause #13 or #15 is received.

This is not the correct UE behaviour when reject cause #13 or #15 is received, because on reception of cause #13 or #15 either PLMN or cell selection will be performed with the goal to select a other suitable and allowable cell either within the same PLMN or in a different PLMN. As a PLMN change is possible without reactivation of the PDP context the activated PDP contexts should be maintained, as the MS normally immediately reselects a suitable cell in a different location area either in the same PLMN or a different PLMN.

**Summary of change:** ⌘

- Changes in the actions upon reception of reject cause #13 and #15 in order to avoid the deactivation of the GMM context.
- In case of location update, routing area update and service request, upon reception of reject cause #13 and #15, LAI, TMSI and ciphering key sequence number, and RAI, P-TMSI, P-TMSI signature and GPRS ciphering key sequence number will not be deleted in, order to avoid unnecessary re-authentications.

Backwards compatibility to R97/98 mobile stations or R97/98 networks:

1. R97/98 MS with R99 network:  
 The MS will de-activate the GMM and PDP contexts and delete LAI, TMSI, etc., upon receipt of the reject cause. The network will de-activate the contexts when the mobile reachable timer expires (equivalent to a de-activation of the MS while out of GPRS coverage).
2. R99 MS with R97/98 network:  
 The network will de-activate the GMM and PDP contexts and delete LAI, TMSI, etc., upon sending the reject cause. The MS will maintain the GMM and PDP contexts and LAI, TMSI, etc. Upon the next routing area update or service request, the network will reject the request with cause #10, "implicitly detached", which will then trigger a re-attach.

For a legacy R99 implementation the same behaviour applies as for a R97/98 implementation.

**Consequences if not approved:**

⌘ The MS will loose activated PDP contexts even if this is not needed. In consequence the service offered to the subscriber will not be good as the service continuity is not ensured and the re-activation of the PDP context causes unnecessary network load.

**Clauses affected:**

⌘ 4.1.2.2; Figure 4.1b; 4.1.3.2; 4.4.4.7, 4.7.3.1.4, 4.7.3.2.4, 4.7.4.2.2, 4.7.5.1.4, 4.7.5.2.4, 4.7.13.4

**Other specs affected:**

⌘  Other core specifications  
⌘  Test specifications  
⌘  O&M Specifications

**Other comments:**

⌘

#### 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 3GPP TS 03.22 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 losing 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.

#### 4.1.2.1.2 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 clause 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, service request 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, GSM ciphering key, UMTS integrity key, UMTS 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, GSM ciphering key, UMTS integrity key, UMTS 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~~ may contain any valid LAI, TMSI, GSM ciphering key, UMTS integrity key, UMTS ciphering key or ciphering key sequence number. For compatibility reasons, all these fields must be set to the "deleted" value ~~if the LAI is 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 mobile station. The "Location update status" stored on the SIM shall be "Location Area not allowed".

### 4.1.3 GPRS mobility management (GMM) sublayer states

In this clause, the GMM protocol of the MS and the network are described by means of two different state machines. In clause 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 clause 4.1.3.2. The states for the network side are described in clause 4.1.3.3.

#### 4.1.3.1 GMM states in the MS

In this clause, the possible GMM states are described of a GMM entity in the mobile station. Clause 4.1.3.1.1 summarises the main states of a GMM entity, see figure 4.1b/3GPP TS 24.008. The substates that have been defined are described in clause 4.1.3.1.2 and clause 4.1.3.1.3.

However, it should be noted that this clause 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/3GPP 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 clause 4.2. Especially, with respect to the behaviour of the MS in abnormal cases it is referred to clause 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 clause 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.

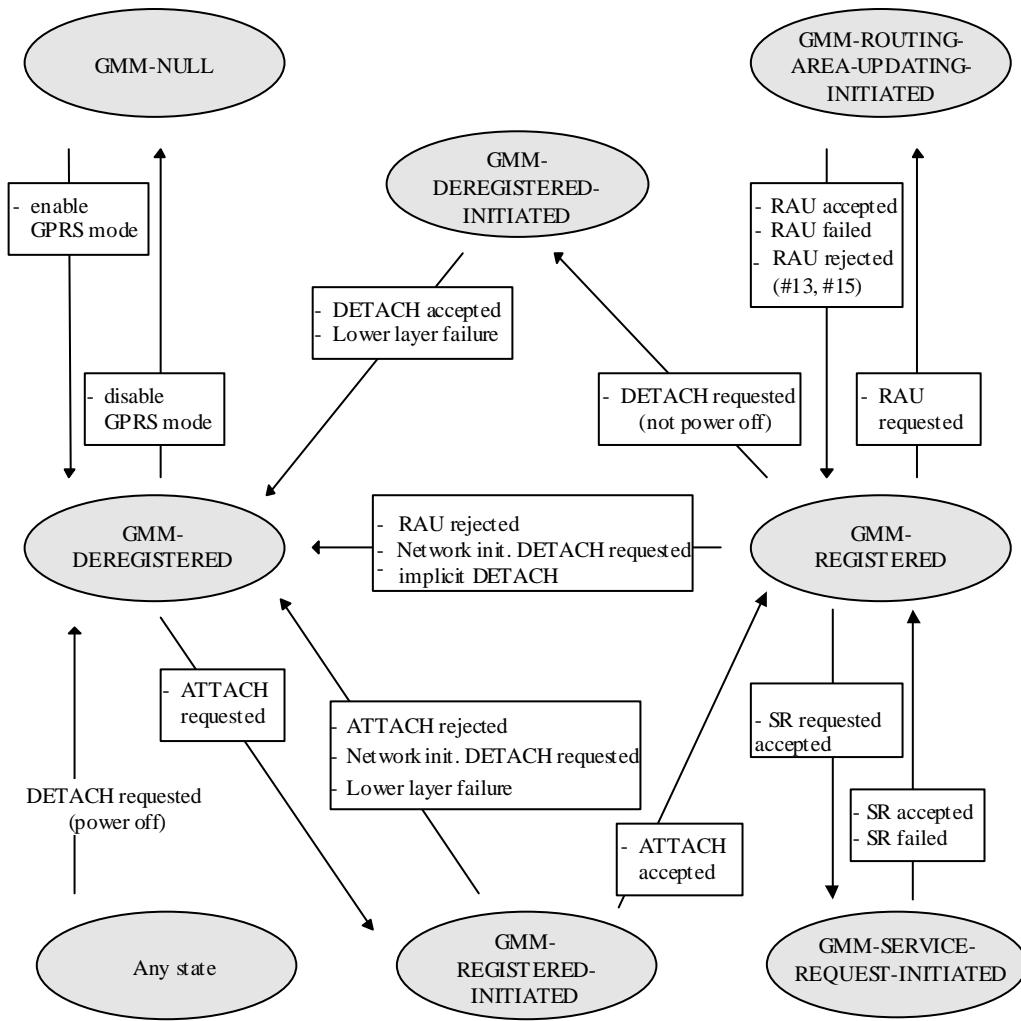
#### 4.1.3.1.3.4 GMM-REGISTERED.ATTEMPTING-TO-UPDATE

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.







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 GSM ciphering key, GPRS UMTS ciphering key, GPRS UMTS 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).

In this case, For this status, the SIM does not may contain the RAI of the routing area (RA) to which the subscriber was attached, and possibly also any valid RAI, P-TMSI, GPRS GSM ciphering key, GPRS UMTS ciphering key, GPRS UMTS integrity key or GPRS ciphering key sequence number. For compatibility reasons, all these fields must shall be set to the value "deleted" if the RAI is 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.

#### 4.4.4.7 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, delete the list of "equivalent PLMNs", 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 clause 4.1.2.2), and delete any TMSI, stored LAI and ciphering key sequence number and shall consider the SIM as invalid for non-GPRS services until switch-off or the SIM is removed.

# 11: (PLMN not allowed);

# 12: (Location Area not allowed);

# 13: (Roaming not allowed in this location area); or

# 15: (No Suitable Cells In 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 clause 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 and #15. In addition, the MS shall memorize if cause #13 was received, so to

The MS shall perform a PLMN selection instead of a cell selection when back to the MM IDLE state according to TS 23.122. The MS shall search for a suitable cell in another location area in the same PLMN if cause #15 is received.

# 12: (Location Area not allowed);

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 clause 4.1.2.2).

The mobile station shall store the LAI in the list of "forbidden location areas for regional provision of service".

The MS shall perform a cell selection when back to the MM IDLE state according to TS 03.22 and TS 25.304.

# 13: (Roaming not allowed in this location area).

The mobile station shall reset the attempt counter, set the update status to ROAMING NOT ALLOWED (and store it in the SIM according to clause 4.1.2.2).

The mobile station shall store the LAI in the list of "forbidden location areas for roaming".

The mobile station shall perform a PLMN selection instead of a cell selection when back to the MM IDLE state according to TS 23.122.

# 15: (No Suitable Cells In Location Area).

The mobile station shall reset the attempt counter, set the update status to ROAMING NOT ALLOWED (and store it in the SIM according to clause 4.1.2.2).

The mobile station shall store the LAI in the list of "forbidden location areas for roaming".

The mobile station shall perform shall search for a suitable cell in another location area in the same PLMN according to TS 03.22 and TS 25.304.

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

#### 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, deletes the list of "equivalent PLMNs", 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 clause 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 clause 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 clause 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); or~~

~~# 15 (No Suitable Cells In 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 clause 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, in the list of "forbidden location areas for roaming" for cause #13 or #15. If cause #11 or #13 was received, t~~

~~The MS shall perform a PLMN selection according to TS 23.122, instead of a cell selection. If cause #15 was received the MS shall search for a suitable cell in a different location area on the same PLMN.~~

# 12 (Location area not allowed)

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 clause 4.1.3.2) and shall reset the attach attempt counter. The state is changed to GMM-DEREGISTERED.LIMITED-SERVICE.

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 mobile station shall store the LAI in the list of "forbidden location areas for regional provision of service".

The MS shall perform a cell selection according to TS 03.22 and TS 25.304.

# 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 clause 4.1.3.2) and shall reset the attach attempt counter. The state is changed to GMM-DEREGISTERED.LIMITED-SERVICE or optionally to GMM-DEREGISTERED.PLMN-SEARCH

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 in the list of "forbidden location areas for roaming".

The MS shall perform a PLMN selection according to TS 23.122.

# 14 (GPRS services not allowed in this PLMN)

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 clause 4.1.3.2) and shall change to state GMM-DEREGISTERED.

The MS shall store the PLMN identity in the "forbidden PLMNs for GPRS service" list. A GPRS MS operating in MS operation mode C shall perform a PLMN selection instead of a cell selection.

A GPRS MS operating in MS operation mode A or B in network operation mode II or III, is still IMSI attached for CS services in the network.

# 15 (No Suitable Cells In 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 clause 4.1.3.2) and shall reset the attach attempt counter. The state is changed to GMM-DEREGISTERED.LIMITED-SERVICE.

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 in the list of "forbidden location areas for roaming"

The MS shall search for a suitable cell in another location area in the same PLMN according to TS 03.22 and TS 25.304.

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

----- [next modified section] -----

#### 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, deletes the list of equivalent PLMNs, 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 clause 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 clause 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); or~~

~~# 15 (No Suitable Cells In 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 clause 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 or #15. If cause #11 or #13 was received, t

The MS shall perform a PLMN selection according to TS 23.122. instead of a cell selection. If cause #15 was received the MS shall search for a suitable cell in a different location area on the same PLMN.

#### # 12 (Location area not allowed)

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

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 in the list of "forbidden location areas for regional provision of service".

The MS shall perform a cell selection according to TS 03.22 and TS 25.304.

#### # 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 clause 4.1.3.2) and shall reset the attach attempt counter. The state is changed to GMM-DEREGISTERED.LIMITED-SERVICE or optionally to GMM-DEREGISTERED.PLMN-SEARCH

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 mobile station shall store the LAI in the list of "forbidden location areas for roaming".

The MS shall perform a PLMN selection according to TS 23.122.

#### # 14 (GPRS services not allowed in this PLMN)

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 clause 4.1.3.2) and shall change to state GMM-DEREGISTERED.

The MS shall store the PLMN identity in the "forbidden PLMNs for GPRS service" list.

A GPRS MS operating in MS operation mode A or B shall then perform an IMSI attach for non-GPRS services by use of the MM IMSI attach procedure.

# 15 (No Suitable Cells In 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 clause 4.1.3.2) and shall reset the attach attempt counter. The state is changed to GMM-DEREGISTERED.LIMITED-SERVICE.

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 in the list of "forbidden location areas for roaming".

The MS shall search for a suitable cell in another location area in the same PLMN according to TS 03.22 and TS 25.304.

Other values are considered as abnormal cases. The specification of the MS behaviour in those cases is specified in clause 4.7.3.2.5.



#### 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 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. 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.

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 not deactivate the PDP contexts. The MS shall set the MM update status to U2 NOT UPDATED. A MS in operation mode A or B in network operation mode I may send a DETACH ACCEPT message to the network, and shall re-attach to non-GPRS service by performing the combined routing area updating procedure according to clause 4.7.5.2, sending a ROUTING AREA UPDATE REQUEST message with Update type IE indicating "combined RA/LA updating with IMSI attach". A MS in operation mode C, or in MS operation mode A or B in network operation mode II or III, shall send a DETACH ACCEPT message to the network.

If the detach type IE indicates "IMSI detach", or "re-attach required" then the MS shall ignore the cause code if received.

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.

When receiving the DETACH REQUEST message and the detach type IE indicates "re-attach not required" and the cause code is not "#2 (IMSI unknown in HLR)", 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.

If the detach type IE indicates "re-attach not required", then, 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);

##### # 6 (Illegal ME);

The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED (and shall store it according to clause 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 clause 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 shall set the timer T3212 to its initial value and restart it, if it is not already running.

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 clause 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);~~

~~# 13 (Roaming not allowed in this location area), or~~

~~# 15 (No Suitable Cells In 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 clause 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 and #15. If #11 or #13 was received, t~~

~~The MS shall perform a PLMN selection according to TS 23.122 instead of a cell selection. If cause #15 was received the MS shall search for a suitable cell in a different location area on the same PLMN.~~

# 12 (Location area not allowed)

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

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 in the list of "forbidden location areas for regional provision of service".

The MS shall perform a cell selection according to TS 03.22 and TS 25.304.

# 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 clause 4.1.3.2) and shall reset the attach attempt counter. The state is changed to GMM-DEREGISTERED.LIMITED-SERVICE or optionally to GMM-DEREGISTERED.PLMN-SEARCH

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 in the list of "forbidden location areas for roaming".

The MS shall perform a PLMN selection according to TS 23.122.

# 14 (GPRS services not allowed in this PLMN)

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 clause 4.1.3.2) and shall change to state GMM-DEREGISTERED.

The MS shall store the PLMN identity in the "forbidden PLMNs for GPRS service" list.

A GPRS MS operating in MS operation mode A or B in network operation mode I shall set the timer T3212 to its initial value and restart it, if it is not already running.

A GPRS MS operating in MS operation mode A or B, is still IMSI attached for CS services in the network.

# 15 (No Suitable Cells In 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 clause 4.1.3.2) and shall reset the attach attempt counter. The state is changed to GMM-DEREGISTERED.LIMITED-SERVICE.

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 in the list of "forbidden location areas for roaming"

The MS shall search for a suitable cell in another location area in the same PLMN according to TS 03.22 and TS 25.304.

Other cause values shall not impact the update status. Further actions of the MS are implementation dependent.

#### 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, deletes the list of "equivalent PLMNs", and stops timer T3330. The MS shall then take different actions depending on the received reject cause value:

# 3 (Illegal MS);

# 6 (Illegal ME);

The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED (and shall store it according to clause 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 clause 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.

If the update type is "periodic updating" a GPRS MS operating in MS operation mode A or B in network operation mode I shall set the timer T3212 to its initial value and restart it, if it is not already running.

# 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 clause 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); ~~or~~

# 15 (No Suitable Cells In 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 clause 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 and #15. If #11 or #13 was received, t

The MS shall perform a PLMN selection according to TS 23.122, instead of a cell selection. If cause #15 was received the MS shall search for a suitable cell in a different location area on the same PLMN.

# 12 (Location area not allowed)

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 clause 4.1.3.2), shall reset the routing area updating attempt counter and shall change to state GMM-REGISTERED.LIMITED-SERVICE.

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 mobile station shall store the LAI in the list of "forbidden location areas for regional provision of service".

The MS shall perform a cell selection according to TS 03.22 and TS 25.304.

# 13 (Roaming not allowed in this location area).

The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED (and shall store it according to clause 4.1.3.2) shall reset the routing area updating attempt counter and shall change to state GMM-REGISTERED.LIMITED-SERVICE or optionally to GMM-REGISTERED.PLMN-SEARCH(see 4.2.4.1.2).

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 reset the location update attempt counter. The new MM state is MM IDLE.

The MS shall store the LAI in the list of "forbidden location areas for roaming".

The MS shall perform a PLMN selection according to TS 23.122.

# 14 (GPRS services not allowed in this PLMN)

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 clause 4.1.3.2) and shall change to state GMM-DEREGISTERED.

The MS shall store the PLMN identity in the "forbidden PLMNs for GPRS service" list. A GPRS MS operating in MS operation mode C shall perform a PLMN selection instead of a cell selection.

If the update type is "periodic updating" a GPRS MS operating in MS operation mode A or B in network operation mode I shall set the timer T3212 to its initial value and restart it, if it is not already running.

A GPRS MS operating in MS operation mode A or B in network operation mode II or III, is still IMSI attached for CS services in the network.

# 15 (No Suitable Cells In Location Area)

The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED (and shall store it according to clause 4.1.3.2) shall reset the routing area updating attempt counter and shall change to state GMM-REGISTERED.LIMITED-SERVICE.

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 reset the location update attempt counter. The new MM state is MM IDLE.

The MS shall store the LAI in the list of "forbidden location areas for roaming".

The MS shall search for a suitable cell in another location area in the same PLMN according to TS 03.22 and TS 25.304.

Other values are considered as abnormal cases. The specification of the MS behaviour in those cases is described in clause 4.7.5.1.5.

#### 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, deletes the list of equivalent PLMNs, 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 clause 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 clause 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 and shall then proceed with the appropriate MM specific procedure according to the MM service state.

# 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 clause 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); ~~or~~

# 15 (No Suitable Cells In 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 clause 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 and #15. If #11 or #13 was received, t~~

~~The MS shall then perform a PLMN selection according to TS 23.122. instead of a cell selection. If cause #15 was received the MS shall search for a suitable cell in a different location area on the same PLMN.~~

#### # 12 (Location area not allowed)

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 clause 4.1.3.2), shall reset the routing area updating attempt counter and shall change to state GMM-REGISTERED.LIMITED-SERVICE.

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 mobile station shall store the LAI in the list of "forbidden location areas for regional provision of service".

The MS shall perform a cell selection according to TS 03.22 and TS 25.304.

#### # 13 (Roaming not allowed in this location area).

The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED (and shall store it according to clause 4.1.3.2), shall reset the routing area updating attempt counter and shall change to state GMM-REGISTERED.LIMITED-SERVICE or optionally to GMM-REGISTERED.PLMN-SEARCH(see 4.2.4.1.2).

The MS shall in addition set the update status to U3 ROAMING NOT ALLOWED and shall reset the location update attempt counter. The new MM state is MM IDLE.

The MS shall store the LAI in the list of "forbidden location areas for roaming".

The MS shall perform a PLMN selection according to TS 23.122.

#### # 14 (GPRS services not allowed in this PLMN)

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 clause 4.1.3.2) and shall change to state GMM-DEREGISTERED. If in the MS the timer T3212 is not already running, the timer shall be set to its initial value and restarted.

The MS shall store the PLMN identity in the "forbidden PLMNs for GPRS service" list.

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 and shall then proceed with the appropriate MM specific procedure according to the MM service state.

#### # 15 (No Suitable Cells In Location Area)

The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED (and shall store it according to clause 4.1.3.2), shall reset the routing area updating attempt counter and shall change to state GMM-REGISTERED.LIMITED-SERVICE.

The MS shall in addition set the update status to U3 ROAMING NOT ALLOWED and shall reset the location update attempt counter. The new MM state is MM IDLE.

The MS shall store the LAI in the list of "forbidden location areas for roaming".

The MS shall search for a suitable cell in another location area in the same PLMN according to TS 03.22 and TS 25.304.

Other values are considered as abnormal cases. The specification of the MS behaviour in those cases is described in clause 4.7.5.2.5.

----- [next modified section] -----

#### 4.7.13.4 Service request procedure not accepted by the network

- If the Service request cannot be accepted, the network returns a SERVICE REJECT message to the mobile station. An MS that receives a SERVICE REJECT message stops timer T3317. The MS shall then take different actions depending on the received reject cause value:
  - # 3 (Illegal MS);
  - # 6 (Illegal ME);
- The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED (and shall store it according to clause 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.
- A GPRS MS operating in MS operation mode A 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 clause 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 clause 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 1: 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); or~~

~~# 15 (No Suitable Cells In 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 clause 4.1.3.2) and enter the state GMM-DEREGISTERED.
- A GPRS MS operating in MS operation mode A 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 and #15. If #11 or #13 was received, t
- The MS shall perform a PLMN selection according to TS 23.122, instead of a cell selection. If cause #15 was received the MS shall search for a suitable cell in a different location area on the same PLMN.

# 12 (Location area not allowed)



- 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 clause 4.1.3.2) and shall change to state GMM-REGISTERED.LIMITED-SERVICE.
- 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 mobile station shall store the LAI in the list of "forbidden location areas for regional provision of service".
- The MS shall perform a cell selection according to TS 03.22 and TS 25.304.

# 13 (Roaming not allowed in this location area).

- The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED (and shall store it according to clause 4.1.3.2) attempt counter and shall change to state GMM-REGISTERED.LIMITED-SERVICE or optionally to GMM-REGISTERED.PLMN-SEARCH (see 4.2.4.1.2).
- 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 reset the location update attempt counter. The new MM state is MM IDLE.
- The MS shall store the LAI in the list of "forbidden location areas for roaming".
- The MS shall perform a PLMN selection according to TS 23.122.

# 15 (No Suitable Cells In Location Area)

- The MS set the GPRS update status to GU2 NOT UPDATED (and shall store it according to clause 4.1.3.2) and shall change to state GMM-REGISTERED.ATTEMPTING-TO-UPDATE.
- 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 reset the location update attempt counter. The new MM state is MM IDLE.
- The MS shall store the LAI in the list of "forbidden location areas for roaming".
- The MS shall search for a suitable cell in another location area in the same PLMN according to TS 03.22 and TS 25.304.

# 40 (No PDP context activated)

- The MS shall deactivate locally all active PDP contexts and the MS shall enter the state GMM-REGISTERED.NORMAL-SERVICE. The MS may also activate PDP context(s) to replace any previously active PDP contexts.

NOTE 2: In some cases, user interaction may be required and then the MS cannot activate the PDP context(s) automatically.

Other values are considered as abnormal cases. The specification of the MS behaviour in those cases is described in clause 4.7.13.5.

## CHANGE REQUEST

⌘ **TS 24.008 CR 524** ⌘ ev **3** ⌘ Current version: **4.4.0** ⌘

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

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

<b>Title:</b>	⌘ Impact of regional roaming restrictions on the GMM context		
<b>Source:</b>	⌘ T-Mobil, one2one, Siemens AG		
<b>Work item code:</b>	⌘ GSM/UMTS Interworking	<b>Date:</b>	⌘ Nov., 30 <sup>th</sup> 2001
<b>Category:</b>	⌘ <b>A</b> Use <u>one</u> of the following categories: <b>F</b> (correction) <b>A</b> (corresponds to a correction in an earlier release) <b>B</b> (addition of feature), <b>C</b> (functional modification of feature) <b>D</b> (editorial modification) Detailed explanations of the above categories can be found in 3GPP <a href="#">TR 21.900</a> .	<b>Release:</b>	⌘ <b>REL-4</b> Use <u>one</u> of the following releases: <b>2</b> (GSM Phase 2) <b>R96</b> (Release 1996) <b>R97</b> (Release 1997) <b>R98</b> (Release 1998) <b>R99</b> (Release 1999) <b>REL-4</b> (Release 4) <b>REL-5</b> (Release 5)

**Reason for change:** ⌘ In the current version of 24.008 it is stated that:

- MS shall delete LAI, TMSI and ciphering key sequence number stored in the SIM when reject cause #13 or #15 is received.
- MS shall delete RAI, P-TMSI, P-TMSI signature and GPRS ciphering key sequence number stored in the SIM when reject cause #13 or #15 is received.

This is not the correct UE behaviour when reject cause #13 or #15 is received, because on reception of cause #13 or #15 either PLMN or cell selection will be performed with the goal to select a other suitable and allowable cell either within the same PLMN or in a different PLMN. As a PLMN change is possible without reactivation of the PDP context the activated PDP contexts should be maintained, as the MS normally immediately reselects a suitable cell in a different location area either in the same PLMN or a different PLMN.

**Summary of change:** ⌘

- Changes in the actions upon reception of reject cause #13 and #15 in order to avoid the deactivation of the GMM context.
- In case of location update, routing area update and service request, upon reception of reject cause #13 and #15, LAI, TMSI and ciphering key sequence number, and RAI, P-TMSI, P-TMSI signature and GPRS ciphering key sequence number will not be deleted in, order to avoid unnecessary re-authentications.

Backwards compatibility to R97/98 mobile stations or R97/98 networks:

1. R97/98 MS with R99 network:  
The MS will de-activate the GMM and PDP contexts and delete LAI, TMSI, etc., upon receipt of the reject cause. The network will de-activate the contexts when the mobile reachable timer expires (equivalent to a de-activation of the MS while out of GPRS coverage).
2. R99 MS with R97/98 network:  
The network will de-activate the GMM and PDP contexts and delete LAI, TMSI, etc., upon sending the reject cause. The MS will maintain the GMM and PDP contexts and LAI, TMSI, etc. Upon the next routing area update or service request, the network will reject the request with cause #10, "implicitly detached", which will then trigger a re-attach.

For a legacy R99 implementation the same behaviour applies as for a R97/98

implementation.

**Consequences if not approved:**

⌘ The MS will loose activated PDP contexts even if this is not needed. In consequence the service offered to the subscriber will not be good as the service continuity is not ensured and the re-activation of the PDP context causes unnecessary network load.

**Clauses affected:**

⌘ 4.1.2.2; Figure 4.1b; 4.1.3.2; 4.4.4.7, 4.7.3.1.4, 4.7.3.2.4, 4.7.4.2.2, 4.7.5.1.4, 4.7.5.2.4, 4.7.13.4

**Other specs affected:**

⌘  Other core specifications ⌘   
⌘  Test specifications  
⌘  O&M Specifications

**Other comments:**

⌘

#### 4.1.2.2 The update Status

In parallel with the sublayer states described in clause 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, service request 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, GSM ciphering key, UMTS integrity key, UMTS 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, GSM ciphering key, UMTS integrity key, UMTS 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~~ may contain any valid LAI, TMSI, GSM ciphering key, UMTS integrity key, UMTS ciphering key or ciphering key sequence number. For compatibility reasons, all these fields must be set to the "deleted" value ~~if the LAI is 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 mobile station. The "Location update status" stored on the SIM shall be "Location Area not allowed".

### 4.1.3 GPRS mobility management (GMM) sublayer states

In this clause, the GMM protocol of the MS and the network are described by means of two different state machines. In clause 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 clause 4.1.3.2. The states for the network side are described in clause 4.1.3.3.

#### 4.1.3.1 GMM states in the MS

In this clause, the possible GMM states are described of a GMM entity in the mobile station. Clause 4.1.3.1.1 summarises the main states of a GMM entity, see figure 4.1b/3GPP TS 24.008. The substates that have been defined are described in clause 4.1.3.1.2 and clause 4.1.3.1.3.

However, it should be noted that this clause 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/3GPP 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 clause 4.2. Especially, with respect to the behaviour of the MS in abnormal cases it is referred to clause 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 clause 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

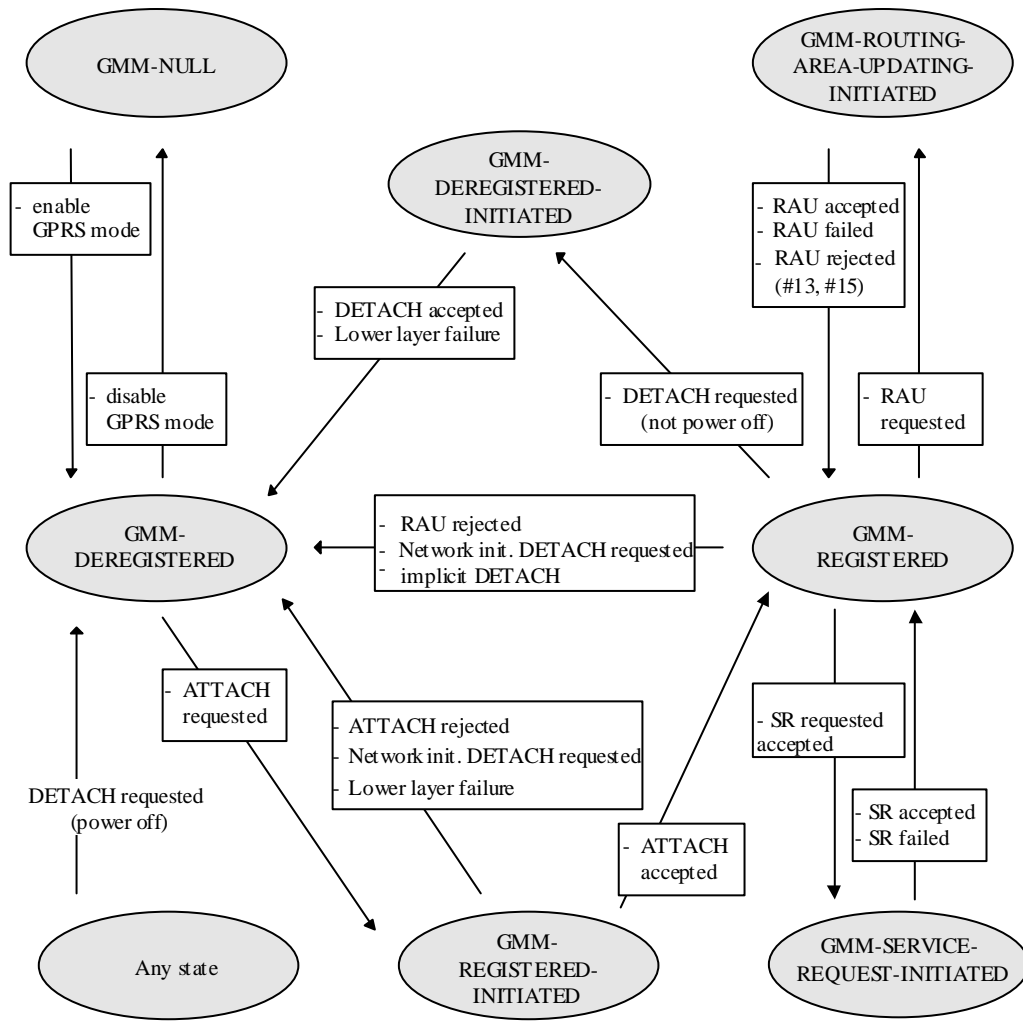
The MS has to perform a routing area updating procedure, but its access class is not allowed in the cell. The procedure will be initiated as soon as access is granted (this might be due to a cell-reselection or due to change of the access class of the current cell). No GMM procedure except routing area 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.







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 GSM ciphering key, GPRS UMTS ciphering key, GPRS UMTS 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).

In this case, For this status, the SIM does not may contain the RAI of the routing area (RA) to which the subscriber was attached, and possibly also any valid RAI, P-TMSI, GPRS GSM ciphering key, GPRS UMTS ciphering key, GPRS UMTS integrity key or GPRS ciphering key sequence number. For compatibility reasons, all these fields must shall be set to the value "deleted" if the RAI is 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.

#### 4.4.4.7 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, delete the list of "equivalent PLMNs", 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 clause 4.1.2.2), and delete any TMSI, stored LAI and ciphering key sequence number and shall consider the SIM as invalid for non-GPRS services until switch-off or the SIM is removed.

# 11: (PLMN not allowed);

# 12: (Location Area not allowed);

# 13: (Roaming not allowed in this location area); or

# 15: (No Suitable Cells In 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 clause 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 and #15. In addition, the MS shall memorize if cause #13 was received, so to

The MS shall perform a PLMN selection instead of a cell selection when back to the MM IDLE state according to TS 23.122. The MS shall search for a suitable cell in another location area in the same PLMN if cause #15 is received.

# 12: (Location Area not allowed);

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 clause 4.1.2.2).

The mobile station shall store the LAI in the list of "forbidden location areas for regional provision of service".

The MS shall perform a cell selection when back to the MM IDLE state according to TS 03.22 and TS 25.304.

# 13: (Roaming not allowed in this location area).

The mobile station shall reset the attempt counter, set the update status to ROAMING NOT ALLOWED (and store it in the SIM according to clause 4.1.2.2).

The mobile station shall store the LAI in the list of "forbidden location areas for roaming".

The mobile station shall perform a PLMN selection instead of a cell selection when back to the MM IDLE state according to TS 23.122.

# 15: (No Suitable Cells In Location Area).

The mobile station shall reset the attempt counter, set the update status to ROAMING NOT ALLOWED (and store it in the SIM according to clause 4.1.2.2).

The mobile station shall store the LAI in the list of "forbidden location areas for roaming".

The mobile station shall perform shall search for a suitable cell in another location area in the same PLMN according to TS 03.22 and TS 25.304.

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

#### 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, deletes the list of "equivalent PLMNs", 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 clause 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 clause 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 clause 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); or~~

~~# 15 (No Suitable Cells In 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 clause 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, in the list of "forbidden location areas for roaming" for cause #13 or #15. If cause #11 or #13 was received, t~~

~~The MS shall perform a PLMN selection according to TS 23.122, instead of a cell selection. If cause #15 was received the MS shall search for a suitable cell in a different location area on the same PLMN.~~

# 12 (Location area not allowed)

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 clause 4.1.3.2) and shall reset the attach attempt counter. The state is changed to GMM-DEREGISTERED.LIMITED-SERVICE.

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 mobile station shall store the LAI in the list of "forbidden location areas for regional provision of service".

The MS shall perform a cell selection according to TS 03.22 and TS 25.304.

# 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 clause 4.1.3.2) and shall reset the attach attempt counter. The state is changed to GMM-DEREGISTERED.LIMITED-SERVICE or optionally to GMM-DEREGISTERED.PLMN-SEARCH

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 in the list of "forbidden location areas for roaming".

The MS shall perform a PLMN selection according to TS 23.122.

# 14 (GPRS services not allowed in this PLMN)

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 clause 4.1.3.2) and shall change to state GMM-DEREGISTERED.

The MS shall store the PLMN identity in the "forbidden PLMNs for GPRS service" list. A GPRS MS operating in MS operation mode C shall perform a PLMN selection instead of a cell selection.

A GPRS MS operating in MS operation mode A or B in network operation mode II or III, is still IMSI attached for CS services in the network.

# 15 (No Suitable Cells In 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 clause 4.1.3.2) and shall reset the attach attempt counter. The state is changed to GMM-DEREGISTERED.LIMITED-SERVICE.

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 in the list of "forbidden location areas for roaming"

The MS shall search for a suitable cell in another location area in the same PLMN according to TS 03.22 and TS 25.304.

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

----- [next modified section] -----

#### 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, deletes the list of equivalent PLMNs, 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 clause 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 clause 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); or~~

~~# 15 (No Suitable Cells In 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 clause 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 or #15. If cause #11 or #13 was received, t

The MS shall perform a PLMN selection according to TS 23.122. instead of a cell selection. If cause #15 was received the MS shall search for a suitable cell in a different location area on the same PLMN.

#### # 12 (Location area not allowed)

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

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 in the list of "forbidden location areas for regional provision of service".

The MS shall perform a cell selection according to TS 03.22 and TS 25.304.

#### # 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 clause 4.1.3.2) and shall reset the attach attempt counter. The state is changed to GMM-DEREGISTERED.LIMITED-SERVICE or optionally to GMM-DEREGISTERED.PLMN-SEARCH

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 mobile station shall store the LAI in the list of "forbidden location areas for roaming".

The MS shall perform a PLMN selection according to TS 23.122.

#### # 14 (GPRS services not allowed in this PLMN)

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 clause 4.1.3.2) and shall change to state GMM-DEREGISTERED.

The MS shall store the PLMN identity in the "forbidden PLMNs for GPRS service" list.

A GPRS MS operating in MS operation mode A or B shall then perform an IMSI attach for non-GPRS services by use of the MM IMSI attach procedure.

# 15 (No Suitable Cells In 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 clause 4.1.3.2) and shall reset the attach attempt counter. The state is changed to GMM-DEREGISTERED.LIMITED-SERVICE.

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 in the list of "forbidden location areas for roaming".

The MS shall search for a suitable cell in another location area in the same PLMN according to TS 03.22 and TS 25.304.

Other values are considered as abnormal cases. The specification of the MS behaviour in those cases is specified in clause 4.7.3.2.5.

#### 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 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. 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.

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 not deactivate the PDP contexts. The MS shall set the MM update status to U2 NOT UPDATED. A MS in operation mode A or B in network operation mode I may send a DETACH ACCEPT message to the network, and shall re-attach to non-GPRS service by performing the combined routing area updating procedure according to clause 4.7.5.2, sending a ROUTING AREA UPDATE REQUEST message with Update type IE indicating "combined RA/LA updating with IMSI attach". A MS in operation mode C, or in MS operation mode A or B in network operation mode II or III, shall send a DETACH ACCEPT message to the network.

If the detach type IE indicates "IMSI detach", or "re-attach required" then the MS shall ignore the cause code if received.

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.

When receiving the DETACH REQUEST message and the detach type IE indicates "re-attach not required" and the cause code is not "#2 (IMSI unknown in HLR)", 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.

If the detach type IE indicates "re-attach not required", then, 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);

##### # 6 (Illegal ME);

The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED (and shall store it according to clause 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 clause 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 shall set the timer T3212 to its initial value and restart it, if it is not already running.

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 clause 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);~~

~~# 13 (Roaming not allowed in this location area), or~~

~~# 15 (No Suitable Cells In 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 clause 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 and #15. If #11 or #13 was received, t~~

~~The MS shall perform a PLMN selection according to TS 23.122 instead of a cell selection. If cause #15 was received the MS shall search for a suitable cell in a different location area on the same PLMN.~~

# 12 (Location area not allowed)

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

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 in the list of "forbidden location areas for regional provision of service".

The MS shall perform a cell selection according to TS 03.22 and TS 25.304.

# 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 clause 4.1.3.2) and shall reset the attach attempt counter. The state is changed to GMM-DEREGISTERED.LIMITED-SERVICE or optionally to GMM-DEREGISTERED.PLMN-SEARCH

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 in the list of "forbidden location areas for roaming".

The MS shall perform a PLMN selection according to TS 23.122.

# 14 (GPRS services not allowed in this PLMN)

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 clause 4.1.3.2) and shall change to state GMM-DEREGISTERED.

The MS shall store the PLMN identity in the "forbidden PLMNs for GPRS service" list.



A GPRS MS operating in MS operation mode A or B in network operation mode I shall set the timer T3212 to its initial value and restart it, if it is not already running.

A GPRS MS operating in MS operation mode A or B, is still IMSI attached for CS services in the network.

# 15 (No Suitable Cells In 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 clause 4.1.3.2) and shall reset the attach attempt counter. The state is changed to GMM-DEREGISTERED.LIMITED-SERVICE.

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 in the list of "forbidden location areas for roaming"

The MS shall search for a suitable cell in another location area in the same PLMN according to TS 03.22 and TS 25.304.

Other cause values shall not impact the update status. Further actions of the MS are implementation dependent.

#### 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, deletes the list of "equivalent PLMNs", and stops timer T3330. The MS shall then take different actions depending on the received reject cause value:

# 3 (Illegal MS);

# 6 (Illegal ME);

The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED (and shall store it according to clause 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 clause 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.

If the update type is "periodic updating" a GPRS MS operating in MS operation mode A or B in network operation mode I shall set the timer T3212 to its initial value and restart it, if it is not already running.

# 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 clause 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); ~~or~~

# 15 (No Suitable Cells In 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 clause 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 and #15. If #11 or #13 was received, t

The MS shall perform a PLMN selection according to TS 23.122, instead of a cell selection. If cause #15 was received the MS shall search for a suitable cell in a different location area on the same PLMN.

# 12 (Location area not allowed)

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 clause 4.1.3.2), shall reset the routing area updating attempt counter and shall change to state GMM-REGISTERED.LIMITED-SERVICE.

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 mobile station shall store the LAI in the list of "forbidden location areas for regional provision of service".

The MS shall perform a cell selection according to TS 03.22 and TS 25.304.

# 13 (Roaming not allowed in this location area).

The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED (and shall store it according to clause 4.1.3.2) shall reset the routing area updating attempt counter and shall change to state GMM-REGISTERED.LIMITED-SERVICE or optionally to GMM-REGISTERED.PLMN-SEARCH(see 4.2.4.1.2).

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 reset the location update attempt counter. The new MM state is MM IDLE.

The MS shall store the LAI in the list of "forbidden location areas for roaming".

The MS shall perform a PLMN selection according to TS 23.122.

# 14 (GPRS services not allowed in this PLMN)

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 clause 4.1.3.2) and shall change to state GMM-DEREGISTERED.

The MS shall store the PLMN identity in the "forbidden PLMNs for GPRS service" list. A GPRS MS operating in MS operation mode C shall perform a PLMN selection instead of a cell selection.

If the update type is "periodic updating" a GPRS MS operating in MS operation mode A or B in network operation mode I shall set the timer T3212 to its initial value and restart it, if it is not already running.

A GPRS MS operating in MS operation mode A or B in network operation mode II or III, is still IMSI attached for CS services in the network.

# 15 (No Suitable Cells In Location Area)

The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED (and shall store it according to clause 4.1.3.2) shall reset the routing area updating attempt counter and shall change to state GMM-REGISTERED.LIMITED-SERVICE.

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 reset the location update attempt counter. The new MM state is MM IDLE.

The MS shall store the LAI in the list of "forbidden location areas for roaming".

The MS shall search for a suitable cell in another location area in the same PLMN according to TS 03.22 and TS 25.304.

Other values are considered as abnormal cases. The specification of the MS behaviour in those cases is described in clause 4.7.5.1.5.

#### 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, deletes the list of equivalent PLMNs, 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 clause 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 clause 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 and shall then proceed with the appropriate MM specific procedure according to the MM service state.

# 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 clause 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); ~~or~~

# 15 (No Suitable Cells In 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 clause 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 and #15. If #11 or #13 was received, t~~

~~The MS shall then perform a PLMN selection according to TS 23.122. instead of a cell selection. If cause #15 was received the MS shall search for a suitable cell in a different location area on the same PLMN.~~

#### # 12 (Location area not allowed)

~~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 clause 4.1.3.2), shall reset the routing area updating attempt counter and shall change to state GMM-REGISTERED.LIMITED-SERVICE.~~

~~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 mobile station shall store the LAI in the list of "forbidden location areas for regional provision of service".~~

~~The MS shall perform a cell selection according to TS 03.22 and TS 25.304.~~

#### # 13 (Roaming not allowed in this location area).

~~The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED (and shall store it according to clause 4.1.3.2), shall reset the routing area updating attempt counter and shall change to state GMM-REGISTERED.LIMITED-SERVICE or optionally to GMM-REGISTERED.PLMN-SEARCH (see 4.2.4.1.2).~~

~~The MS shall in addition set the update status to U3 ROAMING NOT ALLOWED and shall reset the location update attempt counter. The new MM state is MM IDLE.~~

~~The MS shall store the LAI in the list of "forbidden location areas for roaming".~~

~~The MS shall perform a PLMN selection according to TS 23.122.~~

#### # 14 (GPRS services not allowed in this PLMN)

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 clause 4.1.3.2) and shall change to state GMM-DEREGISTERED. If in the MS the timer T3212 is not already running, the timer shall be set to its initial value and restarted.

The MS shall store the PLMN identity in the "forbidden PLMNs for GPRS service" list.

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 and shall then proceed with the appropriate MM specific procedure according to the MM service state.

#### # 15 (No Suitable Cells In Location Area)

~~The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED (and shall store it according to clause 4.1.3.2), shall reset the routing area updating attempt counter and shall change to state GMM-REGISTERED.LIMITED-SERVICE.~~

~~The MS shall in addition set the update status to U3 ROAMING NOT ALLOWED and shall reset the location update attempt counter. The new MM state is MM IDLE.~~

~~The MS shall store the LAI in the list of "forbidden location areas for roaming".~~

~~The MS shall search for a suitable cell in another location area in the same PLMN according to TS 03.22 and TS 25.304.~~

Other values are considered as abnormal cases. The specification of the MS behaviour in those cases is described in clause 4.7.5.2.5.

#### 4.7.13.4 Service request procedure not accepted by the network

- If the Service request cannot be accepted, the network returns a SERVICE REJECT message to the mobile station. An MS that receives a SERVICE REJECT message stops timer T3317. The MS shall then take different actions depending on the received reject cause value:
  - # 3 (Illegal MS);
  - # 6 (Illegal ME);
- The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED (and shall store it according to clause 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.
- A GPRS MS operating in MS operation mode A 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 clause 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 clause 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 1: 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); or~~

~~# 15 (No Suitable Cells In 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 clause 4.1.3.2) and enter the state GMM-DEREGISTERED.
- A GPRS MS operating in MS operation mode A 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 and #15. If #11 or #13 was received, t
- The MS shall perform a PLMN selection according to TS 23.122, instead of a cell selection. If cause #15 was received the MS shall search for a suitable cell in a different location area on the same PLMN.

# 12 (Location area not allowed)

- 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 clause 4.1.3.2) and shall change to state GMM-REGISTERED.LIMITED-SERVICE.
- 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 mobile station shall store the LAI in the list of "forbidden location areas for regional provision of service".
- The MS shall perform a cell selection according to TS 03.22 and TS 25.304.

# 13 (Roaming not allowed in this location area).

- The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED (and shall store it according to clause 4.1.3.2) attempt counter and shall change to state GMM-REGISTERED.LIMITED-SERVICE-~~or~~ optionally to GMM-REGISTERED.PLMN-SEARCH(see 4.2.4.1.2).
- 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 reset the location update attempt counter. The new MM state is MM IDLE.
- The MS shall store the LAI in the list of "forbidden location areas for roaming".
- The MS shall perform a PLMN selection according to TS 23.122.

# 15 (No Suitable Cells In Location Area)

- The MS set the GPRS update status to GU2 NOT UPDATED(and shall store it according to clause 4.1.3.2) and shall change to state GMM-REGISTERED.ATTEMPTING-TO-UPDATE.
- 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 reset the location update attempt counter. The new MM state is MM IDLE.
- The MS shall store the LAI in the list of "forbidden location areas for roaming"
- The MS shall search for a suitable cell in another location area in the same PLMN according to TS 03.22 and TS 25.304.

# 40 (No PDP context activated)

- The MS shall deactivate locally all active PDP contexts and the MS shall enter the state GMM-REGISTERED.NORMAL-SERVICE. The MS may also activate PDP context(s) to replace any previously active PDP contexts.

NOTE 2: In some cases, user interaction may be required and then the MS cannot activate the PDP context(s) automatically.

Other values are considered as abnormal cases. The specification of the MS behaviour in those cases is described in clause 4.7.13.5.

## CHANGE REQUEST

⌘ **TS 24.008 CR 527** ⌘ ev **3** ⌘ Current version: **5.1.0** ⌘

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

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

<b>Title:</b>	⌘ Impact of regional roaming restrictions on the GMM context		
<b>Source:</b>	⌘ T-Mobil, one2one, Siemens AG		
<b>Work item code:</b>	⌘ GSM/UMTS Interworking	<b>Date:</b>	⌘ Nov., 30 <sup>th</sup> 2001
<b>Category:</b>	⌘ <b>A</b>	<b>Release:</b>	⌘ REL-5
	Use <u>one</u> of the following categories: <b>F</b> (correction) <b>A</b> (corresponds to a correction in an earlier release) <b>B</b> (addition of feature), <b>C</b> (functional modification of feature) <b>D</b> (editorial modification) Detailed explanations of the above categories can be found in 3GPP <a href="#">TR 21.900</a> .		Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) REL-4 (Release 4) REL-5 (Release 5)

**Reason for change:** ⌘ In the current version of 24.008 it is stated that:

- MS shall delete LAI, TMSI and ciphering key sequence number stored in the SIM when reject cause #13 or #15 is received.
- MS shall delete RAI, P-TMSI, P-TMSI signature and GPRS ciphering key sequence number stored in the SIM when reject cause #13 or #15 is received.

This is not the correct UE behaviour when reject cause #13 or #15 is received, because on reception of cause #13 or #15 either PLMN or cell selection will be performed with the goal to select a other suitable and allowable cell either within the same PLMN or in a different PLMN. As a PLMN change is possible without reactivation of the PDP context the activated PDP contexts should be maintained, as the MS normally immediately reselects a suitable cell in a different location area either in the same PLMN or a different PLMN.

**Summary of change:** ⌘

- Changes in the actions upon reception of reject cause #13 and #15 corrected and in order to avoid the deactivation of the GMM context.
- In case of location update, routing area update and service request, upon reception of reject cause #13 and #15, LAI, TMSI and ciphering key sequence number, and RAI, P-TMSI, P-TMSI signature and GPRS ciphering key sequence number will not be deleted in, order to avoid unnecessary re-authentications.

Backwards compatibility to R97/98 mobile stations or R97/98 networks:

1. R97/98 MS with R99 network:  
 The MS will de-activate the GMM and PDP contexts and delete LAI, TMSI, etc., upon receipt of the reject cause. The network will de-activate the contexts when the mobile reachable timer expires (equivalent to a de-activation of the MS while out of GPRS coverage).
2. R99 MS with R97/98 network:  
 The network will de-activate the GMM and PDP contexts and delete LAI, TMSI, etc., upon sending the reject cause. The MS will maintain the GMM and PDP contexts and LAI, TMSI, etc. Upon the next routing area update or service request, the network will reject the request with cause #10, "implicitly detached", which will then trigger a re-attach.



For a legacy R99 implementation the same behaviour applies as for a R97/98 implementation.

**Consequences if not approved:**

⌘ The MS will loose activated PDP contexts even if this is not needed. In consequence the service offered to the subscriber will not be good as the service continuity is not ensured and the re-activation of the PDP context causes unnecessary network load.

**Clauses affected:**

⌘ 4.1.2.2; Figure 4.1b; 4.1.3.2; 4.4.4.7, 4.7.3.1.4, 4.7.3.2.4, 4.7.4.2.2, 4.7.5.1.4, 4.7.5.2.4, 4.7.13.4

**Other specs affected:**

⌘  Other core specifications ⌘   
⌘  Test specifications  
⌘  O&M Specifications

**Other comments:**

⌘

#### 4.1.2.2 The update Status

In parallel with the sublayer states described in clause 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, service request 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, GSM ciphering key, UMTS integrity key, UMTS 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, GSM ciphering key, UMTS integrity key, UMTS 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~~ may contain any valid LAI, TMSI, GSM ciphering key, UMTS integrity key, UMTS ciphering key or ciphering key sequence number. For compatibility reasons, all these fields must be set to the "deleted" value if the LAI is 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 mobile station. The "Location update status" stored on the SIM shall be "Location Area not allowed".

### 4.1.3 GPRS mobility management (GMM) sublayer states

In this clause, the GMM protocol of the MS and the network are described by means of two different state machines. In clause 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 clause 4.1.3.2. The states for the network side are described in clause 4.1.3.3.

#### 4.1.3.1 GMM states in the MS

In this clause, the possible GMM states are described of a GMM entity in the mobile station. Clause 4.1.3.1.1 summarises the main states of a GMM entity, see figure 4.1b/3GPP TS 24.008. The substates that have been defined are described in clause 4.1.3.1.2 and clause 4.1.3.1.3.

However, it should be noted that this clause 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/3GPP 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 clause 4.2. Especially, with respect to the behaviour of the MS in abnormal cases it is referred to clause 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 clause 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

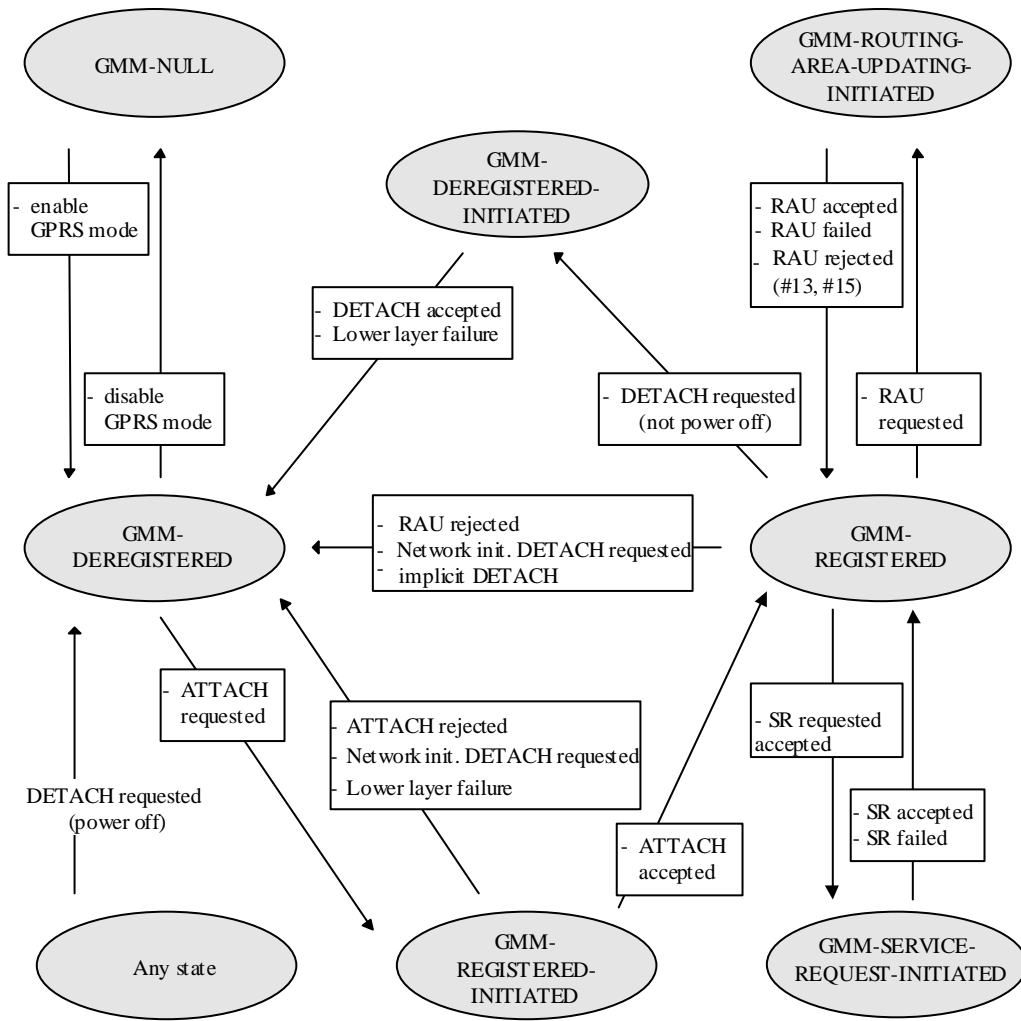
The MS has to perform a routing area updating procedure, but its access class is not allowed in the cell. The procedure will be initiated as soon as access is granted (this might be due to a cell-reselection or due to change of the access class of the current cell). No GMM procedure except routing area 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.





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 GSM ciphering key, GPRS UMTS ciphering key, GPRS UMTS 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).

In this case, For this status, the SIM does not may contain the RAI of the routing area (RA) to which the subscriber was attached, and possibly also any valid RAI, P-TMSI, GPRS GSM ciphering key, GPRS UMTS ciphering key, GPRS UMTS integrity key or GPRS ciphering key sequence number. For compatibility reasons, all these fields must shall be set to the value "deleted" if the RAI is 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.

#### 4.4.4.7 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, delete the list of "equivalent PLMNs", 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 clause 4.1.2.2), and delete any TMSI, stored LAI and ciphering key sequence number and shall consider the SIM as invalid for non-GPRS services until switch-off or the SIM is removed.

# 11: (PLMN not allowed);

# 12: (Location Area not allowed);

# 13: (Roaming not allowed in this location area); or

# 15: (No Suitable Cells In 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 clause 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 and #15. In addition, the MS shall memorize if cause #13 was received, so to

The MS shall perform a PLMN selection instead of a cell selection when back to the MM IDLE state according to TS 23.122. The MS shall search for a suitable cell in another location area in the same PLMN if cause #15 is received.

# 12: (Location Area not allowed);

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 clause 4.1.2.2).

The mobile station shall store the LAI in the list of "forbidden location areas for regional provision of service".

The MS shall perform a cell selection when back to the MM IDLE state according to TS 03.22 and TS 25.304.

# 13: (Roaming not allowed in this location area).

The mobile station shall reset the attempt counter, set the update status to ROAMING NOT ALLOWED (and store it in the SIM according to clause 4.1.2.2).

The mobile station shall store the LAI in the list of "forbidden location areas for roaming".

The mobile station shall perform a PLMN selection instead of a cell selection when back to the MM IDLE state according to TS 23.122.

# 15: (No Suitable Cells In Location Area).

The mobile station shall reset the attempt counter, set the update status to ROAMING NOT ALLOWED (and store it in the SIM according to clause 4.1.2.2).

The mobile station shall store the LAI in the list of "forbidden location areas for roaming".

The mobile station shall perform shall search for a suitable cell in another location area in the same PLMN according to TS 03.22 and TS 25.304.

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



#### 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, deletes the list of "equivalent PLMNs", 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 clause 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 clause 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 clause 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); or~~

~~# 15 (No Suitable Cells In 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 clause 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, in the list of "forbidden location areas for roaming" for cause #13 or #15. If cause #11 or #13 was received, t~~

~~The MS shall perform a PLMN selection according to TS 23.122, instead of a cell selection. If cause #15 was received the MS shall search for a suitable cell in a different location area on the same PLMN.~~

# 12 (Location area not allowed)

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 clause 4.1.3.2) and shall reset the attach attempt counter. The state is changed to GMM-DEREGISTERED.LIMITED-SERVICE.

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 mobile station shall store the LAI in the list of "forbidden location areas for regional provision of service".

The MS shall perform a cell selection according to TS 03.22 and TS 25.304.

# 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 clause 4.1.3.2) and shall reset the attach attempt counter. The state is changed to GMM-DEREGISTERED.LIMITED-SERVICE or optionally to GMM-DEREGISTERED.PLMN-SEARCH

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 in the list of "forbidden location areas for roaming".

The MS shall perform a PLMN selection according to TS 23.122.

# 14 (GPRS services not allowed in this PLMN)

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 clause 4.1.3.2) and shall change to state GMM-DEREGISTERED.

The MS shall store the PLMN identity in the "forbidden PLMNs for GPRS service" list. A GPRS MS operating in MS operation mode C shall perform a PLMN selection instead of a cell selection.

A GPRS MS operating in MS operation mode A or B in network operation mode II or III, is still IMSI attached for CS services in the network.

# 15 (No Suitable Cells In 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 clause 4.1.3.2) and shall reset the attach attempt counter. The state is changed to GMM-DEREGISTERED.LIMITED-SERVICE.

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 in the list of "forbidden location areas for roaming"

The MS shall search for a suitable cell in another location area in the same PLMN according to TS 03.22 and TS 25.304.

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

----- [next modified section] -----

#### 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, deletes the list of equivalent PLMNs, 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 clause 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 clause 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); or~~

~~# 15 (No Suitable Cells In 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 clause 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 or #15. If cause #11 or #13 was received, t

The MS shall perform a PLMN selection according to TS 23.122. instead of a cell selection. If cause #15 was received the MS shall search for a suitable cell in a different location area on the same PLMN.

#### # 12 (Location area not allowed)

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

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 in the list of "forbidden location areas for regional provision of service".

The MS shall perform a cell selection according to TS 03.22 and TS 25.304.

#### # 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 clause 4.1.3.2) and shall reset the attach attempt counter. The state is changed to GMM-DEREGISTERED.LIMITED-SERVICE or optionally to GMM-DEREGISTERED.PLMN-SEARCH

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 mobile station shall store the LAI in the list of "forbidden location areas for roaming".

The MS shall perform a PLMN selection according to TS 23.122.

#### # 14 (GPRS services not allowed in this PLMN)

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 clause 4.1.3.2) and shall change to state GMM-DEREGISTERED.

The MS shall store the PLMN identity in the "forbidden PLMNs for GPRS service" list.

A GPRS MS operating in MS operation mode A or B shall then perform an IMSI attach for non-GPRS services by use of the MM IMSI attach procedure.

# 15 (No Suitable Cells In 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 clause 4.1.3.2) and shall reset the attach attempt counter. The state is changed to GMM-DEREGISTERED.LIMITED-SERVICE.

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 in the list of "forbidden location areas for roaming".

The MS shall search for a suitable cell in another location area in the same PLMN according to TS 03.22 and TS 25.304.

Other values are considered as abnormal cases. The specification of the MS behaviour in those cases is specified in clause 4.7.3.2.5.

#### 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 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. 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.

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 not deactivate the PDP contexts. The MS shall set the MM update status to U2 NOT UPDATED. A MS in operation mode A or B in network operation mode I may send a DETACH ACCEPT message to the network, and shall re-attach to non-GPRS service by performing the combined routing area updating procedure according to clause 4.7.5.2, sending a ROUTING AREA UPDATE REQUEST message with Update type IE indicating "combined RA/LA updating with IMSI attach". A MS in operation mode C, or in MS operation mode A or B in network operation mode II or III, shall send a DETACH ACCEPT message to the network.

If the detach type IE indicates "IMSI detach", or "re-attach required" then the MS shall ignore the cause code if received.

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.

When receiving the DETACH REQUEST message and the detach type IE indicates "re-attach not required" and the cause code is not "#2 (IMSI unknown in HLR)", 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.

If the detach type IE indicates "re-attach not required", then, 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);

##### # 6 (Illegal ME);

The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED (and shall store it according to clause 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 clause 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 shall set the timer T3212 to its initial value and restart it, if it is not already running.

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 clause 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);~~

~~# 13 (Roaming not allowed in this location area), or~~

~~# 15 (No Suitable Cells In 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 clause 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 and #15. If #11 or #13 was received, t~~

~~The MS shall perform a PLMN selection according to TS 23.122 instead of a cell selection. If cause #15 was received the MS shall search for a suitable cell in a different location area on the same PLMN.~~

# 12 (Location area not allowed)

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

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 in the list of "forbidden location areas for regional provision of service".

The MS shall perform a cell selection according to TS 03.22 and TS 25.304.

# 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 clause 4.1.3.2) and shall reset the attach attempt counter. The state is changed to GMM-DEREGISTERED.LIMITED-SERVICE or optionally to GMM-DEREGISTERED.PLMN-SEARCH

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 in the list of "forbidden location areas for roaming".

The MS shall perform a PLMN selection according to TS 23.122.

# 14 (GPRS services not allowed in this PLMN)

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 clause 4.1.3.2) and shall change to state GMM-DEREGISTERED.

The MS shall store the PLMN identity in the "forbidden PLMNs for GPRS service" list.

A GPRS MS operating in MS operation mode A or B in network operation mode I shall set the timer T3212 to its initial value and restart it, if it is not already running.

A GPRS MS operating in MS operation mode A or B, is still IMSI attached for CS services in the network.

# 15 (No Suitable Cells In 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 clause 4.1.3.2) and shall reset the attach attempt counter. The state is changed to GMM-DEREGISTERED.LIMITED-SERVICE.

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 in the list of "forbidden location areas for roaming"

The MS shall search for a suitable cell in another location area in the same PLMN according to TS 03.22 and TS 25.304.

Other cause values shall not impact the update status. Further actions of the MS are implementation dependent.

#### 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, deletes the list of "equivalent PLMNs", and stops timer T3330. The MS shall then take different actions depending on the received reject cause value:

# 3 (Illegal MS);

# 6 (Illegal ME);

The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED (and shall store it according to clause 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 clause 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.

If the update type is "periodic updating" a GPRS MS operating in MS operation mode A or B in network operation mode I shall set the timer T3212 to its initial value and restart it, if it is not already running.

# 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 clause 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); ~~or~~

# 15 (No Suitable Cells In 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 clause 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 and #15. If #11 or #13 was received, t



The MS shall perform a PLMN selection according to TS 23.122, instead of a cell selection. If cause #15 was received the MS shall search for a suitable cell in a different location area on the same PLMN.

# 12 (Location area not allowed)

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 clause 4.1.3.2), shall reset the routing area updating attempt counter and shall change to state GMM-REGISTERED.LIMITED-SERVICE.

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 mobile station shall store the LAI in the list of "forbidden location areas for regional provision of service".

The MS shall perform a cell selection according to TS 03.22 and TS 25.304.

# 13 (Roaming not allowed in this location area).

The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED (and shall store it according to clause 4.1.3.2) shall reset the routing area updating attempt counter and shall change to state GMM-REGISTERED.LIMITED-SERVICE or optionally to GMM-REGISTERED.PLMN-SEARCH(see 4.2.4.1.2).

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 reset the location update attempt counter. The new MM state is MM IDLE.

The MS shall store the LAI in the list of "forbidden location areas for roaming".

The MS shall perform a PLMN selection according to TS 23.122.

# 14 (GPRS services not allowed in this PLMN)

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 clause 4.1.3.2) and shall change to state GMM-DEREGISTERED.

The MS shall store the PLMN identity in the "forbidden PLMNs for GPRS service" list. A GPRS MS operating in MS operation mode C shall perform a PLMN selection instead of a cell selection.

If the update type is "periodic updating" a GPRS MS operating in MS operation mode A or B in network operation mode I shall set the timer T3212 to its initial value and restart it, if it is not already running.

A GPRS MS operating in MS operation mode A or B in network operation mode II or III, is still IMSI attached for CS services in the network.

# 15 (No Suitable Cells In Location Area)

The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED (and shall store it according to clause 4.1.3.2) shall reset the routing area updating attempt counter and shall change to state GMM-REGISTERED.LIMITED-SERVICE.

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 reset the location update attempt counter. The new MM state is MM IDLE.

The MS shall store the LAI in the list of "forbidden location areas for roaming".

The MS shall search for a suitable cell in another location area in the same PLMN according to TS 03.22 and TS 25.304.

Other values are considered as abnormal cases. The specification of the MS behaviour in those cases is described in clause 4.7.5.1.5.

#### 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, deletes the list of equivalent PLMNs, 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 clause 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 clause 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 and shall then proceed with the appropriate MM specific procedure according to the MM service state.

# 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 clause 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); ~~or~~

# 15 (No Suitable Cells In 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 clause 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 and #15. If #11 or #13 was received, t~~

~~The MS shall then perform a PLMN selection according to TS 23.122. instead of a cell selection. If cause #15 was received the MS shall search for a suitable cell in a different location area on the same PLMN.~~

#### # 12 (Location area not allowed)

~~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 clause 4.1.3.2), shall reset the routing area updating attempt counter and shall change to state GMM-REGISTERED.LIMITED-SERVICE.~~

~~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 mobile station shall store the LAI in the list of "forbidden location areas for regional provision of service".~~

~~The MS shall perform a cell selection according to TS 03.22 and TS 25.304.~~

#### # 13 (Roaming not allowed in this location area).

~~The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED (and shall store it according to clause 4.1.3.2), shall reset the routing area updating attempt counter and shall change to state GMM-REGISTERED.LIMITED-SERVICE or optionally to GMM-REGISTERED.PLMN-SEARCH (see 4.2.4.1.2).~~

~~The MS shall in addition set the update status to U3 ROAMING NOT ALLOWED and shall reset the location update attempt counter. The new MM state is MM IDLE.~~

~~The MS shall store the LAI in the list of "forbidden location areas for roaming".~~

~~The MS shall perform a PLMN selection according to TS 23.122.~~

#### # 14 (GPRS services not allowed in this PLMN)

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 clause 4.1.3.2) and shall change to state GMM-DEREGISTERED. If in the MS the timer T3212 is not already running, the timer shall be set to its initial value and restarted.

The MS shall store the PLMN identity in the "forbidden PLMNs for GPRS service" list.

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 and shall then proceed with the appropriate MM specific procedure according to the MM service state.

#### # 15 (No Suitable Cells In Location Area)

~~The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED (and shall store it according to clause 4.1.3.2), shall reset the routing area updating attempt counter and shall change to state GMM-REGISTERED.LIMITED-SERVICE.~~

~~The MS shall in addition set the update status to U3 ROAMING NOT ALLOWED and shall reset the location update attempt counter. The new MM state is MM IDLE.~~

~~The MS shall store the LAI in the list of "forbidden location areas for roaming".~~

~~The MS shall search for a suitable cell in another location area in the same PLMN according to TS 03.22 and TS 25.304.~~

Other values are considered as abnormal cases. The specification of the MS behaviour in those cases is described in clause 4.7.5.2.5.

#### 4.7.13.4 Service request procedure not accepted by the network

- If the Service request cannot be accepted, the network returns a SERVICE REJECT message to the mobile station. An MS that receives a SERVICE REJECT message stops timer T3317. The MS shall then take different actions depending on the received reject cause value:
  - # 3 (Illegal MS);
  - # 6 (Illegal ME);
- The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED (and shall store it according to clause 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.
- A GPRS MS operating in MS operation mode A 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 clause 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 clause 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 1: 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); or~~

~~# 15 (No Suitable Cells In 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 clause 4.1.3.2) and enter the state GMM-DEREGISTERED.
- A GPRS MS operating in MS operation mode A 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 and #15. If #11 or #13 was received, t
- The MS shall perform a PLMN selection according to TS 23.122, instead of a cell selection. If cause #15 was received the MS shall search for a suitable cell in a different location area on the same PLMN.

# 12 (Location area not allowed)

- 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 clause 4.1.3.2) and shall change to state GMM-REGISTERED.LIMITED-SERVICE.
- 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 mobile station shall store the LAI in the list of "forbidden location areas for regional provision of service".
- The MS shall perform a cell selection according to TS 03.22 and TS 25.304.

# 13 (Roaming not allowed in this location area).

- The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED (and shall store it according to clause 4.1.3.2) attempt counter and shall change to state GMM-REGISTERED.LIMITED-SERVICE-~~or~~ optionally to GMM-REGISTERED.PLMN-SEARCH(see 4.2.4.1.2).
- 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 reset the location update attempt counter. The new MM state is MM IDLE.
- The MS shall store the LAI in the list of "forbidden location areas for roaming".
- The MS shall perform a PLMN selection according to TS 23.122.

# 15 (No Suitable Cells In Location Area)

- The MS set the GPRS update status to GU2 NOT UPDATED(and shall store it according to clause 4.1.3.2) and shall change to state GMM-REGISTERED.ATTEMPTING-TO-UPDATE.
- 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 reset the location update attempt counter. The new MM state is MM IDLE.
- The MS shall store the LAI in the list of "forbidden location areas for roaming"
- The MS shall search for a suitable cell in another location area in the same PLMN according to TS 03.22 and TS 25.304.

# 40 (No PDP context activated)

- The MS shall deactivate locally all active PDP contexts and the MS shall enter the state GMM-REGISTERED.NORMAL-SERVICE. The MS may also activate PDP context(s) to replace any previously active PDP contexts.

NOTE 2: In some cases, user interaction may be required and then the MS cannot activate the PDP context(s) automatically.

Other values are considered as abnormal cases. The specification of the MS behaviour in those cases is described in clause 4.7.13.5.