3GPP TSG CN Plenary Meeting #14 **NP-010646**
Kyoto, Japan, 12th –14th December 2001

Source: **TSG CN WG 1**

Title: **CRs to R97 (with mirror CRs) on Work Item GPRS towards 09.18**

Agenda item: **7.12**

Document for: **APPROVAL**

Introduction:

This document contains **6** CRs on **R97 (with mirror CRs) to** Work Item **"GPRS"**, 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
09.18	A046		R97	Clarification of the periodic routing area update procedure	F	6.6.0	6.7.0	N1-011449
09.18	A047		R98	Clarification of the periodic routing area update procedure	Á	7.4.0	7.5.0	N1-011450
09.18	A048	1	R97	Correction of the Reject cause when T6-1 expires	F	6.6.0	6.7.0	N1-011574
09.18	A049		R98	Correction of the Reject cause when T6-1 expires	F	7.4.0	7.5.0	N1-011605
29.018	019		R99	Clarification of the periodic routing area update procedure	A	3.7.0	3.8.0	N1-011451
29.018	020		Rel-4	Clarification of the periodic routing area update procedure	A	4.1.0	4.2.0	N1-011452

3GPP TSG-CN1 Meeting #20 ***Tdoc N1-011449***
Brighton, England, 15.-19. October 2001

CR-Form-v4

CHANGE REQUEST

⌘ **09.18** **CR** **A046** ⌘ ev **-** ⌘ Current version: **6.6.0** ⌘

*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 ☒

Title:	⌘	Clarification of the periodic routing area update procedure
Source:	⌘	Siemens AG
Work item code:	⌘	GPRS
Date:	⌘	27.09.01
Category:	⌘	**F**
Release:	⌘	R97

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

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
REL-4	*(Release 4)*
REL-5	*(Release 5)*

Reason for change:	⌘	The current description of the periodic routing area update is incomplete, as neither the description of the states at the SGSN (subclause 4.2.2) nor the procedural description (subclause 6.1) specify what happens with the state of the association in the SGSN.
Summary of change:	⌘	It is clarified that the state of the association in the SGSN is not changed.
Consequences if not approved:	⌘	Risk of a wrong implementation: If the state of the association in the SGSN is moved to Gs-NULL when the mobile station performs a periodic routing area update, mobile stations in class A or B mode of operation can no longer be paged for circuit switched services if a PCCCH is allocated in the cell.

Clauses affected:	⌘	6.1
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

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

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

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

4.2.2 States at the SGSN

Gs-NULL

There is no association with a VLR for the MS and therefore the SGSN considers that the MS is IMSI detached of non-GPRS services. In this state the SGSN accepts BSSAP+-PAGING-REQUEST messages to MSs only if the 'SGSN-Reset' restoration indicator in the SGSN is set to 'true'.

LA-UPDATE Requested

The SGSN has sent a BSSAP+-LOCATION-UPDATE-REQUEST message to the VLR. In this state the SGSN waits for the outcome of the Location Update for non-GPRS procedure at the VLR before sending the response to the MS. In this state the SGSN accepts BSSAP+-PAGING-REQUEST messages.

Gs-ASSOCIATED

The SGSN stores an association for that MS. In this state the SGSN performs the Location Update for non-GPRS services procedure towards the VLR for MSs in class-A and MSs in class-B mode of operation when the MS moves to a new LA.

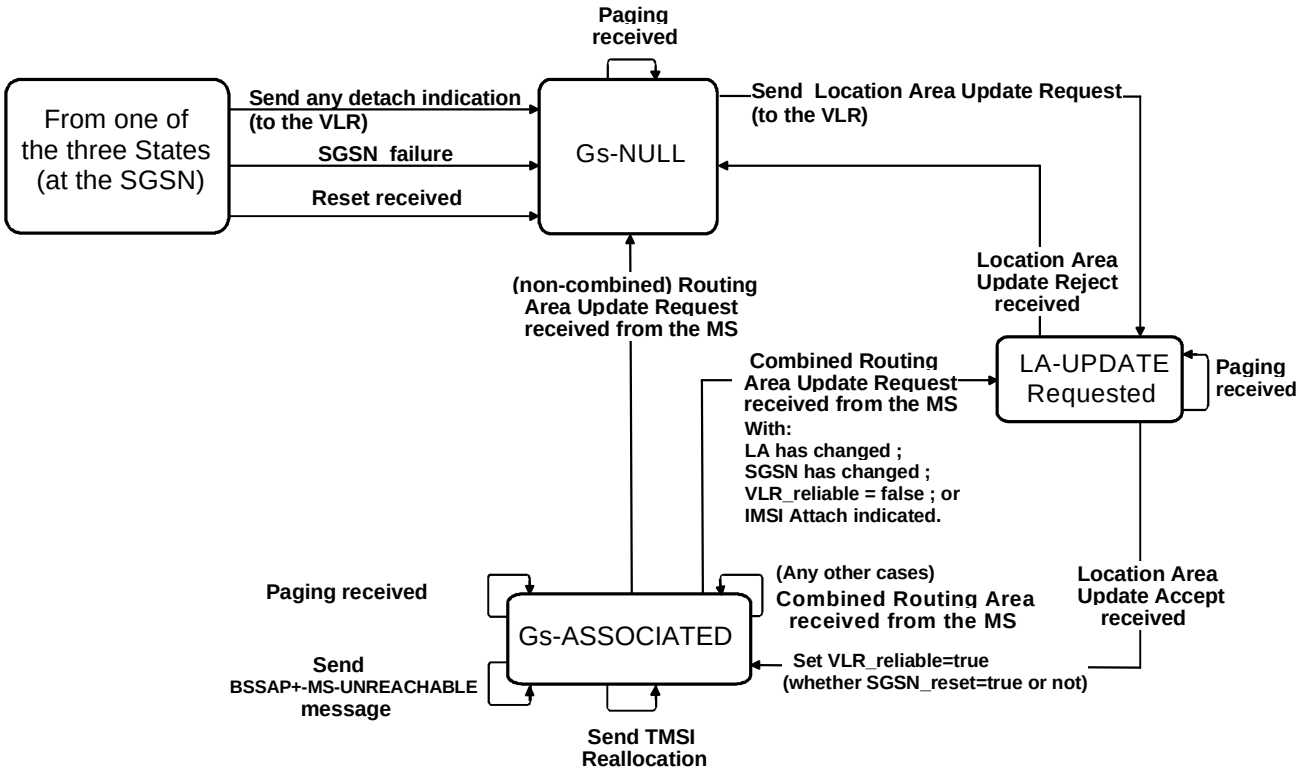

Figure 4.2/GSM 09.18: State diagram at the SGSN

********** FIRST MODIFIED SECTION **********

6 Location Update for non-GPRS services procedure

6.1 General description

The location update for non-GPRS services procedure is a general procedure used by MSs in class-A mode of operation and MSs in class-B mode of operation. This procedure allows MSs and network to perform:

- Combined IMSI attach for GPRS and non-GPRS services.
- IMSI attach for non-GPRS services if the MS is already IMSI attached for GPRS services.
- IMSI attach for GPRS services indication to the VLR if the MS is already IMSI attached for non-GPRS services
- Normal Location Update procedure to the VLR if the MS is IMSI attached for both GPRS and non-GPRS services.
- Reallocation of TMSI to an MS.

The Location Update for non-GPRS services procedures in the Gs interface is always started as a consequence of a direct action by the MS. The combined routeing area update procedure is further specified in GSM 03.60 and 04.08.

The Location Update for non-GPRS services procedure is used by the SGSN to forward to the VLR those parts of the combined routeing area update or IMSI attach procedure which belong to the non-GPRS services. This means that non-GPRS related requests which are included in the combined request, are sent from the SGSN to the VLR. The procedure is also used by the SGSN to indicate to the VLR when an IMSI attach to GPRS services has been performed by an MS that was already IMSI attached to non-GPRS services. The SGSN may also forward a BSSAP+-TMSI-REALLOCATION-COMPLETE message from the MS to the VLR.

The VLR shall acknowledge the BSSAP+-LOCATION-UPDATE-REQUEST message. When the VLR processes the request it does not perform authentication because it relies on the SGSN's security functions.

When an MS is IMSI attached for GPRS and non-GPRS services, any implicit detach timer in the VLR shall be stopped. Instead the Paging Proceed Flag in the SGSN is used to determine the likely availability of the MS to the network. Upon reception of the periodic Routeing Area Update message ~~T~~the SGSN does not report to the VLR ~~upon reception of the periodic Routeing Area Update message.~~, and the state of the association at the SGSN is not changed. When the MS performs a detach only from the GPRS system the GPRS detach indication to the VLR shall cause the VLR's implicit detach timer to be restarted from its initial value.

If the SGSN performs an implicit detach for both GPRS and non-GPRS traffic, then the SGSN shall indicate to the VLR a BSSAP+-IMSI-DETACH-INDICATION message with cause 'Implicit SGSN initiated IMSI detach from non-GPRS service', as further described in section 'Implicit IMSI detach from non-GPRS service procedure' (the implicit IMSI detach message indicates that the MS is unavailable for both GPRS and non-GPRS services).

The IMSI attach for GPRS services to the VLR, when the MS is already IMSI attached for non-GPRS services, is requested by the MS sending a combined IMSI attach for GPRS and non-GPRS services message to the SGSN, as further specified in GSM 03.60 and 04.08.

3GPP TSG-CN1 Meeting #20 ***Tdoc N1-011450***
Brighton, England, 15.-19. October 2001

CR-Form-v4

CHANGE REQUEST

⌘ **09.18** **CR** **A047** ⌘ ev **-** ⌘ Current version: **7.4.0** ⌘

*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 ☒

Title:	⌘	Clarification of the periodic routing area update procedure
Source:	⌘	Siemens AG
Work item code:	⌘	GPRS
Date:	⌘	27.09.01
Category:	⌘	**A**
Release:	⌘	R98

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
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Use one of the following releases:

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R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
REL-4	*(Release 4)*
REL-5	*(Release 5)*

Reason for change:	⌘	The current description of the periodic routing area update is incomplete, as neither the description of the states at the SGSN (subclause 4.2.2) nor the procedural description (subclause 6.1) specify what happens with the state of the association in the SGSN.
Summary of change:	⌘	It is clarified that the state of the association in the SGSN is not changed.
Consequences if not approved:	⌘	Risk of a wrong implementation: If the state of the association in the SGSN is moved to Gs-NULL when the mobile station performs a periodic routing area update, mobile stations in class A or B mode of operation can no longer be paged for circuit switched services if a PCCCH is allocated in the cell.

Clauses affected:	⌘	6.1
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

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6 Location Update for non-GPRS services procedure

6.1 General description

The location update for non-GPRS services procedure is a general procedure used by MSs in class-A mode of operation and MSs in class-B mode of operation. This procedure allows MSs and network to perform:

- Combined IMSI attach for GPRS and non-GPRS services.
- IMSI attach for non-GPRS services if the MS is already IMSI attached for GPRS services.
- IMSI attach for GPRS services indication to the VLR if the MS is already IMSI attached for non-GPRS services
- Normal Location Update procedure to the VLR if the MS is IMSI attached for both GPRS and non-GPRS services.
- Reallocation of TMSI to an MS.

The Location Update for non-GPRS services procedures in the Gs interface is always started as a consequence of a direct action by the MS. The combined routeing area update procedure is further specified in GSM 03.60 and 04.08.

The Location Update for non-GPRS services procedure is used by the SGSN to forward to the VLR those parts of the combined routeing area update or IMSI attach procedure which belong to the non-GPRS services. This means that non-GPRS related requests which are included in the combined request, are sent from the SGSN to the VLR. The procedure is also used by the SGSN to indicate to the VLR when an IMSI attach to GPRS services has been performed by an MS that was already IMSI attached to non-GPRS services. The SGSN may also forward a BSSAP+-TMSI-REALLOCATION-COMPLETE message from the MS to the VLR.

The VLR shall acknowledge the BSSAP+-LOCATION-UPDATE-REQUEST message. When the VLR processes the request it does not perform authentication because it relies on the SGSN's security functions.

When an MS is IMSI attached for GPRS and non-GPRS services, any implicit detach timer in the VLR shall be stopped. Instead the Paging Proceed Flag in the SGSN is used to determine the likely availability of the MS to the network. Upon reception of the periodic Routeing Area Update message ~~T~~the SGSN does not report to the VLR ~~upon reception of the periodic Routeing Area Update message.~~, and the state of the association at the SGSN is not changed. When the MS performs a detach only from the GPRS system the GPRS detach indication to the VLR shall cause the VLR's implicit detach timer to be restarted from its initial value.

If the SGSN performs an implicit detach for both GPRS and non-GPRS traffic, then the SGSN shall indicate to the VLR a BSSAP+-IMSI-DETACH-INDICATION message with cause 'Implicit SGSN initiated IMSI detach from non-GPRS service', as further described in section 'Implicit IMSI detach from non-GPRS service procedure' (the implicit IMSI detach message indicates that the MS is unavailable for both GPRS and non-GPRS services).

The IMSI attach for GPRS services to the VLR, when the MS is already IMSI attached for non-GPRS services, is requested by the MS sending a combined IMSI attach for GPRS and non-GPRS services message to the SGSN, as further specified in GSM 03.60 and 04.08.

3GPP TSG-CN1 Meeting #20
Brighton, England, 15-19 October 2001

Tdoc N1-011574
revised N1-011463

CR-Form-v4

CHANGE REQUEST

⌘ **09.18** **CR** **A048** ⌘ rev. **1** ⌘ Current version: **6.6.0** ⌘

*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 **X**

Title:	⌘	Correction of the Reject cause used when ~~T1-6~~ T6-1 expires
Source:	⌘	Motorola
Work item code:	⌘	GPRS
Date:	⌘	~~Sep. 14~~Oct. 16, 2001
Category:	⌘	**F**
Release:	⌘	R97

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

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

Reason for change: ⌘ Due to misalignment between TS 04.08 and TS 09.18 the following essential problem can arise in GPRS networks operating in NMO I:

- The MS initiates a Combined attach for GPRS and non-GPRS services.
- In response, the SGSN initiates the Location Update for non-GPRS services procedure on the Gs interface and, therefore, it sends a BSSAP+-LOCATION-UPDATE-REQUEST message to the VLR.
- The VLR does not respond in due time and timer T6-1 expires.
- According to 09.18, clause 6.2.4, "the SGSN shall abort the Location Update for non-GPRS service procedure and indicate this to the MS with the Reject cause value 'Service option temporarily out of order'."
- However, according to 04.08, clause 4.7.3.2.3.2, the MS does not expect this Reject cause and, therefore, "the combined attach procedure shall be considered as failed for GPRS and non-GPRS services."

Similar scenarios can arise in other combined procedures.

Summary of change: ⌘ The CR provides an essential correction: It specifies that, the Reject cause used when ~~T1-6~~ T6-1 expires will be 'MSC temporarily not reachable'. ~~the one specified in 04.08.~~ This is already specified in 29.018.

Consequences if not approved: ⌘ Misalignmet between 04.08 and 09.18. If the SGSN complies with the current 09.18, then:

- When a combined procedure fails for non-GPRS services but succeeds for GPRS services, the mobile will consider the procedure as failed for both GPRS and non-GPRS services.

Clauses affected: ⌘ 6.2.4

Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	
Other comments:	⌘	Identical revisions have already been made to 29.018 (see N1-000911).		

6.2.4 Abnormal cases

If timer T6-1 expires, the SGSN shall abort the Location Update for non-GPRS service procedure and indicate this to the MS with the Reject cause value ‘MSC temporarily not reachable’. ~~‘Service option temporarily out of order’.~~ The state of the association to the VLR shall be Gs-NULL.

If the SGSN receives a BSSAP+LOCATION-UPDATE-ACCEPT message and timer T6-1 is not running then:

- If timer T8 is running (see section 8), the message shall be ignored;
- If timer T9 is running (see section 9), the message shall be ignored; or
- If timers T8 and T9 are not running:
  - If the state of the association to the VLR is GS-ASSOCIATED, the message shall be ignored; or
  - If the state of the association to the VLR is different than GS-ASSOCIATED, the message shall be treated as a message incompatible with the protocol state of the SGSN (see section 16.3).

3GPP TSG-CN1 Meeting #20
Brighton, England, 15-19 October 2001

Tdoc N1-011605

CR-Form-v4

CHANGE REQUEST

⌘ **09.18** **CR** **A049** ⌘ rev. **-** ⌘ Current version: **7.4.0** ⌘

*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 ☒

Title: ⌘	Correction of the Reject cause when T6-1 expires	
Source: ⌘	Motorola	
Work item code: ⌘	GPRS	***Date:*** ⌘ Oct. 16, 2001
Category: ⌘	**A**	***Release:*** ⌘ R98

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

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

Reason for change: ⌘

Due to misalignment between TS 04.08 and TS 09.18 the following essential problem can arise in GPRS networks operating in NMO I:

- The MS initiates a Combined attach for GPRS and non-GPRS services.
- In response, the SGSN initiates the Location Update for non-GPRS services procedure on the Gs interface and, therefore, it sends a BSSAP+-LOCATION-UPDATE-REQUEST message to the VLR.
- The VLR does not respond in due time and timer T6-1 expires.
- According to 09.18, clause 6.2.4, "the SGSN shall abort the Location Update for non-GPRS service procedure and indicate this to the MS with the Reject cause value 'Service option temporarily out of order'."
- However, according to 04.08, clause 4.7.3.2.3.2, the MS does not expect this Reject cause and, therefore, "the combined attach procedure shall be considered as failed for GPRS and non-GPRS services."

Similar scenarios can arise in other combined procedures.

Summary of change: ⌘

The CR provides an essential correction: It specifies that, the Reject cause used when T6-1 expires will be 'MSC temporarily not reachable'. This is already specified in 29.018.

Consequences if not approved: ⌘

Misalignmet between 04.08 and 09.18. If the SGSN complies with the current 09.18, then:

- When a combined procedure fails for non-GPRS services but succeeds for GPRS services, the mobile will consider the procedure as failed for both GPRS and non-GPRS services.

Clauses affected: ⌘ 6.2.4

Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	
Other comments:	⌘	Identical revisions have already been made to 29.018 (see N1-000911).		

6.2.4 Abnormal cases

If timer T6-1 expires, the SGSN shall abort the Location Update for non-GPRS service procedure and indicate this to the MS with the Reject cause value ‘MSC temporarily not reachable’. ~~‘Service option temporarily out of order’.~~ The state of the association to the VLR shall be Gs-NULL.

If the SGSN receives a BSSAP+LOCATION-UPDATE-ACCEPT message and timer T6-1 is not running then:

- If timer T8 is running (see section 8), the message shall be ignored;
- If timer T9 is running (see section 9), the message shall be ignored; or
- If timers T8 and T9 are not running:
  - If the state of the association to the VLR is GS-ASSOCIATED, the message shall be ignored; or
  - If the state of the association to the VLR is different than GS-ASSOCIATED, the message shall be treated as a message incompatible with the protocol state of the SGSN (see section 16.3).

6 Location Update for non-GPRS services procedure

6.1 General description

The location update for non-GPRS services procedure is a general procedure used by MSs in class-A mode of operation and MSs in class-B mode of operation. This procedure allows MSs and network to perform:

- Combined IMSI attach for GPRS and non-GPRS services;
- IMSI attach for non-GPRS services if the MS is already IMSI attached for GPRS services;
- IMSI attach for GPRS services indication to the VLR if the MS is already IMSI attached for non-GPRS services;
- Normal Location Update procedure to the VLR if the MS is IMSI attached for both GPRS and non-GPRS services;
- Reallocation of TMSI to an MS.

The Location Update for non-GPRS services procedures in the Gs interface is always started as a consequence of a direct action by the MS. The combined routeing area update procedure is further specified in 3GPP TS 23.060 and 24.008.

The Location Update for non-GPRS services procedure is used by the SGSN to forward to the VLR those parts of the combined routeing area update or IMSI attach procedure which belong to the non-GPRS services. This means that non-GPRS related requests which are included in the combined request, are sent from the SGSN to the VLR. The procedure is also used by the SGSN to indicate to the VLR when an IMSI attach to GPRS services has been performed by an MS that was already IMSI attached to non-GPRS services. The SGSN may also forward a BSSAP+-TMSI-REALLOCATION-COMPLETE message from the MS to the VLR.

The VLR shall acknowledge the BSSAP+-LOCATION-UPDATE-REQUEST message. When the VLR processes the request it does not perform authentication because it relies on the SGSN's security functions.

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If the SGSN performs an implicit detach for both GPRS and non-GPRS traffic, then the SGSN shall indicate to the VLR a BSSAP+-IMSI-DETACH-INDICATION message with cause 'Implicit SGSN initiated IMSI detach from non-GPRS service', as further described in clause 'Implicit IMSI detach from non-GPRS service procedure' (the implicit IMSI detach message indicates that the MS is unavailable for both GPRS and non-GPRS services).

The IMSI attach for GPRS services to the VLR, when the MS is already IMSI attached for non-GPRS services, is requested by the MS sending a combined IMSI attach for GPRS and non-GPRS services message to the SGSN, as further specified in 3GPP TS 23.060 and 24.008.

3GPP TSG-CN1 Meeting #20 ***Tdoc N1-011452***
Brighton, England, 15.-19. October 2001

CR-Form-v4

CHANGE REQUEST

⌘ **29.018** **CR** **020** ⌘ ev **-** ⌘ Current version: **4.1.0** ⌘

*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 ☒

Title:	⌘	Clarification of the periodic routing area update procedure
Source:	⌘	Siemens AG
Work item code:	⌘	GPRS
Date:	⌘	27.09.01
Category:	⌘	**A**
Release:	⌘	Rel-4

Use one of the following categories:
F *(correction)*
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Reason for change:	⌘	The current description of the periodic routing area update is incomplete, as neither the description of the states at the SGSN (subclause 4.2.2) nor the procedural description (subclause 6.1) specify what happens with the state of the association in the SGSN.
Summary of change:	⌘	It is clarified that the state of the association in the SGSN is not changed.
Consequences if not approved:	⌘	Risk of a wrong implementation: If the state of the association in the SGSN is moved to Gs-NULL when the mobile station performs a periodic routing area update, mobile stations in class A or B mode of operation can no longer be paged for circuit switched services if a PCCCH is allocated in the cell.

Clauses affected:	⌘	6.1
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

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

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

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

4.2.2 States at the SGSN

Gs-NULL

There is no association with a VLR for the MS and therefore the SGSN considers that the MS is IMSI detached of non-GPRS services. In this state the SGSN accepts BSSAP+-PAGING-REQUEST messages to MSs only if the 'SGSN-Reset' restoration indicator in the SGSN is set to 'true'.

LA-UPDATE Requested

The SGSN has sent a BSSAP+-LOCATION-UPDATE-REQUEST message to the VLR. In this state the SGSN waits for the outcome of the Location Update for non-GPRS procedure at the VLR before sending the response to the MS. In this state the SGSN accepts BSSAP+-PAGING-REQUEST messages.

Gs-ASSOCIATED

The SGSN stores an association for that MS. In this state the SGSN performs the Location Update for non-GPRS services procedure towards the VLR for MSs in class-A and MSs in class-B mode of operation when the MS moves to a new LA.

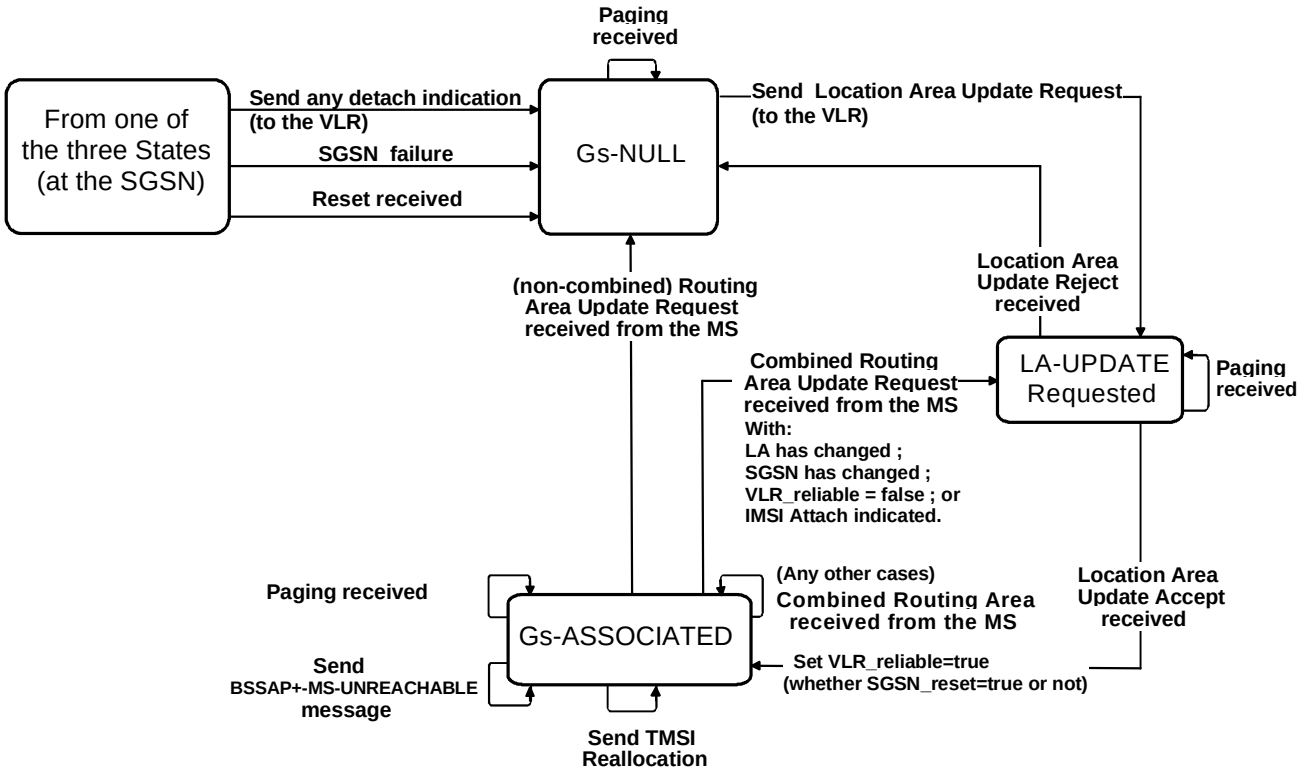

Figure 4.2/3GPP TS 29.018: State diagram at the SGSN

********** FIRST MODIFIED SECTION **********

6 Location Update for non-GPRS services procedure

6.1 General description

The location update for non-GPRS services procedure is a general procedure used by MSs in class-A mode of operation and MSs in class-B mode of operation. This procedure allows MSs and network to perform:

- Combined IMSI attach for GPRS and non-GPRS services;
- IMSI attach for non-GPRS services if the MS is already IMSI attached for GPRS services;
- IMSI attach for GPRS services indication to the VLR if the MS is already IMSI attached for non-GPRS services;
- Normal Location Update procedure to the VLR if the MS is IMSI attached for both GPRS and non-GPRS services;
- Reallocation of TMSI to an MS.

The Location Update for non-GPRS services procedures in the Gs interface is always started as a consequence of a direct action by the MS. The combined routeing area update procedure is further specified in 3GPP TS 23.060 and 24.008.

The Location Update for non-GPRS services procedure is used by the SGSN to forward to the VLR those parts of the combined routeing area update or IMSI attach procedure which belong to the non-GPRS services. This means that non-GPRS related requests which are included in the combined request, are sent from the SGSN to the VLR. The procedure is also used by the SGSN to indicate to the VLR when an IMSI attach to GPRS services has been performed by an MS that was already IMSI attached to non-GPRS services. The SGSN may also forward a BSSAP+-TMSI-REALLOCATION-COMPLETE message from the MS to the VLR.

The VLR shall acknowledge the BSSAP+-LOCATION-UPDATE-REQUEST message. When the VLR processes the request it does not perform authentication because it relies on the SGSN's security functions.

When an MS is IMSI attached for GPRS and non-GPRS services, any implicit detach timer in the VLR shall be stopped. Instead the Paging Proceed Flag in the SGSN is used to determine the likely availability of the MS to the network. Upon reception of the periodic Routeing Area Update message ~~T~~the SGSN does not report to the VLR ~~upon reception of the periodic Routeing Area Update message.~~, and the state of the association at the SGSN is not changed. When the MS performs a detach only from the GPRS system the GPRS detach indication to the VLR shall cause the VLR's implicit detach timer to be restarted from its initial value.

If the SGSN performs an implicit detach for both GPRS and non-GPRS traffic, then the SGSN shall indicate to the VLR a BSSAP+-IMSI-DETACH-INDICATION message with cause 'Implicit SGSN initiated IMSI detach from non-GPRS service', as further described in clause 'Implicit IMSI detach from non-GPRS service procedure' (the implicit IMSI detach message indicates that the MS is unavailable for both GPRS and non-GPRS services).

The IMSI attach for GPRS services to the VLR, when the MS is already IMSI attached for non-GPRS services, is requested by the MS sending a combined IMSI attach for GPRS and non-GPRS services message to the SGSN, as further specified in 3GPP TS 23.060 and 24.008.