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Technical Specification

**GEO-Mobile Radio Interface Specifications;
Part 3: Network specifications;
Sub-part 4: Restoration Procedures;
GMR-2 03.007**



Reference

DTS/SES-002-03007

Keywords

GMR, GSM, GSO, interface, MES, mobile, MSS,
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Contents

Intellectual Property Rights	4
Foreword	6
Introduction	7
1 Scope	8
2 References	8
3 Definitions and abbreviations	8
4 Design objectives	9
5 Restoration indicators in location registers	9
5.1 Restoration indicators in the VLR	9
5.2 Restoration indicators in the HLR	10
6 Restoration of data in the VLR	10
6.1 Restart of the VLR	10
6.2 Restoration procedures	10
6.2.1 Incoming call	10
6.2.2 Mobile terminated short message	11
6.2.3 Outgoing MES request	12
6.2.4 Location updating	12
6.2.5 Use of TMSI	12
7 Restoration of data in the HLR	13
7.1 Restart of the HLR	13
7.2 Procedures during restoration	13
7.2.1 Mobile terminal call	13
7.2.2 Mobile originated activity	13
8 Periodic location updating	14
9 Stand-alone operation of the VLR	14
History	15

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IPRs:

Project	Company	Title	Country of Origin	Patent n°	Countries Applicable
TS 101 377 V1.1.1	Digital Voice Systems Inc		US	US 5,715,365	US
TS 101 377 V1.1.1	Digital Voice Systems Inc		US	US 5,754,974	US
TS 101 377 V1.1.1	Digital Voice Systems Inc		US	US 5,226,084	US
TS 101 377 V1.1.1	Digital Voice Systems Inc		US	US 5,701,390	US
TS 101 377 V1.1.1	Digital Voice Systems Inc		US	US 5,826,222	US

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Project	Company	Title	Country of Origin	Patent n°	Countries Applicable
TS 101 377 V1.1.1	Ericsson Mobile Communication	Improvements in, or in relation to, equalisers	GB	GB 2 215 567	GB
TS 101 377 V1.1.1	Ericsson Mobile Communication	Power Booster	GB	GB 2 251 768	GB
TS 101 377 V1.1.1	Ericsson Mobile Communication	Receiver Gain	GB	GB 2 233 846	GB
TS 101 377 V1.1.1	Ericsson Mobile Communication	Transmitter Power Control for Radio Telephone System	GB	GB 2 233 517	GB

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Project	Company	Title	Country of Origin	Patent n°	Countries Applicable
TS 101 377 V1.1.1	Hughes Network Systems		US	Pending	US

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Project	Company	Title	Country of Origin	Patent n°	Countries Applicable
TS 101 377 V1.1.1	Lockheed Martin Global Telecommunic. Inc	2.4-to-3 Kbps Rate Adaptation Apparatus for Use in Narrowband Data and Facsimile Communication Systems	US	US 6,108,348	US
TS 101 377 V1.1.1	Lockheed Martin Global Telecommunic. Inc	Cellular Spacecraft TDMA Communications System with Call Interrupt Coding System for Maximizing Traffic Throughput Cellular Spacecraft TDMA Communications System with Call Interrupt Coding System for Maximizing Traffic Throughput	US	US 5,717,686	US
TS 101 377 V1.1.1	Lockheed Martin Global Telecommunic. Inc	Enhanced Access Burst for Random Access Channels in TDMA Mobile Satellite System	US	US 5,875,182	
TS 101 377 V1.1.1	Lockheed Martin Global Telecommunic. Inc	Spacecraft Cellular Communication System	US	US 5,974,314	US
TS 101 377 V1.1.1	Lockheed Martin Global Telecommunic. Inc	Spacecraft Cellular Communication System	US	US 5,974,315	US
TS 101 377 V1.1.1	Lockheed Martin Global Telecommunic. Inc	Spacecraft Cellular Communication System with Mutual Offset High-argin Forward Control Signals	US	US 6,072,985	US
TS 101 377 V1.1.1	Lockheed Martin Global Telecommunic. Inc	Spacecraft Cellular Communication System with Spot Beam Pairing for Reduced Updates	US	US 6,118,998	US

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Satellite Earth Stations and Systems (SES).

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Version 1.m.n

where:

- the third digit (n) is incremented when editorial only changes have been incorporated in the specification;
- the second digit (m) is incremented for all other types of changes, i.e. technical enhancements, corrections, updates, etc.

The present document is part 3, sub-part 4 of a multi-part deliverable covering the GEO-Mobile Radio Interface Specifications, as identified below:

Part 1: "General specifications";

Part 2: "Service specifications";

Part 3: "Network specifications";

Sub-part 1: "Network Functions; GMR-2 03.001";

Sub-part 2: "Network Architecture; GMR-2 03.002";

Sub-part 3: "Numbering, Addressing and Identification; GMR-2 03.003";

Sub-part 4: "Restoration Procedures; GMR-2 03.007";

Sub-part 5: "Organization of Subscriber Data; GMR-2 03.008";

Sub-part 6: "Handover Procedures; GMR-2 03.009";

Sub-part 7: "Technical Realization of Short Message Service (SMES) Point-to-Point; GMR-2 03.040";

Sub-part 8: "Location Registration Procedures; GMR-2 03.012";

Sub-part 9: "Discontinuous Reception (DRX) in the GMR-2 System; GMR-2 03.013";

Sub-part 10: "Security Related Network Functions; GMR-2 03.020";

Sub-part 11: "Functions Related to Mobile Earth Station (MES) in idle Mode; GMR-2 03.022";

Sub-part 12: "Technical Realization of Facsimile Group 3 Transparent; GMR-2 03.045";

Sub-part 13: "Transmission Planning Aspects of the Speech Service in the Public Satellite Mobile Network (PSMN) system; GMR-2 03.050";

Sub-part 14: "Call Waiting (CW) and Call Hold (HOLD) Supplementary Services - Stage 2; GMR-2 03.083";

Sub-part 15: "Multiparty Supplementary Services; GMR-2 03.084";

Sub-part 16: "Technical Realization of Operator Determined Barring; GMR-2 03.015";

Sub-part 17: "Call Barring (CB) Supplementary Services - Stage 2; GMR-2 03.088";

Part 4: "Radio interface protocol specifications";

Part 5: "Radio interface physical layer specifications";

Part 6: "Speech coding specifications";

Part 7: "Terminal adaptor specifications".

Introduction

GMR stands for GEO (Geostationary Earth Orbit) Mobile Radio interface, which is used for mobile satellite services (MSS) utilizing geostationary satellite(s). GMR is derived from the terrestrial digital cellular standard GSM and supports access to GSM core networks.

Due to the differences between terrestrial and satellite channels, some modifications to the GSM standard are necessary. Some GSM specifications are directly applicable, whereas others are applicable with modifications. Similarly, some GSM specifications do not apply, while some GMR specifications have no corresponding GSM specification.

Since GMR is derived from GSM, the organization of the GMR specifications closely follows that of GSM. The GMR numbers have been designed to correspond to the GSM numbering system. All GMR specifications are allocated a unique GMR number as follows:

GMR-n xx.zyy

where:

xx.0yy (z=0) is used for GMR specifications that have a corresponding GSM specification. In this case, the numbers xx and yy correspond to the GSM numbering scheme.

xx.2yy (z=2) is used for GMR specifications that do not correspond to a GSM specification. In this case, only the number xx corresponds to the GSM numbering scheme and the number yy is allocated by GMR.

n denotes the first (n=1) or second (n=2) family of GMR specifications.

A GMR system is defined by the combination of a family of GMR specifications and GSM specifications as follows:

- If a GMR specification exists it takes precedence over the corresponding GSM specification (if any). This precedence rule applies to any references in the corresponding GSM specifications.

NOTE: Any references to GSM specifications within the GMR specifications are not subject to this precedence rule. For example, a GMR specification may contain specific references to the corresponding GSM specification.

- If a GMR specification does not exist the corresponding GSM specification may or may not apply. The applicability of the GSM specifications is defined in GMR-n 01.201.

1 Scope

The data stored in location registers are automatically updated in normal operation; the main information stored in a location register defines the location of each mobile station and the subscriber data required to handle traffic for each mobile subscriber. The loss or corruption of these data will seriously degrade the service offered to mobile subscribers; it is therefore necessary to define procedures to limit the effects of failure of a location register, and to restore the location register data automatically. The present document defines the necessary procedures.

The basic principle is that restoration should be based on radio contact to avoid faulty data being spread in the system.

Subscriber data for supplementary services must also be correctly restored, although the impact on service of corruption of supplementary service data is less severe.

Procedures for supporting these functions are defined in GSM 09.02 [4].

If the restoration of subscriber data in the VLR is triggered by Location Updating, the VLR retrieves subscriber data from the HLR by sending an 'Update Location' request, which triggers one or more 'Insert Subscriber Data' operations from the HLR. The 'Update Location' request may also be used to send the LMSI to the HLR.

If the restoration of subscriber data in the VLR is triggered by a 'Provide Roaming Number' request, the behaviour of the VLR depends on whether it is implemented according to MAP version 1 or MAP version 2. For MAP version 2, the VLR retrieves subscriber data from the HLR by sending a 'Restore Data' request, which triggers one or more 'Insert Subscriber Data' operations from the HLR. The 'Restore Data' request is also used to send the LMSI to the HLR. For MAP version 1, the VLR retrieves subscriber data from the HLR by sending a 'Send Parameters' request with parameter type 'Subscriber Data', which cannot be used to send the LMSI to the HLR.

The VLR number and MSC number in the subscriber data in the HLR are updated by the 'Update Location' procedure.

2 References

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

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

[1] GMR-2 01.004 (ETSI TS 101 377-1-1): "GEO-Mobile Radio Interface Specifications; Part 1: General specifications; Sub-part 1: Abbreviations and Acronyms".

[2] GMR-2 03.022 (ETSI TS 101 377-3-11): "GEO-Mobile Radio Interface Specifications; Part 3: Network specifications; Sub-part 11: Functions Related to Mobile Earth Station (MES) in idle Mode".

[3] GSM 03.40 (ETSI ETS 300 536): "Digital cellular telecommunications system (Phase 2); Technical realization of Short Message Service (SMS) Point-to-Point (PP)" (V4.13.0).

[4] GSM 09.02 (ETSI ETS 300 599): "Digital cellular telecommunications system (Phase 2); Mobile Application Part (MAP) specification" (V4.18.0).

3 Definitions and abbreviations

For the purposes of the present document, the definitions and abbreviations given in GMR-2 01.004 [1] apply.

4 Design objectives

To avoid loss of all the data stored in a location register when part of the equipment of the location register fails, a regime must be implemented to secure the data. This regime can include replication of volatile storage units and periodic back-up of data to non-volatile storage. If the data security regime ensures the integrity of the data in spite of failure of part of the location register equipment then there will be no impact on service. The present document describes the procedures to be used when the integrity of data in the location register cannot be ensured; that situation is referred to below as 'failure'.

The VLR shall erase all IMSI records affected by the failure when it restarts after a failure.

For the HLR, periodic back-up of data to non-volatile storage is mandatory.

5 Restoration indicators in location registers

5.1 Restoration indicators in the VLR

Three restoration indicators are provided in the VLR for each IMSI record: 'Confirmed by Radio Contact', 'Subscriber Data Confirmed by HLR' and 'Location Information Confirmed in HLR'.

The indicator 'Confirmed by Radio Contact' indicates whether the VLR's record of location area identity and MSC number for the mobile station is confirmed by radio contact.

The indicator 'Confirmed by Radio Contact' in an IMSI record is set to the initial value 'Not Confirmed' when the VLR receives a 'Provide Roaming Number' request or an 'Update Location Area' request for an MES for which the VLR does not have an IMSI record.

The indicator 'Confirmed by Radio Contact' is set to 'Confirmed' when the radio contact that has been established with the MES is authenticated.

The indicator 'Subscriber Data Confirmed by HLR' indicates whether the subscriber data set for the mobile station held by the VLR is consistent with that held by the HLR.

The indicator 'Subscriber Data Confirmed by HLR' is set to the initial value 'Not Confirmed' when the VLR receives a 'Provide Roaming Number' request or an 'Update Location Area' request for an MES for which the VLR does not have an IMSI record.

The indicator 'Subscriber Data Confirmed by HLR' is set to 'Confirmed' at either of the following events:

- the VLR successfully performs an 'Update Location' to the HLR;
- the VLR successfully performs a 'Restore Data' operation to the HLR.

The indicator 'Location Information Confirmed in HLR' indicates whether the HLR's record of VLR number and MSC number for the mobile station is confirmed by radio contact.

The indicator 'Location Information Confirmed in HLR' is set to 'Not Confirmed' at any of the following events:

- the VLR receives an 'Update Location Area' request for an MES for which the VLR has no IMSI record;
- a VLR which serves two or more MSCs receives a 'Provide Roaming Number' request for an MES for which the VLR has no IMSI record;
- the VLR receives a 'Reset' message from the HLR with which the MES is registered.

The indicator 'Location Information Confirmed in HLR' is set to 'Confirmed' at either of the following events:

- a VLR which serves only one MSC receives a 'Provide Roaming Number' request for an MES for which the VLR has no IMSI record;
- successful completion of the 'Update Location' procedure triggered by authenticated radio contact.

5.2 Restoration indicators in the HLR

As an implementation option, one restoration indicator may be provided in the HLR for each IMSI record: 'Check SS'.

The 'Check SS' indicator is set to 'Check Required' when the HLR restarts after a failure.

The 'Check SS' indicator is checked whenever the HLR receives an 'Update Location' request from a VLR. If it is set to 'Check Required', after successful completion of subscriber data retrieval that ran embedded in the 'Update Location' procedure the HLR sends a 'Forward Check SS Indication' request message to the VLR and sets the 'Check SS' indicator to 'Check Not Required'.

6 Restoration of data in the VLR

The effect on service of failure of a VLR is different from the effect of failure of an HLR. The procedures for restoration of a VLR and an HLR are therefore different.

6.1 Restart of the VLR

When a VLR restarts after a failure, all IMSI records affected by the failure are erased.

There will be no subscriber data or location information stored for an affected mobile station until after the VLR has received either a 'Provide Roaming Number' request or an 'Update location Area' request for that mobile station.

The VLR causes all affected LMSIs to become invalid. 'Invalid' in this context means that the LMSI can no longer be regarded as accurate. The term is used to avoid unnecessary constraints on the implementation.

On receipt of either a 'Provide Roaming Number' request or an 'Update Location Area' request, restoration of subscriber data in the VLR is triggered individually for each IMSI record as described below.

6.2 Restoration procedures

The objective of the restoration procedure is to handle all traffic for each mobile subscriber correctly. In order to meet this objective, the procedure must make the subscriber data in the VLR consistent with that in the HLR, and make the location information in the HLR and VLR reflect accurately the current location of the MES.

6.2.1 Incoming call

a) Send Routing Information (GMSC to HLR):

- the HLR sends 'Provide Roaming Number' to the VLR as for normal operation. The LMSI is updated by the VLR when the VLR requests the transfer of subscriber data from the HLR using the 'Restore Data' operation.

b) Provide Roaming Number (HLR to VLR):

- regardless of whether the VLR has an IMSI record corresponding to the IMSI in the 'Provide Roaming Number', it returns an MSRN. If no IMSI record exists, the VLR creates a skeleton IMSI record, sets the indicators 'Subscriber Data Confirmed by Radio Contact' and 'Confirmed by HLR' to 'Not Confirmed'. If the VLR serves two or more MSCs, the VLR sets the indicator 'Location Information Confirmed in HLR' to 'Not Confirmed'. Otherwise, if the VLR serves only one MSC, the indicator 'Location Information Confirmed in HLR' is set to the initial value 'Confirmed';
- if the indicator 'Subscriber Data Confirmed by HLR' is 'Not Confirmed' the VLR requests authentication data, if required and still not available and subscriber data from the HLR. When the dialogue that covers the subscriber data retrieval procedure is completed successfully, the VLR sets the indicator 'Subscriber Data Confirmed by HLR' to 'Confirmed'. The indicators 'Confirmed by Radio Contact' and 'Location Information Confirmed in HLR' remain unchanged;

- if the IMSI record for the MES is marked 'Subscriber Data Confirmed by HLR' but 'Not Confirmed by Radio Contact' the operator may choose an appropriate method to limit the number of 'Search for MES' procedures for that MES.
- c) Send Information for I/C Call Setup (MSC to VLR):
- if the VLR has no IMSI record, or if the record is marked 'Subscriber Data Not Confirmed by HLR' the VLR returns a 'System Failure' error;
 - if the VLR has an IMSI record marked 'Subscriber Data Confirmed by HLR' and 'Not Confirmed by Radio Contact', the VLR handles the request in the normal way, except that the 'Search for MES' procedure is used instead of the 'Page MES' procedure;
 - if the VLR has an IMSI record marked 'Subscriber Data Confirmed by HLR' and 'Confirmed by Radio Contact', the VLR handles the request in the normal way; for this MES, VLR restoration is complete;
 - the state of the indicator 'Location Information Confirmed in HLR' does not affect the 'Send Information for I/C Call Setup' procedure.
- d) Process Access Request in Response to Search (MSC to VLR):
- if the MES responds to paging, the MSC sends a positive response to the search request and a 'Process Access Request' to the VLR. After successful authentication, if required, the VLR sets the indicator 'Confirmed by Radio Contact' to 'Confirmed', sets the location area information for the MES, and handles the request in the normal way;
 - the VLR checks the indicator 'Location Information Confirmed in HLR'. If it indicates 'Not Confirmed' the VLR starts an 'Update Location' procedure to the HLR. When this procedure is successfully completed the VLR sets the indicator 'Location Information Confirmed in HLR' to 'Confirmed'.

For this MES, VLR restoration is complete.

6.2.2 Mobile terminated short message

- a) Send Routing Information for MT SMS (SMS-GMSC->HLR):
- the HLR returns the MSC number as for normal operation.
- b) Send Information for MT SMS (MSC->VLR) - MAP version 2:
- if the VLR has no IMSI record, or if the record is marked 'Subscriber Data Not Confirmed by HLR' the VLR returns an 'Unidentified Subscriber' error. This causes the MSC to report a short message delivery failure, with cause 'Unidentified Subscriber', to the SMS gateway MSC. The Gateway MSC sends a 'Report SM Delivery Status' request, with a cause of 'Absent Subscriber', to the HLR. This causes the HLR to set the 'Mobile Station Not Reachable Flag' for the MS, as described in GSM 03.40 [3] and GSM 09.02[4];
 - if the VLR has an IMSI record marked 'Subscriber Data Confirmed by HLR' and 'Not Confirmed by Radio Contact', the VLR handles the request in the normal way, except that the 'Search for MS' procedure is used instead of the 'Page MS' procedure;
 - if the VLR has an IMSI record marked 'Subscriber Data Confirmed by HLR' and 'Confirmed by Radio Contact', the VLR handles the request in the normal way; for this MS, VLR restoration is complete;
 - the state of the indicator 'Location Information Confirmed in HLR' does not affect the 'Send Information for MT SMS' procedure.
- c) Send Information for I/C Call Setup (MSC->VLR) - MAP version 1:
- if the VLR has no IMSI record, or if the record is marked 'Subscriber Data Not Confirmed by HLR' the VLR returns a 'System Failure' error. This causes the MSC to report a short message delivery failure, with cause 'System Failure', to the SMS gateway MSC;
 - if the VLR has an IMSI record marked 'Subscriber Data Confirmed by HLR' and 'Not Confirmed by Radio Contact', the VLR handles the request in the normal way, except that the 'Search for MS' procedure is used instead of the 'Page MS' procedure;

- if the VLR has an IMSI record marked 'Subscriber Data Confirmed by HLR' and 'Confirmed by Radio Contact', the VLR handles the request in the normal way; for this MS, VLR restoration is complete;
- the state of the indicator 'Location Information Confirmed in HLR' does not affect the 'Send Information for MT SMS' procedure.

d) Process Access Request in Response to Search (MSC->VLR):

- if the MS responds to paging, the MSC sends a positive response to the search request and a 'Process Access Request' to the VLR. After successful authentication, if required, the VLR sets the indicator 'Confirmed by Radio Contact' to 'Confirmed', sets the location area information for the MS, and handles the request in the normal way;
- the VLR checks the indicator 'Location Information Confirmed in HLR'. If it indicates 'Not Confirmed' the VLR starts an 'Update Location' procedure to the HLR. When this procedure is successfully completed, the VLR sets the indicator 'Location Information Confirmed in HLR' to 'Confirmed'.

For this MS, VLR restoration is complete.

6.2.3 Outgoing MES request

An outgoing request (MES originated call or call-independent supplementary service activity) from the MES causes the VLR to check its IMSI record for that MES.

- If the MES is unknown in this VLR (i.e. the VLR has no IMSI record for the MES) or there is an IMSI record marked 'Subscriber Data Not Confirmed by HLR' the outgoing request is rejected with error cause 'Unidentified Subscriber'. This causes the MES to initiate the location registration procedure described below.
- If the VLR has an IMSI record for the MES marked 'Subscriber Data Confirmed by HLR' the request is handled in the normal way, and after any necessary authentication and/or IMEI checking the record is marked 'Confirmed by Radio Contact'.
- The VLR checks the indicator 'Location Information Confirmed in HLR'. If it indicates 'Not Confirmed' the VLR starts an 'Update Location' procedure to the HLR. When this procedure is successfully completed the VLR sets the indicator 'Location Information Confirmed in HLR' to 'Confirmed'.

For this MES, VLR restoration is complete.

6.2.4 Location updating

A location registration request (location updating) from an MES causes the VLR to check its IMSI record for that MES.

- If the MES is unknown in this VLR (i.e. the VLR has no IMSI record for the MES) the VLR creates a skeleton IMSI record for the MES and sets the indicators 'Confirmed by Radio Contact', 'Location Information Confirmed in HLR' and 'Subscriber Data Confirmed by HLR' to 'Not Confirmed'. If authentication is required, the VLR retrieves authentication data. When the radio contact with the Mobile Earth Station is authenticated, the VLR sets the indicator 'Confirmed by Radio Contact' to 'Confirmed'. The VLR then performs an 'Update Location' to the HLR. If this is successful, the VLR sets the indicators 'Location Information Confirmed in HLR' and 'Subscriber Data Confirmed by HLR' to 'Confirmed'. For this MES, VLR restoration is complete.
- If the VLR has an IMSI record for the MES, after successful authentication, if required, the VLR sets the indicator 'Confirmed by Radio Contact' to 'Confirmed'. If the record is marked 'Location Information Not Confirmed in HLR' or 'Subscriber Data Not Confirmed by HLR' the VLR performs an 'Update Location' to the HLR. If this is successful, the VLR sets the indicators 'Location Information Confirmed in HLR' and 'Subscriber Data Confirmed by HLR' to 'Confirmed'.

For this MES, VLR restoration is complete.

6.2.5 Use of TMSI

TMSI is not available in the current version of GMR-2.

7 Restoration of data in the HLR

The loss or corruption of subscriber data in the HLR has an impact not only in the HLR's own PSMN but also on the service for its mobiles in other PSMNs and PLMNs. Restoration of the data in the HLR requires co-operation from all the VLRs to which its mobiles have roamed.

7.1 Restart of the HLR

When an HLR restarts after failure it performs the following actions for the subscriber data records that have been affected by the HLR fault:

- reload all data from the non-volatile back-up;
- reset all 'MES Purged' flags;
- mark each subscriber record 'SS Check Required' by setting the 'Check SS' indicator if the 'Forward Check SS Indication' service is implemented;
- send a 'Reset' message to each VLR where one or more of its MESs are registered. This causes each VLR concerned to mark each relevant subscriber record 'Location Information Not Confirmed in HLR'.

7.2 Procedures during restoration

7.2.1 Mobile terminal call

If the VLR receives a 'Process Access Request' request in response to a 'Page' or 'Search for MES' operation, after successful authentication, if required, it checks the indicator 'Location Information Confirmed in HLR'. If this indicates 'Not Confirmed' the VLR triggers an 'Update Location' to the HLR as described in clause 6.2.1.d).

When the HLR receives the 'Update Location' request it stores the VLR number, MSC number and LMSI in the subscriber record as for normal operation.

If the 'Forward Check SS Indication' service is implemented, the HLR checks the indicator 'Check SS'. If this indicates 'Check Required', after successful completion of the subscriber data retrieval procedure that ran embedded in the 'Update Location' procedure the HLR sends a 'Forward Check SS Indication' to the VLR and marks the subscriber record 'Check Not Required'. When the VLR receives the 'Forward Check SS Indication' request it forwards an indication to the MES to alert the user that supplementary service parameters should be checked.

7.2.2 Mobile originated activity

When the VLR receives a request from an MES (MES originated call, call-independent supplementary service activity or location registration request) whose IMSI record is marked 'Location Information Not Confirmed in HLR', it will perform an 'Update Location' to the HLR as described in clauses 6.2.3 and 6.2.4.

When the HLR receives an 'Update Location' request from the VLR, it proceeds as described in clause 7.2.1.

8 Periodic location updating

The time taken to confirm the location of an MES after location register failure is governed by the frequency with which the MES establishes radio contact with the network. The location information for an MES which remains silent for a long time will remain doubtful for a long time.

A method of reducing this time is to require the MES to establish radio contact with the network at intervals, purely to confirm its location, if the MES does not move to a new location area (which would lead to a normal location registration) or respond to paging for a mobile terminated call or request a mobile originated call or call-independent supplementary service activity.

The interval between successive periodic location updating is controlled by a timer in the MES; this timer is reset to its initial value at the end of each successfully established radio contact between the MES and the network.

The use of the periodic location update timer is described in GMR-2 03.022 [2].

9 Stand-alone operation of the VLR

If no unused authentication triplets are available in the VLR for an IMSI record when authentication is required, the VLR may reuse already used authentication triplets. It is an operator option to define how many times an authentication triplets may be reused in the VLR.

If the Update Location response contains an error different from 'Unknown Subscriber' or 'Roaming Not Allowed' or if there is a parameter problem (e.g. no HLR number included), no error shall be indicated to the MSC and the IMSI record in the VLR shall not be affected, provided that the associated 'Subscriber Data Confirmed by HLR' indicator is in the 'Confirmed' status.

History

Document history		
V1.1.1	March 2001	Publication