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Technical Specification

**GEO-Mobile Radio Interface Specifications;
Part 3: Network specifications;
Sub-part 8: Location Registration Procedures;
GMR-2 03.012**



Reference

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IPRs:

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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 8 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 present document defines the procedures in the network related to location registration. They include:

- location updating;
- location cancellation;
- periodic location updating;

The procedures in the Mobile Earth Station (MES) are described in GMR-2 03.022 [7]. The procedures between MSC, VLR and HLR utilize the Mobile Application Part (MAP) and details concerning the exchange of information are contained in GSM 09.02 [8].

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 03.002 (ETSI TS 101 377-3-2): "GEO-Mobile Radio Interface Specifications; Part 3: Network specifications; Sub-part 2: Network Architecture".
- [3] GMR-2 03.003 (ETSI TS 101 377-3-3): "GEO-Mobile Radio Interface Specifications; Part 3: Network specifications; Sub-part 3: Numbering, Addressing and Identification".
- [4] GMR-2 03.007 (ETSI TS 101 377-3-4): "GEO-Mobile Radio Interface Specifications; Part 3: Network specifications; Sub-part 4: Restoration Procedures".
- [5] GMR-2 03.008 (ETSI TS 101 377-3-5): "GEO-Mobile Radio Interface Specifications; Part 3: Network specifications; Sub-part 5: Organization of Subscriber Data".
- [6] GMR-2 03.020 (ETSI TS 101 377-3-10): "GEO-Mobile Radio Interface Specifications; Part 3: Network specifications; Sub-part 10: Security related Network Functions".
- [7] 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".
- [8] GSM 09.02 (ETSI ETS 300 599): "European digital cellular telecommunications system (Phase 2); Mobile Application Part (MAP) specification" (V4.18.0).
- [9] GSM 09.07 (ETSI ETS 300 604): "European digital cellular telecommunications system (Phase 2); General requirements on interworking between the Public Land Mobile Network (PLMN) and the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN)" (V4.12.1).

3 Abbreviations

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

4 General service definitions

4.1 Location registration

Location registration means that the PSMNs keep track of where the MESs are located in the system area. The location information for each MES is stored in functional units called location registers. Functionally, there are two types of location registers:

- the home location register where all subscriber parameters of a MES are permanently stored, and where the current location may be stored;
- the visitor location register where all relevant data concerning a MES are stored as long as the station is within the area controlled by that visitor location register.

See also GMR-2 03.002 [2] where the network architecture is described, and GMR-2 03.008 [5] where the data stored in the location registers are described.

The action taken by a MES in order to provide location information to the PSMN will be referred to as location updating.

4.2 Location area and MSC area

The MSC area is composed of the area covered by all gateway stations controlled by the MSC. A MSC area may consist of several location areas. A location area is an area in which MESs may roam without updating the location registers. A location area consists of one or two spot beams.

The paging procedure is used within the location area in which the MES is located in order to initiate interactions (e.g., incoming call to mobile).

For further details of the network architecture, see GMR-2 03.002 [2].

4.3 Location area identification

The Location Area Identification (LAI) plan is part of the gateway station identification plan. The gateway stations are identified uniquely (see GMR-2 03.003 [3]). The Location Area Identification is included in messages sent in the BCCH.

4.4 Use of the term mobile earth station (MES) in this TS

In order to simplify the text the term Mobile Earth Station (MES) as used in relation to location registration refers to the entity where the IMSI is stored, i.e., in card operated MESs the term Mobile Earth Station (MES) refers to the card.

5 Procedures in the network related to location updating

5.1 Procedures in the MSC related to location updating

The MSC shall pass messages related to location updating between the MES and the VLR.

5.2 Procedures in the GSC related to Location Updating

The GSC shall insert the Location Area Identification and periodic location updating time-out value on the BCCH.

5.3 Normal location updating operation

When receiving a Location Updating Request from an MES, the MSC shall convey the message to its associated visitor location register. Any response from the location register shall similarly be conveyed to the MES.

5.4 IMSI enquiry procedure

The MES shall identify itself by the IMSI plus Location Area Identification of the previous VLR. In the latter case the new VLR shall attempt to request the IMSI and authentication parameters from the previous VLR by the methods defined in GSM 09.02 [8].

If this procedure fails, the VLR shall request that the MES identifies itself by use of the IMSI.

5.5 Information transfer between visitor and home location registers

5.5.1 Procedures for location registration

Detailed procedures for exchange of and location updating information between visitor and home location registers are given in GSM 09.02 [8]. Below follows an overview of these procedures.

5.5.1.1 Location updating procedure

This procedure is used when an MES registers with a visitor location register.

The visitor location register provides routing information to the home location register. This information consists, for instance, of VLR address used for routing of MAP messages.

The VLR may also allocate an optional identity for the MES at location updating: the Local Mobile Station Identity: see GMR-2 03.003 [3].

5.5.1.2 Downloading of subscriber parameters to the VLR

As a part of the location updating procedure, the home location register will convey the subscriber parameters of the MES which need to be known by the visitor location register for proper call handling. This procedure is also used whenever there is a change in the subscriber parameters that need to be conveyed to the VLR (e.g. change in subscription, a change in supplementary services activation status).

If the HPSMN applies the multi-numbering option, different MSISDNs are allocated for different Basic Services (see GSM 09.07 [9]) and stored in the HLR. Among these MSISDNs, the Basic MSISDN Indicator as part of the HLR subscriber data (see GMR-2 03.008 [5]) marks the 'Basic MSISDN' to be sent to the VLR at location update. It is used in the VLR for call handling as calling party and as line identity.

5.5.1.3 Location cancellation procedure

The procedure is used by the home location register to remove a MES from a visitor location register. The procedure will normally be used when the MES has moved to an area controlled by a different location register. The procedure can also be used in other cases, e.g. an MES ceases to be a subscriber of the home PSMN.

5.5.1.4 Subscriber parameter request procedure

This procedure enables a visitor location register to request the HLR (at any time) to provide subscriber parameters for a specified MES (e.g. after a restart).

5.5.1.5 Mobile subscriber purging procedure

A VLR may purge the subscriber data for an MES which has not established radio contact for a period determined by the network operator. Purging means to delete the subscriber data. The VLR shall inform the HLR of the purging.

When the HLR is informed of the purging, it shall set the flag "MES purged" in the IMSI record of the MES concerned. Presence of the "MES purged" flag will cause any request for routing information for a call or short message to the MES to be treated as if the MES were not reachable.

In the HLR, the "MES purged" flag is reset by the location updating procedure and after reload of data from the non-volatile back-up that is performed when the HLR restarts after a failure.

5.5.1.6 Recovery procedures

Recovery and restoration procedures for location registers are defined in Technical Specifications GMR-2 03.007 [4] and GSM 09.02 [8].

Recovery arrangements should be such that MESs with a valid subscription are not deleted from the HLR as a result of HLR failure. The worst result of an HLR failure will thus be that some MESs are stored with errors in the temporary subscriber data.

6 Authentication

Authentication at location updating shall be in accordance with GMR-2 03.020 [6].

History

Document history		
V1.1.1	March 2001	Publication