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Technical Specification

**GEO-Mobile Radio Interface Specifications;
Part 3: Network specifications;
Sub-part 6: Location Registration and
Position Identification Procedures;
GMR-1 03.012**



Reference

DTS/SES-001-03012

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IPRs:

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TS 101 376 V1.1.1	Digital Voice Systems Inc		US	US 5,226,084	US
TS 101 376 V1.1.1	Digital Voice Systems Inc		US	US 5,715,365	US
TS 101 376 V1.1.1	Digital Voice Systems Inc		US	US 5,826,222	US
TS 101 376 V1.1.1	Digital Voice Systems Inc		US	US 5,754,974	US
TS 101 376 V1.1.1	Digital Voice Systems Inc		US	US 5,701,390	US

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TS 101 376 V1.1.1	Ericsson Mobile Communication	Improvements in, or in relation to, equalisers	GB	GB 2 215 567	GB
TS 101 376 V1.1.1	Ericsson Mobile Communication	Power Booster	GB	GB 2 251 768	GB
TS 101 376 V1.1.1	Ericsson Mobile Communication	Receiver Gain	GB	GB 2 233 846	GB
TS 101 376 V1.1.1	Ericsson Mobile Communication	Transmitter Power Control for Radio Telephone System	GB	GB 2 233 517	GB

IPR Owner: Ericsson Mobile Communications (UK) Limited
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Project	Company	Title	Country of Origin	Patent n°	Countries Applicable
TS 101 376 V1.1.1	Hughes Network Systems		US	Pending	US

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Project	Company	Title	Country of Origin	Patent n°	Countries Applicable
TS 101 376 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 101 376 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 101 376 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 101 376 V1.1.1	Lockheed Martin Global Telecommunic. Inc	Spacecraft Cellular Communication System	US	US 5,974,314	US
TS 101 376 V1.1.1	Lockheed Martin Global Telecommunic. Inc	Spacecraft Cellular Communication System	US	US 5,974,315	US
TS 101 376 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 101 376 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).

The contents of the present document are subject to continuing work within TC-SES and may change following formal TC-SES approval. Should TC-SES modify the contents of the present document it will then be republished by ETSI with an identifying change of release date and an increase in version number as follows:

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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 6 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-1 03.001";

Sub-part 2: "Network Architecture; GMR-1 03.002";

Sub-part 3: "Numbering, Addressing and identification; GMR-1 03.003";

Sub-part 4: "Organization of Subscriber Data; GMR-1 03.008";

Sub-part 5: "Technical realization of Supplementary Services; GMR-1 03.011";

Sub-part 6: "Location Registration and Position Identification Procedures; GMR-1 03.012";

Sub-part 7: "Discontinuous Reception (DRX); GMR-1 03.013";

Sub-part 8: "Support of Dual-Tone Multifrequency Signalling (DTMF); GMR-1 03.014";

Sub-part 9: "Security related Network Functions; GMR-1 03.020";

Sub-part 10: "Functions related to Mobile Earth station (MES) in idle mode; GMR-1 03.022";

Sub-part 11: "Technical realization of the Short Message Service (SMS) Point-to-Point (PP); GMR-1 03.040";

Sub-part 12: "Technical realization of the Short Message Service Cell Broadcast (SMSCB); GMR-1 03.041";

Sub-part 13: "Technical realization of group 3 facsimile using transparent mode of transmission; GMR-1 03.045";

Sub-part 14: Transmission Planning Aspects of the Speech Service in the GMR-1 system; GMR-1 03.050";

Sub-part 15: "Line Identification supplementary service - Stage 2; GMR-1 03.081";

Sub-part 16: "Call Barring (CB) supplementary services - Stage 2; GMR-1 03.088";

Sub-part 17: "Unstructured Supplementary Service Data (USSD) - Stage 2; GMR-1 03.290";

Sub-part 18: "Terminal-to-Terminal Call (TtT); GMR-1 03.296";

Sub-part 19: "Optimal Routing technical realization; GMR-1 03.297";

Sub-part 20: "Technical realization of High-Penetration Alerting; GMR-1 03.298";

Sub-part 21: "Position Reporting services; Stage 2 Service description; GMR-1 03.299";

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-1 01.201 [2].

1 Scope

The present document describes the procedures related to position identification and location registration of a mobile earth station (MES) with the network in a GMR-1 Mobile Satellite System. The procedures include:

- location updating;
- location cancellation;
- periodic location updating;
- IMSI attach/detach.

The procedures in the MES are described in specifications GMR-1 03.022 [5], and GMR-1 03.299 [6]. The procedures between MSC, VLR, and HLR utilize the Mobile Application Part (MAP) and details concerning the exchange of information are contained in specification GSM 09.02 [8].

The clauses of the present document refer to equivalent clauses of GSM 03.12 [7] but include additional information regarding position identification for mobile earth stations.

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 and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

- [1] GMR-1 01.004 (ETSI TS 101 376-1-1): "GEO-Mobile Radio Interface Specifications; Part 1: General specifications; Sub-part 1: Abbreviations and acronyms; GMR-1 01.004".
- [2] GMR-1 01.201 (ETSI TS 101 376-1-2): "GEO-Mobile Radio Interface Specifications; Part 1: General specifications; Sub-part 2: Introduction to the GMR-1 Family; GMR-1 01.201".
- [3] GMR-1 03.002 (ETSI TS 101 376-3-2): "GEO-Mobile Radio Interface Specifications; Part 3: Network specifications; Sub-part 2: Network Architecture; GMR-1 03.002".
- [4] GMR-1 03.003 (ETSI TS 101 376-3-3): "GEO-Mobile Radio Interface Specifications; Part 3: Network specifications; Sub-part 3: Numbering, Addressing and identification; GMR-1 03.003".
- [5] GMR-1 03.022 (ETSI TS 101 376-3-10): "GEO-Mobile Radio Interface Specifications; Part 3: Network specifications; Sub-part 10: Functions related to Mobile Earth station (MES) in idle mode; GMR-1 03.022".
- [6] GMR-1 03.299 (ETSI TS 101 376-3-21): "GEO-Mobile Radio Interface Specifications; Part 3: Network specifications; Sub-part 21: Position Reporting services; Stage 2 Service description; GMR-1 03.299".
- [7] GSM 03.12 (ETSI ETS 300 530): "European digital cellular telecommunications system (Phase 2); Location registration procedures (GSM 03.12 V4.4.2)".
- [8] GSM 09.02 (ETSI ETS 300 599): "Digital cellular telecommunications system (Phase 2); Mobile Application Part (MAP) specification (GSM 09.02 version 4.19.0)".

3 Terminology, definitions and abbreviations

3.1 Terminology

For the purposes of the present document, in the context of the GMR-1 system, the following terminology changes in annex A of document GMR-1 01.004 [1] shall be applied when comparing GSM and GMR-1 functionality.

3.2 Definitions

3.2.1 Position identification

In the GMR-1 system, spot beams can potentially cover more than one country and there may be multiple PLMNs operating within a single spot beam. In this situation it is necessary to provide a different method for location registration compared with GSM. Within the GMR-1 system, the MES separately determines its position (using GPS) and passes this information back to the GSC/TCS within [a channel request]. The GSC/TCS uses this information to validate the MES position against specific location areas. If the network determines that the MES is not currently positioned in the supported location area, the request is rejected. If the network determines that the MES is operating within the supported location area, the channel request may be accepted. Position identification in the MES is described in specification.

The structure of the Location Area Identification (LAI) is defined in GMR-1 03.003 [4]. The format differs from the GSM LAI but is of the same size and is handled in the same way.

3.2.2 Location registration

Refer to clause 2.1 of GSM 03.12 [7].

3.2.3 Location area and MSC area

Location area is defined in GMR-1 03.022 [5].

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.

The mobile earth stations are required to perform further position identification under the following main conditions:

- Measured MES position exceeds a limit distance from last registered position (GPS update distance).
- Network service request is initiated (eg. channel request for call set-up).
- Location update timer expires.

A location area may be the size of a single spotbeam, or part of a spotbeam.

The paging procedure is used within the spotbeam in which the MES is located in order to initiate interactions (eg. incoming call to mobile).

For further details of the network architecture, see specification GMR-1 03.002 [3].

3.2.4 Location area identification

Refer to clause 2.3 of GSM 03.12 [7].

For the GMR-1 system, the location area identifier includes the MSC, and spotbeam identification.

3.2.5 IMSI detach/attach operation

The support of IMSI detach/attach operation is mandatory in MESs. The facility may be enabled or disabled by the network according to the requirements of the fixed infrastructure of the PLMN. The BCCH shall indicate whether the detach/attach operation is to be performed by the MES, see GMR-1 03.022 [5].

3.2.5.1 Explicit IMSI detach/attach

Refer to clause 2.4.1 of GSM 03.12 [7].

3.2.5.2 Implicit IMSI detach

Refer to clause 2.4.2 of GSM 03.12 [7].

3.3 Abbreviations

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

MES	Mobile earth station
GMR-1	GEO-Mobile Radio
GSS	Gateway station system
GSC	Gateway station controller
GPS	Global positioning system
TCS	Traffic control subsystem

4 Procedures in the network related to location updating

4.1 Procedures in the GSS related to position identification and location updating

The TCS may enable or disable MES position reporting. Refer to GMR-1 03.299 [6].

Where MES position reporting is enabled, the GSC/TCS of the gateway station subsystem (GSS) shall use position identification information to validate the MES position against the location area being used to attempt location update. The information shall be used to initiate the MSC location updating procedures.

4.2 Procedures in the MSC related to location updating

Refer to clause 3.1 of GSM 03.12 [7].

4.3 Procedures in the GSC related to location updating

The GSC shall insert the Location Area Identification, GPS update distance value, GPS update timer value, periodic location updating time-out value and IMSI detach/attach supported information on the BCCH.

4.4 Normal location updating and IMSI detach/attach operation

Refer to clause 3.3 of GSM 03.12 [7].

4.5 IMSI enquiry procedure

Refer to clause 3.4 of GSM 03.12 [7].

4.6 Information transfer between visitor and home location registers

4.6.1 Procedures for location registration

Refer to clause 3.5.1 of GSM 03.12 [7].

4.6.1.1 Location updating procedure

Refer to clause 3.5.1.1 of GSM 03.12 [7].

4.6.1.2 Downloading of subscriber parameters to the VLR

Refer to clause 3.5.1.2 of GSM 03.12 [7].

4.6.1.3 Location cancellation procedure

Refer to clause 3.5.1.3 of GSM 03.12 [7].

4.6.1.4 Subscriber parameter request procedure

Refer to clause 3.5.1.4 of GSM 03.12 [7].

4.6.1.5 Mobile subscriber purging procedure

Refer to clause 3.5.1.5 of GSM 03.12 [7].

4.6.1.6 Recovery procedures

Refer to clause 3.5.1.6 of GSM 03.12 [7].

5 Authentication

Refer to clause 4 of GSM 03.12 [7].

Annex A (informative): Bibliography

GMR-1 03.008 (ETSI TS 101 376-3-4): "GEO-Mobile Radio Interface Specifications; Part 3: Network specifications; Sub-part 4: Organization of Subscriber Data; GMR-1 03.008".

GMR-1 03.020 (ETSI TS 101 376-3-9): "GEO-Mobile Radio Interface Specifications; Part 3: Network specifications; Sub-part 9: Security related Network Functions; GMR-1 03.020".

GSM 03.07 (ETSI ETS 300 525): "European digital cellular telecommunications system (Phase 2); Restoration procedures (GSM 03.07 V4.3.1).

History

Document history		
V1.1.1	March 2001	Publication