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Technical Specification

**GEO-Mobile Radio Interface Specifications;
Part 4: Radio interface protocol specifications;
Sub-part 1: GMR-2 Mobile Earth Station-Network Interface;
General Aspects and Principles
GMR-2 04.001**



Reference

DTS/SES-002-04001

KeywordsGMR, MSS, MES, satellite, GSO, S-PCN, GSM,
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650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

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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

IPR Owner: Digital Voice Systems Inc
One Van de Graaff Drive Burlington,
MA 01803
USA

Contact: John C. Hardwick
Tel.: +1 781-270-1030
Fax: +1 781-270-0166

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

IPR Owner: Ericsson Mobile Communications (UK) Limited
The Keytech Centre, Ashwood Way
Basingstoke
Hampshire RG23 8BG
United Kingdom

Contact: John Watson
Tel.: +44 1256 864821

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

IPR Owner: Hughes Network Systems
11717 Exploration Lane
Germantown, Maryland 20876
USA

Contact: John T. Whelan
Tel: +1 301-428-7172
Fax: +1 301-428-2802

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	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

IPR Owner: Lockheed Martin Global Telecommunications, Inc.
900 Forge Road
Norrstown, PA. 19403
USA

Contact: R.F. Franciose
Tel.: +1 610.354.2535
Fax: +1 610.354.7244

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:

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 4, sub-part 1 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";

Part 4: "Radio interface protocol specifications";

Sub-part 1: "GMR-2 Mobile Earth Station-Network Interface; General Aspects and Principles; GMR-2 04.001";

Sub-part 2: "GMR-2 Mobile Earth Station-Network Interface; Channel Structures and Access capabilities; GMR-2 04.003";

Sub-part 3: "Layer 1 General requirements; GMR-2 04.004";

Sub-part 4: "Data Link Layer General Aspects; GMR-2 04.005";

Sub-part 5: "GMR-2 Mobile Earth Station - Network Interface; Data Link (DL) layer Specifications; GMR-2 04.006";

Sub-part 6: "Mobile Radio Interface Signalling Layer 3; General Aspects; GMR-2 04.007";

Sub-part 7: "Mobile radio interface Layer 3 Specifications; GMR-2 04.008";

Sub-part 8: "Point-to-Point Short Message Services; GMR-2 04.011";

Sub-part 9: "Performance requirements on the mobile radio interface; GMR-2 04.013";

Sub-part 10: "Rate Adaptation on the Mobile Earth Station (MES) - Gateway System Interface; GMR-2 04.021";

Sub-part 11: "Call Waiting (CW) and Call Holding (HOLD) Supplementary Services; GMR-2 04.083";

Sub-part 12: "Multiparty Supplementary Services (MPTY); GMR-2 04.084";

Sub-part 13: "Technical Realisation of the Early Flag Technique; GMR-2 04.201";

Sub-part 14: "Call Barring Supplementary Services; GMR-2 02.088";

Part 5: "Radio interface physical layer specifications";

Part 6: "Speech coding 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 are defined in GMR-n 01.201.

1 Scope

The present document establishes the general principles relating to the technical specifications for the GMR-2 mobile earth station (MES) - network interface.

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; GMR-2 01.004".
- [2] GSM 02.30 (ETSI ETS 300 511 Edition 2): "European digital cellular telecommunications system (Phase 2); Man-Machine Interface (MMI) of the Mobile Station (MS); (GSM 02.30 version 4.13.2)".
- [3] GMR-2 04.003 (ETSI TS 101 377-4-2): "GEO-Mobile Radio Interface Specifications; Part 4: Radio interface protocol specifications; Sub-part 2: GMR-2 Mobile Earth Station-Network Interface; Channel Structures and Access capabilities; GMR-2 04.003".
- [4] GMR-2 04.004 (ETSI TS 101 377-4-3): "GEO-Mobile Radio Interface Specifications; Part 4: Radio interface protocol specifications; Sub-part 3: Layer 1 General requirements; GMR-2 04.004".
- [5] GMR-2 04.005 (ETSI TS 101 377-4-4): "GEO-Mobile Radio Interface Specifications; Part 4: Radio interface protocol specifications; Sub-part 4: Data Link Layer General Aspects; GMR-2 04.005".
- [6] GMR-2 04.006 (ETSI TS 101 377-4-5): "GEO-Mobile Radio Interface Specifications; Part 4: Radio interface protocol specifications; Sub-part 5: GMR-2 Mobile Earth Station - Network Interface; Data Link (DL) layer Specifications; GMR-2 04.006".
- [7] GMR-2 04.007 (ETSI TS 101 377-4-6): "GEO-Mobile Radio Interface Specifications; Part 4: Radio interface protocol specifications; Sub-part 6: Mobile Radio Interface Signalling Layer 3; General Aspects; GMR-2 04.007".
- [8] GMR-2 04.008 (ETSI TS 101 377-4-7): "GEO-Mobile Radio Interface Specifications; Part 4: Radio interface protocol specifications; Sub-part 7: Mobile radio interface Layer 3 Specifications; GMR-2 04.008".
- [9] GSM 04.10 (ETSI ETS 300 558 Edition 2): "Digital cellular telecommunications system (Phase 2); Mobile radio interface layer 3; Supplementary services specification; General aspects (GSM 04.10 version 4.10.0)".
- [10] GSM 04.11 (ETSI ETS 300 559 Edition 4): "Digital cellular telecommunications system (Phase 2); Point-to-Point (PP) Short Message Service (SMS) support on mobile radio interface (GSM 04.11 version 4.10.0)".
- [11] GSM 04.12 (ETSI ETS 300 560 Edition 3): "Digital cellular telecommunications system (Phase 2); Short Message Service Cell Broadcast (SMSCB) support on the mobile radio interface (GSM 04.12 version 4.6.0)".

- [12] ITU-T Recommendation X.200: "Information technology - Open Systems Interconnection - Basic reference model: The basic model".
- [13] ITU-T Recommendation X.210: "Information technology - Open Systems Interconnection - Basic Reference Model: Conventions for the definition of OSI services".

3 Abbreviations

All abbreviations used in the present document are listed in GMR-2 01.004 [1].

4 General

4.1 Basic GMR-2 user access interfaces

The GMR-2 system supports a wide range of services that a user accesses by a standard set of interfaces at a mobile earth station (MES). The mobile earth station is connected to the GMR-2 fixed infrastructure via a radio path to the satellite and gateway(s) and NCC as shown in figure 4.1.1.

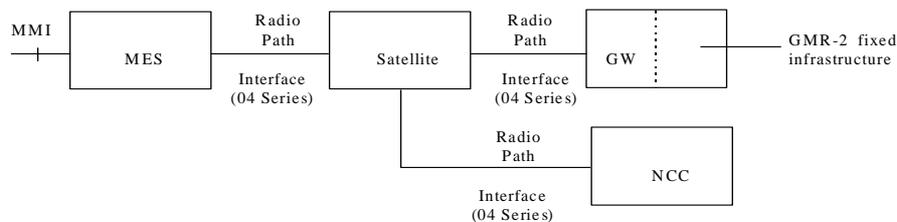


Figure 4.1.1: Basic interfaces for user access for GMR-2

4.2 MES - network interface

The MES - network interface on this radio path is specified in the GMR-2 04 series of technical specifications in such a way as to permit user and network technologies and configurations to evolve separately.

4.3 Principles and procedures for the MMI

The principles and procedures for the man-machine interface (MMI) to the MES (Mobile Earth Station) are described in technical specification GSM 02.30 [2]. The user may also use standard terminal interfaces within the MES.

5 Interface Applications

Figure 5.1 shows some examples of the application of GMR-2 MES - network interfaces. The following cases are shown:

- 1) Access of simple hand-portable or vehicle mounted MESs;
- 2) Access of a MES with multiple terminal equipment installation;
- 3) Access of a mobile PBX or LAN.

In addition, the figure identifies inter-network interfaces for connections to:

- 1) Land-line ISDN networks;
- 2) Dedicated serving networks.

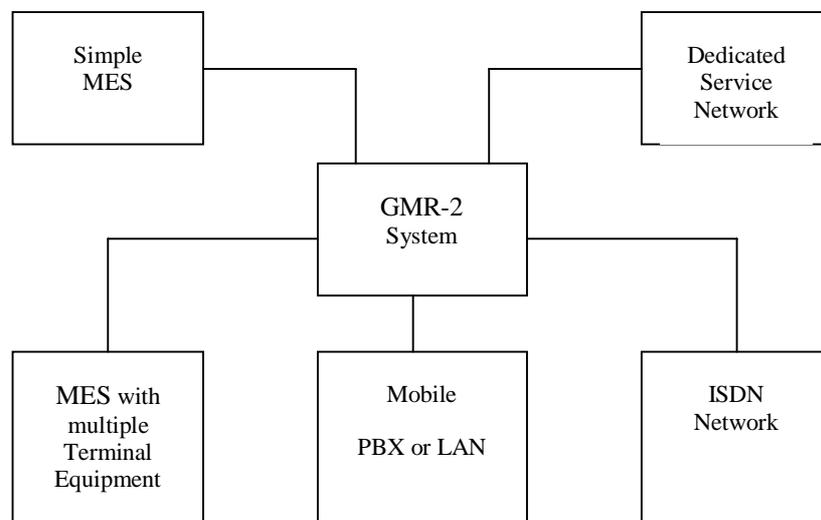


Figure 5.1: Examples of GMR-2 interfaces

6 Interface technical specification objectives

MES - network interface technical specifications should allow:

- 1) Different types of mobile earth stations and terminal equipment to use the same standard interface;
- 2) Portability of MESs within the system area of GMR-2;
- 3) Separate evolution of both mobile earth stations and network equipment technologies and configurations;
- 4) Calls to a terminal using the same code (call number) no matter in what country it is actually located;
- 5) Connections of a MES to the ISDN network so that only the radio channel capacity and the ISDN protocol are limiting factors.

7 Interface characteristics

The MES - network interface is specified by a comprehensive set of characteristics, including:

- 1) Channel structures and access capabilities;
- 2) User-network protocols;
- 3) Maintenance and operation characteristics;
- 4) Performance characteristics;
- 5) Service characteristics.

8 Technical specifications on GMR-2 network interfaces

8.1 Reference configurations

The reference configurations for the GMR-2 MES - network interface define the terminology for various reference points.

8.2 Channel structures and access capabilities

Technical specification GMR-2 04.003 [3] defines the channel structures and access capabilities for the MES - network interface. A distinction is necessary between the logical channel structure supported by the interface and the access capability supported by the radio path of the system.

The MES - network interface as defined in technical specifications GMR-2 04.004 through 04.012 is applicable to a wide range of situations.

9 Protocol modelling principles

9.1 Signalling protocols

The signalling protocols on the MES - network interface are specified using the concepts of the reference model of open system interconnection (OSI) given in ITU-T Recommendations X.200 [12] and X.210 [13].

9.2 Basic structuring technique

The basic structuring technique in the OSI reference model is layering. According to this technique, communication among application processes is viewed as being logically partitioned into an ordered set of layers represented in a vertical sequence as shown in figure 9.2.1.

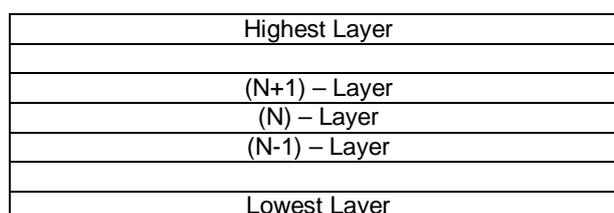


Figure 9.2.1: Layering

Entities exist in each layer. Entities in the same layer, but in different systems which must exchange information to achieve a common objective are called "peer entities." Entities in adjacent layers interact through their common boundary. The services provided by the (N + 1) - layer are the combination of the services and functions provided by the (N) - layer and all layers below the (N) - layer.

Management functions may also be required. They may include functions which are common for several layers and are not supported by the services provided by a specific layer. Examples of such functions are error reporting, status reporting and management of the operation of certain layers. Such management functions do not require that peer-to-peer messages are sent across the MES- network interface.

9.3 MES signalling

For signalling on the MES - network interface, three layers are required as shown in figure 9.3.1.

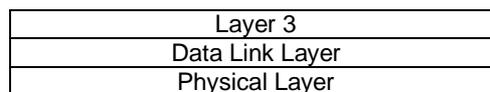


Figure 9.3.1: Layering on the MES – network interface

The layers are:

- 1) PHYSICAL LAYER which corresponds to the lowest layer. The functions and protocols of the physical layer are defined in technical specification GMR-2 04.004 [4].
- 2) DATA LINK LAYER. The functions and protocols of the data link layer are defined in technical specifications GMR-2 04.005 [5] and 04.006 [6].
- 3) LAYER 3. The functions and protocols of layer 3 are defined in technical specifications GSM 04.10 [9] and 04.12 [11], and GMR-2 04.008 [8] and 04.011 [10].

9.4 Service primitives

Layer-to-layer interactions are specified in terms of service primitives. The primitives represent, in an abstract way, the logical exchange of information and control between adjacent layers. They do not specify or constrain implementation.

Primitives are also used to describe information exchange between layers and the mobile management entity.

The primitives that are exchanged between the (N + 1) - layer and the (N) - layer are of the following four types (see figure 9.4.1).

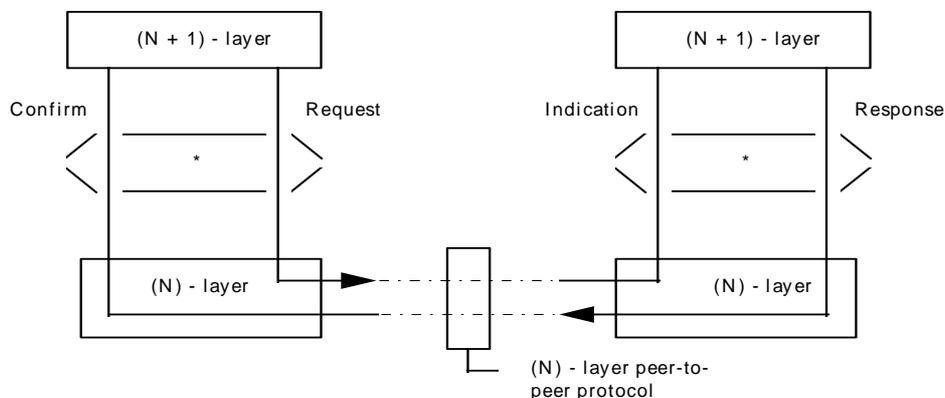


Figure 9.4.1: Primitive action sequence for peer-to-peer communication

The REQUEST primitive type is used when a higher layer is requesting a service from the next lower layer.

The INDICATION primitive type is used by a layer providing a service to notify the next higher layer of activities related to the primitive type REQUEST.

The RESPONSE primitive type is used by a layer to acknowledge receipt, from a lower layer, of the primitive type INDICATION.

The CONFIRM primitive type is used by the layer providing the requested service to confirm that the activity has been completed.

History

Document history		
V1.1.1	March 2001	Publication