

# ETSI TS 101 376-4-1 V1.1.1 (2001-03)

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*Technical Specification*

**GEO-Mobile Radio Interface Specifications;  
Part 4: Radio interface protocol specifications;  
Sub-part 1: Mobile Earth Station-Gateway Station  
System (MES-GSS) Interface;  
GMR-1 04.001**

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**Reference**

DTS/SES-001-04001

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**Keywords**GMR, GSO, GSM, MSS, MES, S-PCN, gateway,  
interface, mobile, radio, satellite**ETSI**

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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  
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### IPRs:

Project	Company	Title	Country of Origin	Patent n°	Countries Applicable
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

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 101 376 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  
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 101 376 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 101 376 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	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-margin 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

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

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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:

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: "Mobile Earth Station-Gateway Station System (MES-GSS) Interface; GMR-1 04.001";**

Sub-part 2: "GMR-1 Satellite Network Access Reference Configuration; GMR-1 04.002";

Sub-part 3: "Channel Structures and Access Capabilities; GMR-1 04.003";

Sub-part 4: "Layer 1 General Requirements; GMR-1 04.004";

Sub-part 5: "Data Link Layer General Aspects; GMR-1 04.005";

Sub-part 6: "Mobile earth Station-Gateway Station Interface Data Link Layer Specifications; GMR-1 04.006";

Sub-part 7: "Mobile Radio Interface Signalling Layer 3 General Aspects; GMR-1 04.007";

Sub-part 8: "Mobile Radio Interface Layer 3 Specifications; GMR-1 04.008";

Sub-part 9: "Performance Requirements on the Mobile Radio Interface; GMR-1 04.013";

Sub-part 10: "Rate Adaptation on the Access Terminal-Gateway Station Subsystem (MES-GSS) Interface; GMR-1 04.021";

Sub-part 11: "Radio Link Protocol (RLP) for Data Services; GMR-1 04.022";

Part 5: "Radio interface physical layer specifications";

Part 6: "Speech coding specifications";

Part 7: "Terminal adaptor specifications".

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## 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 general aspects and principles relating to the interface descriptions for the GMR-1 Mobile Satellite System.

The present document introduces principal interfaces of the system and their properties. It also describes the protocol layering model that is used throughout the 04.0yy series specifications for the description of the communication layers that make up the MES – GSS interface, and it provides a model for the description of their interfaces.

The present document is based on GSM 04.01 [11].

---

# 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 04.002 (ETSI TS 101 376-4-2): "GEO-Mobile Radio Interface Specifications; Part 4: Radio interface protocol specifications; Sub-part 2: GMR-1 Satellite Network AccessReference Configuration; GMR-1 04.002".
- [4] GMR-1 04.003 (ETSI TS 101 376-4-3): "GEO-Mobile Radio Interface Specifications; Part 4: Radio interface protocol specifications; Sub-part 3: Channel Structures and Access Capabilities; GMR-1 04.003".
- [5] GMR-1 04.004 (ETSI TS 101 376-4-4): "GEO-Mobile Radio Interface Specifications; Part 4: Radio interface protocol specifications; Sub-part 4: Layer 1 General Requirements; GMR-1 04.004".
- [6] GMR-1 04.005 (ETSI TS 101 376-4-5): "GEO-Mobile Radio Interface Specifications; Part 4: Radio interface protocol specifications; Sub-part 5: Data Link Layer General Aspects; GMR-1 04.005".
- [7] GMR-1 04.006 (ETSI TS 101 376-4-6): "GEO-Mobile Radio Interface Specifications; Part 4: Radio interface protocol specifications; Sub-part 6: Mobile earth Station-Gateway Station Interface Data Link Layer Specifications; GMR-1 04.006".
- [8] GMR-1 04.007 (ETSI TS 101 376-4-7): "GEO-Mobile Radio Interface Specifications; Part 4: Radio interface protocol specifications; Sub-part 7: Mobile Radio Interface Signalling Layer 3 General Aspects; GMR-1 04.007".
- [9] GMR-1 04.008 (ETSI TS 101 376-4-8): "GEO-Mobile Radio Interface Specifications; Part 4: Radio interface protocol specifications; Sub-part 8: Mobile Radio Interface Layer 3 Specifications; GMR-1 04.008".
- [10] GSM 02.30 (ETSI ETS 300 511): "European digital cellular telecommunications system (Phase 2); Man-Machine Interface (MMI) of the Mobile Station (MS); (GSM 02.30 (V4.13.0))".



- [11] GSM 04.01 (ETSI ETS 300 550): "European digital cellular telecommunications system (Phase 2); Mobile Station - Base Station System (MS - BSS) interface; General aspects and principles; (GSM 04.01 (V4.0.4))".
- [12] GSM 04.10 (ETSI ETS 300 558): "Digital cellular telecommunications system (Phase 2); Mobile radio interface layer 3; Supplementary services specification; General aspects (GSM 04.10 (V4.10.1))".
- [13] GSM 04.11 (ETSI ETS 300 559): "Digital cellular telecommunications system (Phase 2); Point-to-Point (PP) Short Message Service (SMS) support on mobile radio interface (GSM 04.11 (V4.10.0))".
- [14] GSM 04.12 (ETSI ETS 300 560): "Digital cellular telecommunications system (Phase 2); Short Message Service Cell Broadcast (SMSCB) support on the mobile radio interface; (GSM 04.12 (V4.6.0))".

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## 3 Terminology and abbreviations

### 3.1 Terminology

Refer to the terminology cross reference table in GMR-1 01.201 [2] for a cross reference between common GSM terms and the equivalent terms used in GMR-1 specifications.

### 3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

MES	Mobile Earth Station
GMR-1	GEO-Mobile Radio
GSS	Gateway Station System

Also Refer to GMR-1 01.004 [1].

---

## 4 General

### 4.1 Access by a standard set of interfaces at an MES

A GMR-1 Satellite Network supports a wide range of services which a user accesses by a standard set of interfaces at a mobile earth station (MES). The mobile earth station is connected to the GMR-1 Satellite Network fixed infrastructure via a user terminal interface, GMR-1 satellite, and feeder link interface to a gateway station, as shown in figure 1.

## 4.2 Basic interfaces for user access for GMR-1 satellite network

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

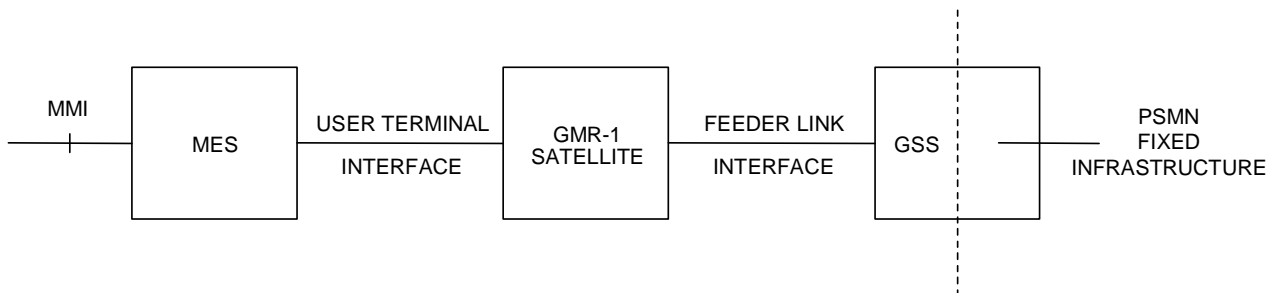


Figure 1: Basic interfaces for user access for a GMR-1 Satellite Network

## 4.3 Principles and procedures for the man-machine interface (MMI) to the MES

The principles and procedures for the man-machine interface (MMI) to the MES are described in GSM 02.30 [10]. The user may also use standard terminal interfaces within the MES. The reference configuration for the access is described in GMR-1 04.002 [3].

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# 5 Interface applications

Figure 2 shows some examples of the application of GMR-1 MES-GSS interfaces. The following cases are shown:

- i) access of simple handportable or vehicle mounted MESs;
- ii) access of an MES with multiple terminal equipment installation.

In addition, the figure identifies internetwork interfaces for connections to:

- iii) land-line ISDN networks;
- iv) GSM PLMN;
- v) dedicated service networks.

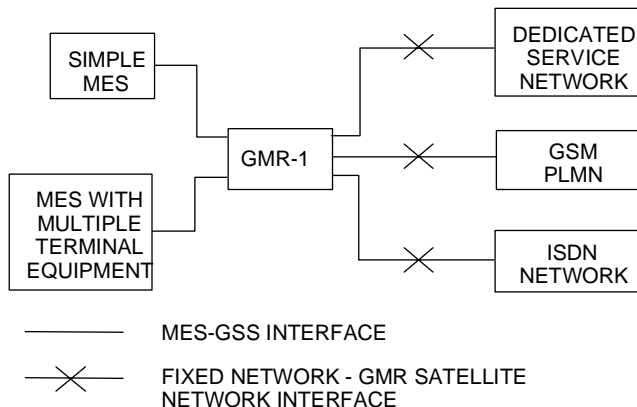


Figure 2: Examples of GMR-1 interfaces

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## 6 Interface technical specification objectives

Same as clause 3 of GSM 04.01 [11].

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## 7 Interface characteristics

Same as clause 4 of GSM 04.01 [11].

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## 8 Interface capabilities

Same as clause 5 of GSM 04.01 [11].

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## 9 Technical specifications on GMR-1 MES-GSS interfaces

### 9.1 Reference configurations

The reference configurations for the GMR-1 MES-GSS interface define the terminology for various reference points. GMR-1 04.002 [3] contains the GMR-1 Satellite Network access reference configuration.

### 9.2 Channel structure and access capabilities

GMR-1 04.003 [4] defines the channel structures and access capabilities for the MES-GSS 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.

### 9.3 MES-GSS interface as defined in GMR-1 04 series

The MES-GSS interface as defined in GMR-1 04 series is applicable to a wide range of situations.

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## 10 Protocol modelling principles

### 10.1 Signalling protocols on the MES-GSS interface

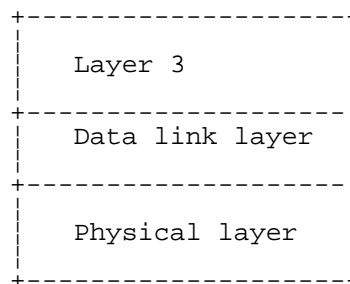
Same as clause 7.1 of GSM 04.01 [11].

### 10.2 The basic structuring technique in the OSI reference model

Same as clause 7.2 of GSM 04.01 [11].

### 10.3 Signalling on the GSS interface

For signalling on the MES-BSS interface three layers are required as shown in figure 3.



**Figure 3: Layering on the MES-BSS interface**

The layers are:

- **PHYSICAL LAYER** which corresponds to the lowest layer. The functions and protocols of the physical layer are defined in GMR-1 04.004 [5].
- **DATA LINK LAYER**. The functions and protocols of the data link layer are defined in GMR-1 04.005 [6] and GMR-1 04.006 [7].
- **LAYER 3**. The functions and protocols of layer 3 are defined in GMR-1 04.007 [8], GMR-1 04.008 [9], GSM 04.10 [12], GSM 04.11 [13] and GSM 04.12 [14].

### 10.4 Service primitives

Same as clause 7.4 of GSM 04.01 [11].

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## Annex A (informative): Bibliography

ITU-T Recommendation X.200: "Information technology - Open Systems Interconnection - Basic reference model: The basic model".

ITU-T Recommendation X.210: "Information technology - Open Systems Interconnection - Basic Reference Model: Conventions for the definition of OSI services".

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## History

<b>Document history</b>		
V1.1.1	March 2001	Publication