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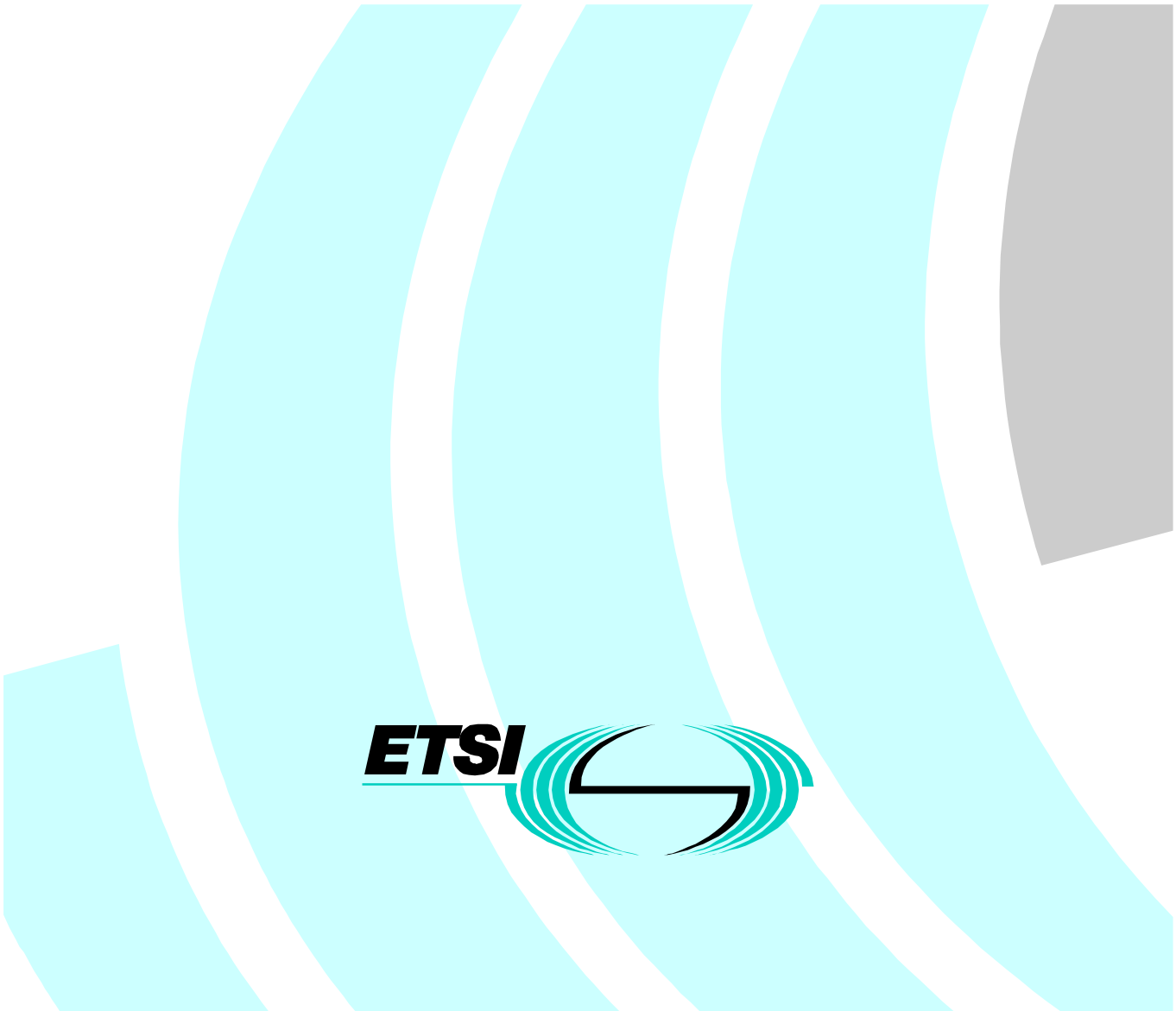
Technical Specification

GEO-Mobile Radio Interface Specifications;
Part 4: Radio interface protocol specifications;
Sub-part 3: Channel Structures and Access Capabilities;
GMR-1 04.003



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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

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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

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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 ThroughputCellular 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:

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 3 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".

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 defines sets of channel types, access capabilities, and channel configurations for the GMR-1 Mobile Satellite System. These channels are defined at the configuration reference point Um (radio interface), as defined in GMR-1 04.002 [4].

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 03.022 (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".

[4] 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 Access Reference Configuration; GMR-1 04.002".

[5] GMR-1 05.002 (ETSI TS 101 376-5-2): "GEO-Mobile Radio Interface Specifications; Part 5: Radio interface physical layer specifications; Sub-part 2: Multiplexing and Multiple Access; Stage 2 Service Description; GMR-1 05.002".

3 Definitions and abbreviations

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

4 General definitions

A channel represents a specified portion of the information-carrying capacity of an interface.

Channels are classified by channel types, which have common characteristics. Channel types appearing at the radio interface are specified in clause 5.

At a given time, the complete interface between a gateway station (GS) and a set of mobile Earth stations (MESs) corresponds to some interface structure. The interface structure may change in time. The number of possible different such interface structures can be large. The GS access capability is a description of all the possible interface structures of the considered GS. GS access capabilities are specified in clause 6.

At a given moment, the channel configuration of an MES is the interface structure. This MES actually uses to transmit information to or receive information from the GS. The channel configuration may change in time. A limited number of channel configurations are identified, and are specified in clause 7.

5 Channel types and their use

5.1 User channels

User channels are intended to carry a wide variety of user information streams. A distinguishing characteristic is that user channels do not carry signalling information for connection management (CM), mobility management (MM), or radio resource (RR) management. Instead, this signalling information is carried over the control channels.

User channels may be used to provide access to the public land mobile network (PLMN) and the networks it provides access to.

Different types of user channels are distinguished by their rates.

5.1.1 B3 channel

A B3 channel is a bidirectional user channel able to carry a 5,2 kbps stream with an error structure and a transmission delay compatible with some grade of service, intended to carry speech encoded according to technical specifications in the GMR-1 06-series.

A B3 channel uses the radio resources referred to as TCH3. Traffic channels (TCHs) are fixed physical gross-rate channels (see GMR-1 05.002 [5]).

5.1.2 B6 channel

A B6 channel is a bidirectional user channel able to carry a 10,75 kbps stream with an error structure and a transmission delay compatible with some grade of service, intended to carry a bit stream at a rate of 4,8 kbps or 2,4 kbps.

A B6 channel uses the radio resources referred to as TCH6 (see GMR-1 05.002 [5]). The following are examples of user information streams that may be carried on a B6 channel:

- Data information corresponding to circuit switching user classes of services at 4,8 kbps or 2,4 kbps.
- Data information corresponding to facsimile user classes of services at 4,8 kbps or 2,4 kbps.

5.1.3 B9 channel

A B9 channel is a bidirectional user channel able to carry a 16,45 kbps stream with an error structure and a transmission delay compatible with some grade of service, intended to carry a bit stream at a rate of 9,6 kbps, 4,8 kbps or 2,4 kbps.

A B9 channel uses the radio resources referred to as TCH9 (see GMR-1 05.002 [5]). The following are examples of user information streams that may be carried on a B6 channel:

- Data information corresponding to circuit switching user classes of services at 9,6 kbps, 4,8 kbps or 2,4 kbps.
- Data information corresponding to facsimile user classes of services at 9,6 kbps, 4,8 kbps or 2,4 kbps.

5.2 Control channels

5.2.1 General

Control channels are intended to carry signalling or synchronization data. Control channels are used to provide all active MESs with a continuous frame-oriented means of communication across the MES-GS interface.

The control channels are primarily intended to carry signalling information for connection management (CM), mobility management (MM), and radio resource (RR) management. In addition to signalling information, control channels may also be used to carry other data, including those related to short message services.

An MES channel configuration contains one or more control channels. These control channels may change in time with the channel configuration. Access management signalling functions are used to ensure continuity when control channels change.

Control channels are classified by control channel types, which have common characteristics. Three types of control channels are defined: broadcast, common, and dedicated. These control channel types are specified in the following clauses.

5.2.2 Broadcast channels

5.2.2.1 Frequency correction channel (FCCH)

The frequency correction channel (FCCH) is a point-to-multipoint, unidirectional control channel from the fixed subsystem to the MESs.

The FCCH carries information for frequency correction of the MES. This frequency correction is only required for operation of the radio subsystem.

5.2.2.2 GPS broadcast control channel (GBCH)

The GPS broadcast control channel (GBCH) is a point-to-multipoint, unidirectional control channel from the fixed subsystem to the MESs.

The GBCH carries global positioning system (GPS) time information and GPS satellite ephemeris information to the MESs as described in GMR-1 03.022 [3].

5.2.2.3 Broadcast control channel (BCCH)

The broadcast control channel (BCCH) is a point-to-multipoint, unidirectional control channel from the fixed subsystem to the MESs.

The BCCH broadcasts a variety of information to the MESs, including information necessary for the MES to register in the system. The BCCH uses a protocol specified in technical specifications in GMR-1 04-series.

5.2.3 Common control channel (CCCH)

A common control channel (CCCH) is a point-to-multipoint bidirectional control channel. A CCCH is primarily intended to carry signalling information necessary for access management functions such as the allocation of dedicated channels. The CCCH can be used for other purposes.

The CCCH uses a layered protocol according to technical specifications in the GMR-1 04-series. In particular, the multipoint-to-point management is achieved through random access techniques.

The following terms may be used when the context requires it:

1) The random access channel (RACH) is the uplink (MES to network) part of the CCCH.

2) The access grant channel (AGCH) is the downlink (network to MES) part of the CCCH reserved for assignment messages.

3) The basic alerting channel (BACH) is the downlink part of the CCCH reserved for alerting messages.

4) The paging channel (PCH) is the remaining part of the downlink part of the CCCH.

5.2.4 Dedicated control channels

Most dedicated control channel (DCCHs) are point-to-point bidirectional control channels. (The exception is TACCH, which is downlink only, and may be point-to-multipoint.)

A DCCH is intended to carry signalling information necessary for to an MES or a particular set of connections.

The DCCH uses a layered protocol according to technical specifications in the GMR-1 04- and 05-series.

The dedicated control channels indicate resources dedicated to an MES or a particular set of connections.

DCCHs are further classified as follows:

1) Slow TCH-associated control channel (SACCH). This channel is a bidirectional DCCH always allocated together with a TCH or SDCCH.

2) Fast TCH3-associated control channel (FACCH3). This channel is a bidirectional DCCH obtained by preemptive dynamic multiplexing on a TCH3. (It is always allocated together with a TCH3).

3) Fast TCH6-associated control channel (FACCH6). This channel is a bidirectional DCCH obtained by preemptive dynamic multiplexing on a TCH6. (It is always allocated together with a TCH6).

4) Fast TCH9 associated control channel (FACCH9). This channel is a bidirectional DCCH obtained by preemptive dynamic multiplexing on a TCH9. (It is always allocated together with a TCH9).

5) Standalone dedicated control channel (SDCCH/4). This channel is a bidirectional DCCH whose allocation is not linked to the allocation of a TCH.

6) Terminal-to-terminal associated control channel (TACCH/2). This channel can be shared among a subset of terminal-to-terminal calls, and is not necessarily dedicated to a single terminal-to-terminal call.

6 GS access capability

The GS access capability is composed of:

- n1 BCCH;
- n1 CCCH physically related to the BCCH;
- n2 additional CCCH.

The global resource can be used to accommodate:

- n3 (TCH9 + FACCH + SACCH);
- n4 (TCH6 + FACCH + SACCH);
- n 5 (TCH3 + FACCH + SACCH);
- n6 (SDCCH + SACCH);
- the exact use of the global resource may vary in time.

7 Channel configurations

At a given moment, an MES can access only a limited number of the channels appearing on its radio interface. Different compositions for the accessed channels set are identified and specified below.

The different channel configurations are:

Table 1: Channel configurations

Configuration Number	Logical Channel Configuration	MES Phase
1	FCCH + BCCH	Normally used only in the phase when the physical connection is not set, such as just after switch-on, or after a long interruption of the physical connection due to poor propagation conditions.
2	GBCH	
3	CCCH.	Used by the active but idle MES.
4	CCCH + BCCH	
5	SDCCH+SACCH	Used in phases when only a dedicated control channel is needed.
6	B3+FACCH + SACCH	Used in particular when a circuit-switched communication is in progress.
7	B6+FACCH + SACCH	
8	B9+FACCH + SACCH	

History

Document history		
V1.1.1	March 2001	Publication