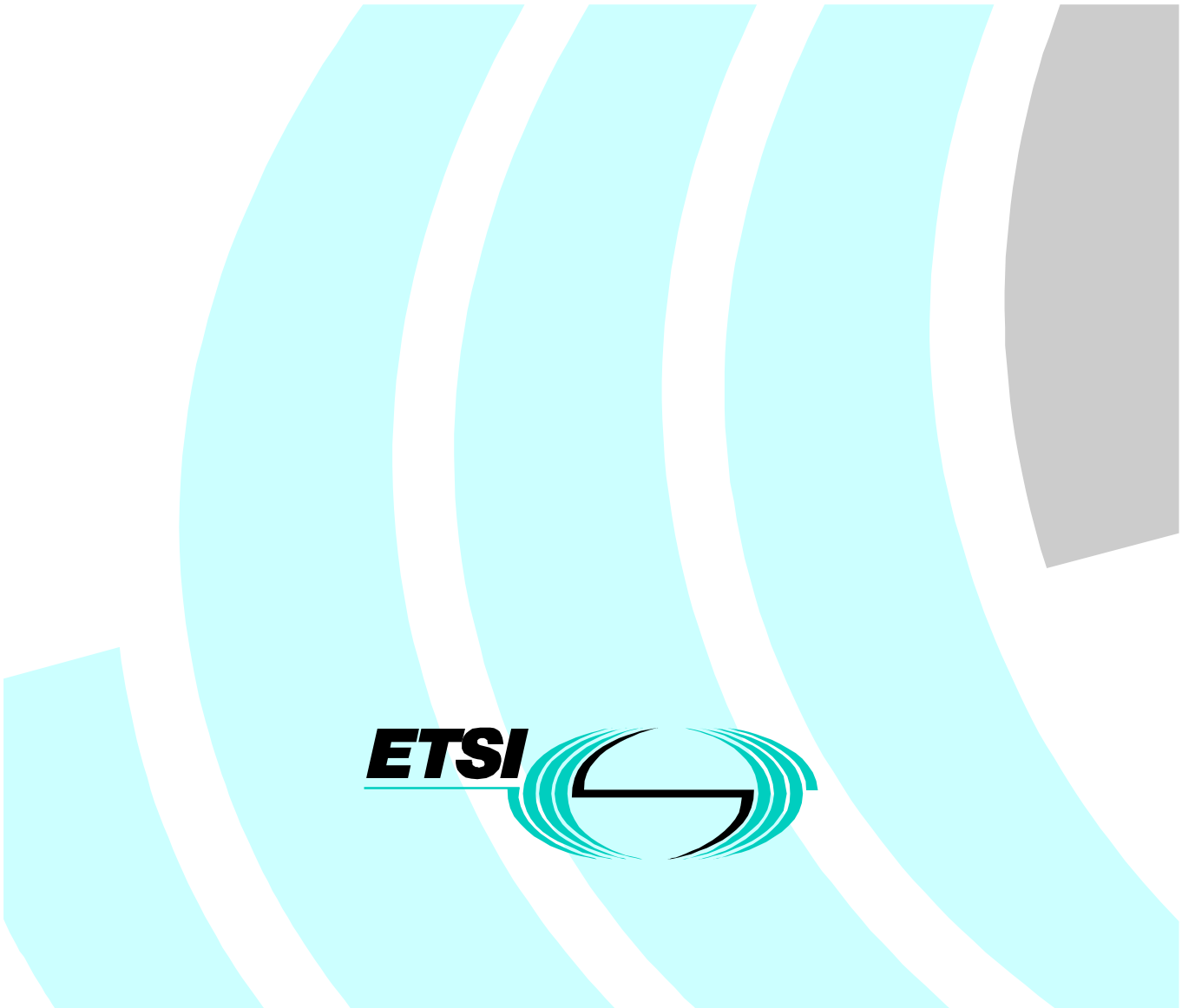
ETSI TS 101 377-3-9 V1.1.1 (2001-03)

Technical Specification

GEO-Mobile Radio Interface Specifications;
Part 3: Network specifications;
Sub-part 9: Discontinuous Reception (DRX)
in the GMR-2 System;
GMR-2 03.013



Reference
DTS/SES-002-03013

Keywords
DRX, GMR, GSM, GSO, interface, MES, mobile, MSS, radio, satellite, S-PCN

ETSI

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

Contents

Intellectual Property Rights

The information pertaining to essential IPRs is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (http://www.etsi.org/ipr).

The attention of ETSI has been drawn to the Intellectual Property Rights (IPRs) listed below which are, or may be, or may become, Essential to the present document. The IPR owner has undertaken to grant irrevocable licences, on fair, reasonable and non-discriminatory terms and conditions under these IPRs pursuant to the ETSI IPR Policy. Further details pertaining to these IPRs can be obtained directly from the IPR owner.

The present IPR information has been submitted to ETSI and pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

IPRs:

Project	Company	Title	Country of Origin	Patent n°	Countries Applicable
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

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 ThroughputCellular 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
Norristown, 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 3, sub-part 9 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 a system wide view of the operation of discontinuous reception on the GMR-2 system.

The support of DRX is mandatory in GSM PLMNs.

The detailed coding and procedural details are defined in the relevant Technical Specifications dealing with the specific interfaces that are involved, for instance GSM 08.08 [5] and GMR-2 04.008 [2]. Reference is also made to the framing on the air interface which is defined in GMR-2 05.002 [3].

The Technical Specification gives an overview of the implementation of discontinuous reception DRX within the GSM system, the actions required at MSC, GWS, and MES, the support of the facility via the air interface, and some operational aspects of the facility.

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 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".

[3] GMR-2 05.002 (ETSI TS 101 377-5-20): "GEO-Mobile Radio Interface Specifications; Part 5: Radio interface physical layer specifications; Sub-part 20: Multiplexing and multiple access on the radio path".

[4] GSM 08.02 (ETSI ETS 300 587): "Digital cellular telecommunications system (Phase 2); Base Station System - Mobile-services Switching Centre (GWS - MSC) interface Interface principles"(V4.2.0).

[5] GSM 08.08 (ETSI ETS 300 590): "Digital cellular telecommunications system (Phase 2); Mobile Switching Centre - Base Station System (MSC - GWS) interface Layer 3 specification" (V4.12.1).

[6] GSM 03.68: "Digital cellular telecommunications system (Phase 2+); Voice Group Call Service (VGCS) Stage 2" (V6.1.0).

[7] GSM 03.69: "Digital cellular telecommunications system (Phase 2+); Voice Broadcast Service (VBS) Stage 2" (V6.1.0).

3 Abbreviations

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

4 Overview of discontinuous reception

DRX is a technique that allows the mobile station to power down significant amounts of its internal circuitry for a high percentage of the time when it is in the idle mode.

It also ensures that the MES is aware of exactly when page requests for it may be transmitted and it can then therefore schedule other tasks such that it avoids the problem of not decoding valid page requests transmitted by the network in the idle mode periods.

The technique works by dividing the MESs within a cell into a set of groups. The group in which an MES resides is then known locally at both the MES and the GWS. All paging requests to each group are then scheduled and sent at a particular time, which is derived from the TDMA frame number in conjunction with the IMSI of the MES, and some BCCH transmitted data.

Thus both the GWS and the MES know when relevant page requests will be sent and the MES can power down for the period when it knows that page requests will not occur.

The page request can contain the IMSI (TMSI is not supported) in order to identify the MES concerned. The IMSI is however always used to identify the paging population. Paging by means of the IMEI is for further study.

Mechanisms for the application of DRX for the voice group call and voice broadcast services are defined in stage 2 descriptions in GSM 03.68 [6] and GSM 03.69 [7], respectively.

5 MSC functions

The MSC is almost transparent to DRX, since it has no real time knowledge of the absolute frame numbers on the air interface (refer to GSM 08.02 [4]).

It should be noted, however, that the MSC does define which cells are to be paged in order to locate a particular MES. Normally this will be a location area.

The MSC therefore constructs page requests and sends them to a specific set of GWSs. Each page request always includes the IMSI. The timer to detect non-receipt of a page response may require alteration depending upon the number of page groups that are involved. If this is the case, then the timer will be set by O and M command at the same time as the number of paging groups at the cell is altered.

6 GWS functions

At the GWS page requests are received. It is implicit (single cell GWSs) or explicit (multi cell GWSs) within the page requests from the MSC to which cell the page request is destined (Technical Specifications GSM 08.08 [5] and GSM 08.02 [4] refers).

The GWS analyses the IMSI in order to derive the page group of the MES involved. The air interface page request is then constructed and transmitted in the appropriate TDMA burst. If the page request includes an IMSI then the IMSI is used to derive the page population. The scheduling of the page requests is therefore completely controlled by the GWS.

The relationship between paging group and TDMA burst, and IMSI and paging group is given in GMR-2 05.002 [3].

The exact scheduling mechanism used at the GWS is not defined in the present document.

However the GWS may set the "page mode" bits as described in GMR-2 04.008 [2]. This can be used to optimize paging load and reduce missed page requests during system reconfiguration.

7 MES functions

The MES shall derive its paging group as defined in GMR-2 05.002 [3].

The MES shall interpret all paging requests in its paging group according to the paging mode bits as described in GMR-2 04.008 [2].

8 Support via the air interface

The BCCH and paging channel messages are defined in GMR-2 04.008 [2]. GMR-2 05.002 [3] defines the algorithms which enable an MES to know the exact frame and burst when page requests relevant to it might be transmitted.

9 Operational aspects

There will be occasions when it is necessary to alter the parameters of cell such that the paging group of the MES may alter.

If (referring to GMR-2 05.002 [3]) any of the parameters BS_AG_BLKS_RES, BS_CC_CHANS_COMB, BS_CC_CHANS or BS_PA_MFRMS have to be altered, then the period when page requests may be lost can be minimized for example by:

- Firstly setting the page mode to "page reorganization" in all page requests on the affected cell for the exact duration of one paging period (i.e. BS_PA_MFRMS multi-frames). At the completion of this announcement period, the BCCH parameters are set to the new values and the GWS starts scheduling the paging messages according to the new parameters. The page mode is reset to any of the values "normal mode" or "extended mode" as required.

History

Document history		
V1.1.1	March 2001	Publication