

ETSI TS 101 376-5-6 V3.4.1 (2015-10)



**GEO-Mobile Radio Interface Specifications (Release 3);
Third Generation Satellite Packet Radio Service;
Part 5: Radio interface physical layer specifications;
Sub-part 6: Radio Subsystem Link Control;
GMR-1 3G 45.008**

Reference

RTS/SES-00374-5-6

Keywords

3G, control, gateway, GMPRS, GMR, GPRS,
GSM, GSO, interface, MES, mobile, MSC, 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

Important notice

The present document can be downloaded from:
<http://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the only prevailing document is the print of the Portable Document Format (PDF) version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at
<http://portal.etsi.org/tb/status/status.asp>

If you find errors in the present document, please send your comment to one of the following services:
<https://portal.etsi.org/People/CommitteeSupportStaff.aspx>

Copyright Notification

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.
The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2015.
All rights reserved.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are Trade Marks of ETSI registered for the benefit of its Members.
3GPP™ and **LTE™** are Trade Marks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.
GSM® and the GSM logo are Trade Marks registered and owned by the GSM Association.

Contents

Intellectual Property Rights	5
Foreword.....	5
Modal verbs terminology.....	6
Introduction	6
1 Scope	8
2 References	8
2.1 Normative references	8
2.2 Informative references.....	9
3 Definitions and abbreviations.....	9
3.1 Definitions	9
3.2 Abbreviations	11
4 General	11
5 RF power control.....	11
6 Radio link failure.....	12
7 Idle mode tasks.....	13
8 Network prerequisites.....	13
8.1 BCCH carriers with FCCH.....	13
8.2 BCCH carriers with FCCH3.....	13
9 Aspects of Discontinuous Transmission (DTX).....	13
9.0 General	13
9.1 Rules of burst transmission (A/Gb mode).....	13
9.2 Rules of burst transmission on a Dedicated CHannel (DCH) (Iu mode).....	13
10 Radio link measurements	14
11 Control parameters	14
12 GMPRS mode tasks	14
12.1 GMPRS and GMR-1 3G spot beam selection and reselection	14
12.1.1 BCCH type identification (A/Gb mode only)	14
12.1.2 Spot beam selection	15
12.1.3 Spot beam reselection	15
12.2 Idle mode link loss (A/Gb model only).....	15
12.3 Link adaptation.....	15
12.3.1 Objective and overall procedure	15
12.3.2 Power control and link adaptation parameters.....	16
12.3.3 PAN, FQI, SQIR, and SQISDR transmission.....	16
12.3.3.1 Terminal Type A, C and D.....	16
12.3.3.2 Terminal Type E and above	16
12.3.4 PAR transmission	16
12.3.4.1 Terminal Type A, C and D.....	16
12.3.4.2 Terminal Type E and above	17
12.3.5 MES output power.....	17
12.3.5.1 Terminal Type A, C, D, E and above.....	17
12.3.5.2 Open-loop power control at a terminal type C MES.....	17
12.3.5.2.0 General	17
12.3.5.2.1 Signal quality estimation	17
12.3.5.2.2 Open-loop power control procedure.....	17
12.3.6 GS output power.....	18
12.3.7 Radio link measurements and accuracy requirements	18
12.3.8 Signal Quality Indicator Report (SQIR) and Signal Quality Standard Deviation (SQISDR) transmissions.....	21

12.3.8a	Forward Quality Indicator (FQI) transmissions.....	23
12.3.9	Code rate adaptation	24
12.3.9.0	General	24
12.3.9.1	Terminal type A	24
12.3.9.2	Terminal type C	24
12.3.9.3	Terminal type D	25
12.3.9.4	Terminal type E and above.....	25
12.4	UT Link Quality Report (UTLQR) handling.....	26
12.5	Timing for the power level adjustment.....	26
13	Idle Mode Tasks with FCCH3.....	26
13.1	Introduction	26
13.2	Measurements for stored list spot beam selection	26
13.3	All LMSS band carrier spot beam search	27
13.4	Criteria for Spot Beam Selection and Reselection	27
13.4.0	General.....	27
13.4.1	MES Capabilities and Operating Environment.....	28
13.4.2	Position-Based Spot Beam Selection.....	28
13.4.3	Power-Based Spot Beam Selection.....	29
13.4.3.0	General	29
13.4.3.1	Spot Beam BCCH Power Comparison.....	30
13.4.3.2	BCCH Flux Density Criterion (C1)	31
13.5	Minimum Signal Strength for Transmission Via the RACH3.....	31
13.6	Spot beam reselection.....	31
13.7	BCCH read operation	32
13.8	Abnormal cases and emergency calls.....	32
Annex A (informative):	Pseudocode for power control	33
Annex B (informative):	Per-burst SQI estimation	34
Annex C (informative):	Position determination at the MES	35
Annex D (informative):	Recommended Approach to SQM Bias Verification.....	36
Annex E (informative):	Bibliography.....	37
History		38

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, 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://ipr.etsi.org>).

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.

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 3.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 5, sub-part 6 of a multi-part deliverable covering the GEO-Mobile Radio Interface Specifications (Release 3); Third Generation Satellite Packet Radio Service, as identified below:

Part 1: "General specifications";

Part 2: "Service specifications";

Part 3: "Network specifications";

Part 4: "Radio interface protocol specifications";

Part 5: "Radio interface physical layer specifications":

Sub-part 1: "Physical Layer on the Radio Path: General Description; GMR-1 3G 45.001";

Sub-part 2: "Multiplexing and Multiple Access; Stage 2 Service Description; GMR-1 3G 45.002";

Sub-part 3: "Channel Coding; GMR-1 3G 45.003";

Sub-part 4: "Modulation; GMR-1 3G 45.004";

Sub-part 5: "Radio Transmission and Reception; GMR-1 3G 45.005";

Sub-part 6: "Radio Subsystem Link Control; GMR-1 3G 45.008";

Sub-part 7: "Radio Subsystem Synchronization; GMR-1 3G 45.010";

Part 6: "Speech coding specifications";

Part 7: "Terminal adaptor specifications".

Modal verbs terminology

In the present document "shall", "shall not", "should", "should not", "may", "need not", "will", "will not", "can" and "cannot" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

"must" and "must not" are **NOT** allowed in ETSI deliverables except when used in direct citation.

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.

The present document is part of the GMR Release 3 specifications. Release 3 specifications are identified in the title and can also be identified by the version number:

- Release 1 specifications have a GMR 1 prefix in the title and a version number starting with "1" (V1.x.x).
- Release 2 specifications have a GMPRS 1 prefix in the title and a version number starting with "2" (V2.x.x).
- Release 3 specifications have a GMR-1 3G prefix in the title and a version number starting with "3" (V3.x.x).

The GMR release 1 specifications introduce the GEO-Mobile Radio interface specifications for circuit mode Mobile Satellite Services (MSS) utilizing geostationary satellite(s). GMR release 1 is derived from the terrestrial digital cellular standard GSM (phase 2) and it supports access to GSM core networks.

The GMR release 2 specifications add packet mode services to GMR release 1. The GMR release 2 specifications introduce the GEO-Mobile Packet Radio Service (GMPRS). GMPRS is derived from the terrestrial digital cellular standard GPRS (included in GSM Phase 2+) and it supports access to GSM/GPRS core networks.

The GMR release 3 specifications evolve packet mode services of GMR release 2 to 3rd generation UMTS compatible services. The GMR release 3 specifications introduce the GEO-Mobile Radio Third Generation (GMR-1 3G) service. Where applicable, GMR-1 3G is derived from the terrestrial digital cellular standard 3GPP and it supports access to 3GPP core networks.

Due to the differences between terrestrial and satellite channels, some modifications to the GSM or 3GPP standard are necessary. Some GSM and 3GPP specifications are directly applicable, whereas others are applicable with modifications. Similarly, some GSM and 3GPP specifications do not apply, while some GMR specifications have no corresponding GSM or 3GPP specification.

Since GMR is derived from GSM and 3GPP, the organization of the GMR specifications closely follows that of GSM or 3GPP as appropriate. The GMR numbers have been designed to correspond to the GSM and 3GPP numbering system. All GMR specifications are allocated a unique GMR number. This GMR number has a different prefix for Release 2 and Release 3 specifications as follows:

- Release 1: GMR n xx.zyy.
- Release 2: GMPRS n xx.zyy.
- Release 3: GMR-1 3G xx.zyy.

where:

- xx.0yy (z = 0) is used for GMR specifications that have a corresponding GSM or 3GPP specification. In this case, the numbers xx and yy correspond to the GSM or 3GPP numbering scheme.
- xx.2yy (z = 2) is used for GMR specifications that do not correspond to a GSM or 3GPP specification. In this case, only the number xx corresponds to the GSM or 3GPP 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 and 3GPP specifications as follows:

- If a GMR specification exists it takes precedence over the corresponding GSM or 3GPP specification (if any). This precedence rule applies to any references in the corresponding GSM or 3GPP specifications.

NOTE: Any references to GSM or 3GPP specifications within the GMR or 3GPP specifications are not subject to this precedence rule. For example, a GMR or 3GPP specification may contain specific references to the corresponding GSM or 3GPP specification.

- If a GMR specification does not exist, the corresponding GSM or 3GPP specification may or may not apply. The applicability of the GSM and 3GPP specifications is defined in ETSI TS 101 376-1-2 [9].

The clause numbering and the table numbering and figure numbering in the present document are aligned to the corresponding numbering of ETSI TS 101 376-5-6 (Release 1) [7] as far as possible. In several places, this means that the table numbering and figure numbering is non-continuous in the present document in order to maintain this alignment, the following rules apply:

- A table that uses the same table number replaces the corresponding table in ETSI TS 101 376-5-6 (Release 1) [7];
- A table that uses a different table number is a new additional table.