ETSI TS 101 376-3-22 V2.3.1 (2008-08)

Technical Specification

GEO-Mobile Radio Interface Specifications (Release 2)
General Packet Radio Service;
Part 3: Network specifications;
Sub-part 22: Overall description of the GMPRS radio interface;
Stage 2;
GMPRS-1 03.064

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- 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 22 of a multi-part deliverable covering the GEO-Mobile Radio Interface Specifications (Release 2) General Packet Radio Service, as identified below:

Part 1: "General specifications";

Part 2: "Service specifications";

Part 3: "Network specifications":

Sub-part 1: "Network Functions";

Sub-part 2: "Network Architecture";

Sub-part 3: "Numbering, Addressing and identification";

Sub-part 4: "Organization of Subscriber Data";

Sub-part 5: "Technical realization of Supplementary Services";

Sub-part 6: "Location Registration and Position Identification Procedures";

Sub-part 7: "Discontinuous Reception (DRX)";

Sub-part 8: "Support of Dual-Tone Multifrequency Signalling (DTMF)";

Sub-part 9: "Security related Network Functions";

Sub-part 10: "Functions related to Mobile Earth Station (MES) in idle mode";

Sub-part 11: "Technical realization of the Short Message Service (SMS) Point-to-Point (PP)";

Sub-part 12: "Technical realization of the Short Message Service Cell Broadcast (SMSCB)";

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Sub-part 13: "Technical realization of group 3 facsimile using transparent mode of transmission";

Sub-part 14: "Transmission Planning Aspects of the Speech Service in the GMR-1 system";

Sub-part 15: "Line Identification supplementary service - Stage 2";

Sub-part 16: "Call Barring (CB) supplementary services - Stage 2";

Sub-part 17: "Unstructured Supplementary Service Data (USSD) - Stage 2";

Sub-part 18: "Terminal-to-Terminal Call (TtT)";

Sub-part 19: "Optimal Routing technical realization";

Sub-part 20: "Technical realization of High-Penetration Alerting";

Sub-part 21: "Position Reporting services; Stage 2 Service description";

Sub-part 22: "Overall description of the GMPRS radio interface; Stage 2";

Part 4: "Radio interface protocol specifications";

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.

The present document is part of the GMR Release 2 specifications. Release 2 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.).

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.

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. This GMR number has a different prefix for Release 2 specifications as follows:

- Release 1: GMR-n xx.zyy.
- Release 2: GMPRS-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 TS 101 376-1-2 [10].

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1 Scope

The present document provides the overall description for lower-layer functions of the GEO-Mobile Packet Radio Service (GMPRS-1) radio interface (Um).

The overall description provides the following information:

- The services offered to higher-layer functions.
- The distribution of required functions into functional groups.
- A definition of the capabilities of each functional group.
- Service primitives for each functional group, including a description of what services and information flows are to be provided;
- A model of operation for information flows within and between the functions.

The present document is applicable to the following GMPRS-1 Um functional layers:

- Radio Link Control functions.
- Medium Access Control functions
- Physical Link Control functions.

The present document describes the information transfer and control functions to be used across the radio (Um) interface for communication between the MES and the Network (see figure 1).

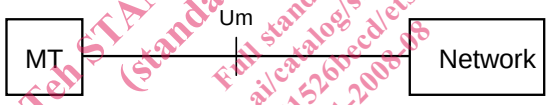

Figure 1: Scope of GMPRS-1 logical radio interface architecture

The overall GMPRS-1 logical architecture and the GMPRS-1 functional layers above the Radio Link Control and Medium Access Control layer are the same as GSM/GPRS as described in TS 101 344 [3].

GMPRS-1 04.007 [5] contains a description in general terms of the structured functions and procedures of this protocol and the relationship of this protocol with other layers and entities.

TS 101 376-4-8 [6] contains the definition of GMPRS-1 RLC/MAC procedures when operating on the Common Control Channel (CCCH).

TS 101 376-4-12 [7] contains the definition of RLC/MAC functions when operating on a Packet Data Channel (PDCH).

The functional procedures for the Logical Link Control (LLC) layer above the RLC/MAC are the same as GSM/GPRS as described in TS 101 351 [8].

GMR-1 05-series defines the Physical Link layer and Physical RF layer (see [11] to [17]).

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2 References

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2.1 Normative references

The following referenced documents are indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

[1] ETSI TS 101 376-1-1: "GEO-Mobile Radio Interface Specifications (Release 2) General Packet Radio Service; Part 1: General specifications; Sub-part 1: Abbreviations and acronyms; GMPRS-1 01.004".

[2] ETSI EN 301 113: "Digital cellular telecommunications system (Phase 2+) (GSM); General Packet Radio Service (GPRS); Service description; Stage 1 (GSM 02.60 version 6.3.1 Release 1997)".

[3] ETSI TS 101 344: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS) Service description; Stage 2". (3GPP TS 03.60 Release 1997).

[4] 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".

NOTE: This is a reference to a GMR-1 Release 1 specification. See the introduction for more details.

[5] ETSI TS 101 376-4-7: "GEO-Mobile Radio Interface Specifications (Release 2) General Packet Radio Service; Part 4: Radio interface protocol specifications; Sub-part 7: Mobile Radio Interface Signalling Layer 3 General Aspects; GMPRS-1 04.007".

[6] ETSI TS 101 376-4-8: "GEO-Mobile Radio Interface Specifications (Release 2) General Packet Radio Service; Part 4: Radio interface protocol specifications; Sub-part 8: Mobile Radio Interface Layer 3 Specifications; GMPRS-1 04.008".

[7] ETSI TS 101 376-4-12: "GEO-Mobile Radio Interface Specifications (Release 2) General Packet Radio Service; Part 4: Radio interface protocol specifications; Sub-part 12: Mobile Earth Station (MES) - Base Station System (BSS) interface; Radio Link Control/ Medium Access Control (RLC/MAC) protocol GMPRS-1 04.060".

[8] ETSI TS 101 351: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Mobile Station - Serving GPRS Support Node (MS-SGSN) Logical Link Control (LLC) layer specification". (3GPP TS 04.64 Release 1997).

[9] ETSI TS 101 297: "Digital cellular telecommunications system (Phase 2+) (GSM); General Packet Radio Service (GPRS); Mobile Station (MS) - Serving GPRS Support Node (SGSN); Subnetwork Dependent Convergence Protocol (SNDCP)". (GSM 04.65 Release 1997)".

[10] ETSI TS 101 376-1-2: "GEO-Mobile Radio Interface Specifications (Release 2) General Packet Radio Service; Part 1: General specifications; Sub-part 2: Introduction to the GMR-1 family; GMPRS-1 01.201".

[11] ETSI TS 101 376-5-1: "GEO-Mobile Radio Interface Specifications (Release 1); Part 5: Radio interface physical layer specifications; Sub-part 1: Physical Layer on the Radio Path: General Description; GMR-1 05.001".

NOTE: This is a reference to a GMR-1 Release 1 specification. See the introduction for more details.

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

[13] ETSI TS 101 376-5-3: "GEO-Mobile Radio Interface Specifications (Release 2) General Packet Radio Service; Part 5: Radio interface physical layer specifications; Sub-part 3: Channel Coding; GMPRS-1 05.003".

[14] ETSI TS 101 376-5-4: "GEO-Mobile Radio Interface Specifications (Release 2) General Packet Radio Service; Part 5: Radio interface physical layer specifications; Sub-part 4: Modulation; GMPRS-1 05.004 ".

[15] ETSI TS 101 376-5-5: "GEO-Mobile Radio Interface Specifications (Release 2) General Packet Radio Service; Part 5: Radio interface physical layer specifications; Sub-part 5: Radio Transmission and Reception; GMPRS-1 05.005".

[16] ETSI TS 101 376-5-6: "GEO-Mobile Radio Interface Specifications (Release 2) General Packet Radio Service; Part 5: Radio interface physical layer specifications; Sub-part 6: Radio Subsystem Link Control; GMPRS-1 05.008".

[17] ETSI TS 101 376-5-7: "GEO-Mobile Radio Interface Specifications (Release 2) General Packet Radio Service; Part 5: Radio interface physical layer specifications; Sub-part 7: Radio Subsystem Synchronization; GMPRS-1 05.010".

[18] ETSI TS 101 376-3-10: "GEO-Mobile Radio Interface Specifications (Release 2) General Packet Radio Service; Part 3: Network specifications; Sub-part 10: Functions related to Mobile Earth Station (MES) in idle mode; GMPRS-1 03.022".

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2.2 Informative references

The following referenced documents are not essential to the use of the present document but they assist the user with regard to a particular subject area**.** For non-specific references, the latest version of the referenced document (including any amendments) applies.

Not applicable.

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TS 101 376-1-2 [10] apply.

GMPRS-1 also uses some GSM definitions and the relevant GSM/GPRS specific definitions can be found in EN 301 113 [2] and TS 101 344 [3].

3.2 Symbols

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

Gb	Interface between an SGSN and a BSC.
Um	Interface between MES and GMPRS-1 fixed network part. The Um interface is the GMPRS-1 network interface for providing packet data services over the radio to the MES.

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TS 101 376-1-1 [1] apply.

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4 Packet data logical channels

NOTE: The text in this clause is informative. The normative text is in TS 101 376-5-2 [12]. Where there is a conflict between these descriptions, the normative text has precedence.

4.1 General

This clause describes the packet data logical channels that are supported by the radio subsystem. The packet data logical channels are mapped onto the physical channels that are dedicated to packet data.

The physical channel dedicated to packet data traffic is called a Packet Data Channel (PDCH). A PDCH can carry common control channel (PCCCH) with the data and dedicated control channels.

Packet channels are defined in GMR-1 for 125 kHz and for 156,25 kHz carriers, which are each three time-slots or twelve time-slots wide. Packet channels are also defined for uplink 31,25 kHz carriers and downlink 62,5 kHz carriers, which are six timeslots wide. Timeslots are defined in TS 101 376-5-2 [12].

In the context of RLC/MAC and other higher layers, the term *MAC-slot* is used to define a triad of timeslots containing a single Packet Access Burst or Packet Normal Burst. Thus there can be eight packet channels or one or more CCCH and packet channels carrying PCCCH in a 24 slot (8 MAC-slot) frame. The term 4-MAC-slot is used to define four consecutive MAC slots or twelve consecutive timeslots. The starting MAC-slot of a 4-MAC-slot can be any one of the eight MAC-slots in a frame. Depending on the starting MAC-slot, a 4-MAC-slot may span two consecutive frames.

An additional term is defined, which is the dual MAC-slot abbreviated as D-MAC-slot. A D-MAC-slot represents two consecutive MAC slots or six consecutive timeslots. A D-MAC slot k ($0 \leq k \leq 3$) can be defined as a combination of MAC-slot 2k and MAC-slot 2k + 1.

4.2 Packet Common Control Channel (PCCCH)

PCCCH comprise logical channels for common control signalling used for packet data as described in the following clauses.