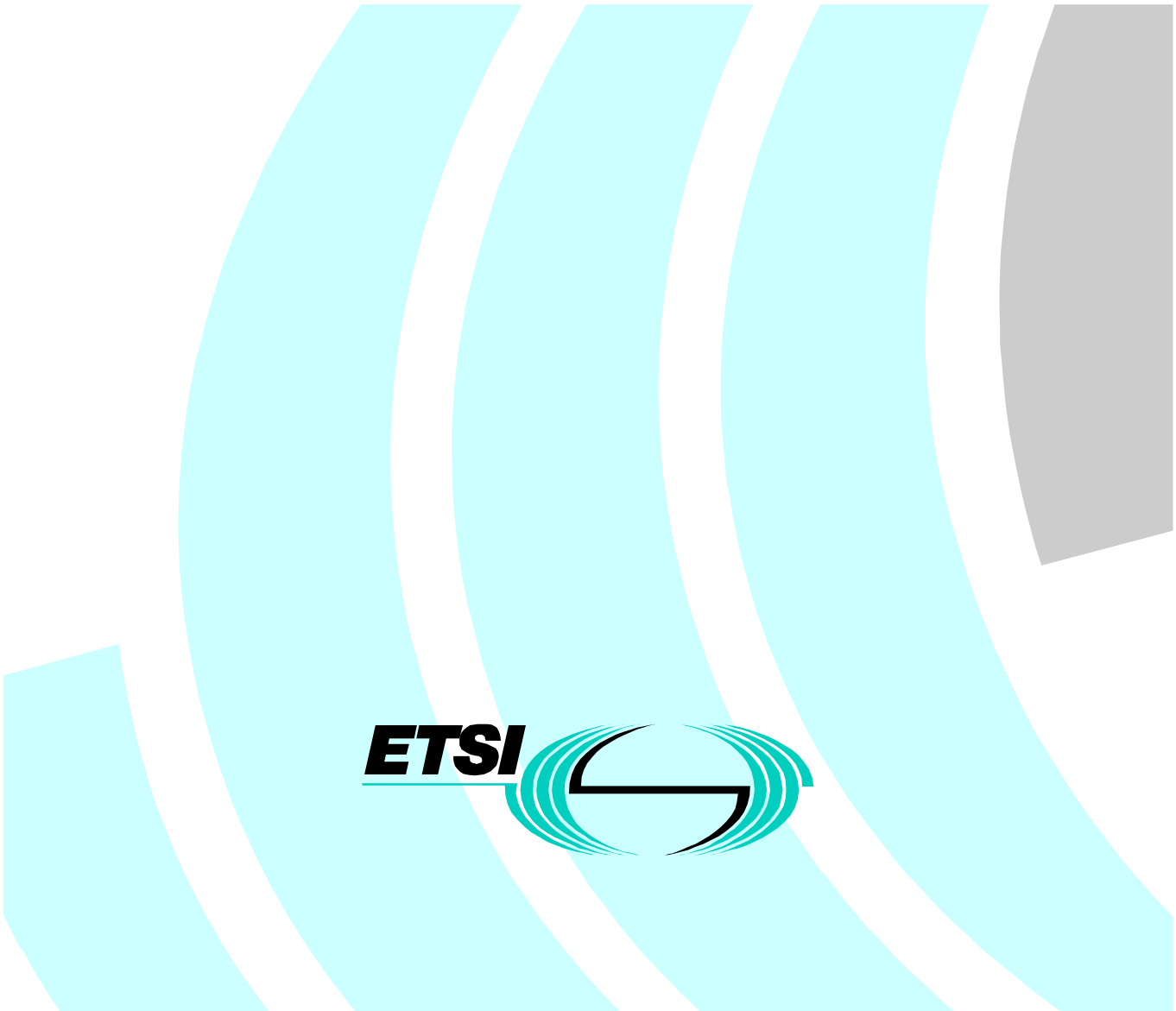
ETSI TS 101 377-4-3 V1.1.1 (2001-03)

Technical Specification

GEO-Mobile Radio Interface Specifications;
Part 4: Radio interface protocol specifications;
Sub-part 3: Layer 1 General requirements;
GMR-2 04.004



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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

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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

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Project	Company	Title	Country of Origin	Patent n°	Countries Applicable
TS 101 377 V1.1.1	Hughes Network Systems		US	Pending	US

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Project	Company	Title	Country of Origin	Patent n°	Countries Applicable
TS 101 377 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

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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: "GMR-2 Mobile Earth Station-Network Interface; General Aspects and Principles; GMR-2 04.001";

Sub-part 2: "GMR-2 Mobile Earth Station-Network Interface; Channel Structures and Access capabilities; GMR-2 04.003";

Sub-part 3: "Layer 1 General requirements; GMR-2 04.004";

Sub-part 4: "Data Link Layer General Aspects; GMR-2 04.005";

Sub-part 5: "GMR-2 Mobile Earth Station - Network Interface; Data Link (DL) layer Specifications; GMR-2 04.006";

Sub-part 6: "Mobile Radio Interface Signalling Layer 3; General Aspects; GMR-2 04.007";

Sub-part 7: "Mobile radio interface Layer 3 Specifications; GMR-2 04.008";

Sub-part 8: "Point-to-Point Short Message Services; GMR-2 04.011";

Sub-part 9: "Performance requirements on the mobile radio interface; GMR-2 04.013";

Sub-part 10: "Rate Adaptation on the Mobile Earth Station (MES) - Gateway System Interface; GMR-2 04.021";

Sub-part 11: "Call Waiting (CW) and Call Holding (HOLD) Supplementary Services; GMR-2 04.083";

Sub-part 12: "Multiparty Supplementary Services (MPTY); GMR-2 04.084";

Sub-part 13: "Technical Realisation of the Early Flag Technique; GMR-2 04.201";

Sub-part 14: "Call Barring Supplementary Services; GMR-2 02.088";

Part 5: "Radio interface physical layer specifications";

Part 6: "Speech coding specifications".

Introduction

GMR stands for GEO (Geostationary Earth Orbit) Mobile Radio interface, which is used for mobile satellite services (MSS) utilising 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 organisation 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 are defined in GMR-n 01.201.

1 Scope

The present document defines a technical specification for the service offered by the physical layer (GMR-2 05-series of technical specifications) of the MES-to-network interface (GMR-2 05 and 04-series of technical specifications). Its main objective is to be a guidance for the interface between the GMR-2 technical specifications in the 05-series and the 04-series. It also specifies the format of signalling channels and the order of bit transmission.

As far as possible, the present document makes use of the layering principles of the reference model for open system interconnection (OSI) as contained in ITU-T Recommendations X.200 [16] and X.210 [17].

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; GMR-2 01.004".

[2] GMR-2 03.013 (ETSI TS 101 377-3-9): "GEO Mobile Radio Interface Specifications; Part 3: Network specifications; Sub-part 9: Discontinuous Reception (DRX) in the GMR-2 System; GMR-2 03.013".

[3] GMR-2 03.020 (ETSI TS 101 377-3-10): "GEO-Mobile Radio Interface Specifications: Part 3: Network specifications; Sub-part 10: Security related Network Functions; GMR-2 03.020".

[4] GMR-2 04.003 (ETSI TS 101 377-4-2): "GEO-Mobile Radio Interface Specifications; Part 4: Radio interface protocol specifications; Sub-part 2: GMR-2 Mobile Earth Station-Network Interface; Channel Structures and Access capabilities; GMR-2 04.003".

[5] GMR-2 04.005 (ETSI TS 101 377-4-4): "GEO-Mobile Radio Interface Specifications; Part 4: Radio interface protocol specifications; Sub-part 4: Data Link Layer General Aspects; GMR-2 04.005".

[6] GMR-2 04.006 (ETSI TS 101 377-4-5): "GEO-Mobile Radio Interface Specifications; Part 4: Radio interface protocol specifications; Sub-part 5: GMR-2 Mobile Earth Station - Network Interface; Data Link (DL) layer Specifications; GMR-2 04.006".

[7] GMR-2 04.007 (ETSI TS 101 377-4-6): "GEO-Mobile Radio Interface Specifications; Part 4: Radio interface protocol specifications; Sub-part 6: Mobile Radio Interface Signalling Layer 3; General Aspects; GMR-2 04.007".

[8] 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; GMR-2 04.008".

[9] GSM 04.12 (ETSI ETS 300 560 Edition 3): "Digital cellular telecommunications system (Phase 2); Short Message Service Cell Broadcast (SMSCB) support on the mobile radio interface (GSM 04.12 version 4.6.0)".

[10] GMR-2 05.001 (ETSI TS 101 377-5-1): "GEO-Mobile Radio Interface Specifications; Part 5: Radio interface physical layer specifications; Sub-part 1: Physical Layer on the Radio Path; GMR-2 05.001".

[11] GMR-2 05.002 (ETSI TS 101 377-5-2): "GEO-Mobile Radio Interface Specifications; Part 5: Radio interface physical layer specifications; Sub-part 2: Multiplexing and Multiple Access on the Radio Path; GMR-2 05.002".

[12] GMR-2 05.003 (ETSI TS 101 377-5-3): "GEO-Mobile Radio Interface Specifications; Part 5: Radio interface physical layer specifications; Sub-part 3: Channel Coding; GMR-2 05.003".

[13] GMR-2 05.005 (ETSI TS 101 377-5-5): "GEO-Mobile Radio Interface Specifications; Part 5: Radio interface physical layer specifications; Sub-part 5: Radio Transmission and Reception; GMR-2 05.005".

[14] GMR-2 05.008 (ETSI TS 101 377-5-6): "GEO-Mobile Radio Interface Specifications; Part 5: Radio interface physical layer specifications; Sub-part 6: Radio Subsystem Link Control; GMR-2 05.008".

[15] GMR-2 05.010 (ETSI TS 101 377-5-7): "GEO-Mobile Radio Interface Specifications; Part 5: Radio interface physical layer specifications; Sub-part 7: Radio Subsystem Synchronization; GMR-2 05.010".

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

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

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

Idle mode: in this mode the MES is not allocated any dedicated physical channel; it listens to the S-HPACH and the S-BCCH and/or SHBCCH

Dedicated mode: in this mode the MES is allocated a dedicated physical channel, at least containing two logical channels, only one of them being a S-SACCH

Physical block: the physical block is the minimal unit which can be transferred by the physical layer

3.2 Abbreviations

Abbreviations used in the present document are listed in GMR-2 01.004 [1].

4 Interfaces to the physical layer

The physical layer (layer 1) is the lowest layer in the OSI reference model and it supports all functions required for the transmission of bit streams on the physical medium. These bit streams are transferred on traffic and control channels as defined in GMR-2 04.003 [4].

NOTE: For GMR-2 application the physical layer may also be referred to as the radio subsystem. However, the radio subsystem supports functions additional to those described in the present document.

The physical layer interfaces the data link layer (layer 2) and the supported functional units of the application layer (layer 3), see figure 4.1.

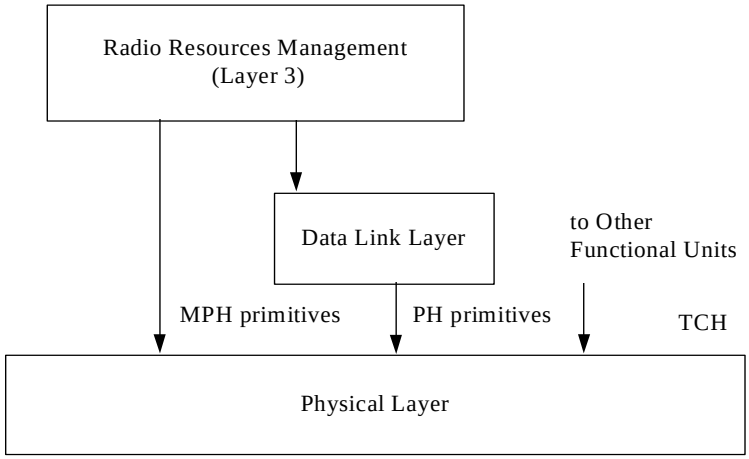

Figure 4.1: Interfaces with the physical layer

4.1 Interface to the data link layer

The physical layer interfaces the data link layer. On this interface, control channels are supported. The data link layer is specified in GMR-2 04.005 [5] and GMR-2 04.006 [6]. Communication between the physical layer and the data link layer is in an abstract way performed by means of PH-primitives. They do not constrain implementations.

NOTE: The terms physical layer and layer 1, and data link layer and layer 2, will be used synonymously in the present document.

The PH-primitives exchanged between the physical layer and the data link layer are used for the transfer of layer 2 frames. They are also used to indicate the establishment of channels to layer 2.

4.2 Interface to the radio resource management

The physical layer interfaces the radio resource management (RR-management) entity of layer 3 in the MES and in the network.

Communication is performed in an abstract way by means of MPH-primitives. They do not constrain implementations .

The primitives exchanged with the RR-management entity are related to the assignment of channels, physical layer system information (including measurement results), etc.

4.3 Interface to other functional units

The physical layer interfaces other functional units in the MES and in the network for supporting traffic channels.

These interfaces are described in the 06 and 07-series of technical specifications.

5 Service of the physical layer

The physical layer supports transfer of bit streams on the radio medium according to the technical specifications of the GMR-2 05-series. The scope of the GMR-2 05-series of technical specifications is the definition of a framework for operation on the radio medium. The application of this framework on the radio medium results in a transmission service. General characteristics of the service obtained by applying the framework of the GMR-2 05-series at the operation on the radio medium are described in this clause.

5.1 Service access point

In the reference model for open system interconnection, service access points (SAPs) of a layer are defined as gates through which services are offered to an adjacent higher layer (figure 5.1.1). Through a SAP, the physical layer offers a service to the data link layer. The SAP is used for the control of the service providing entity: for the physical layer - commands related to the establishment and release of channels and the transfer of data; for the physical layer - the transfer of bits. The physical layer service access points defined in the present document differ from the OSI physical layer service access points, in that the layer 3 RR-Management instead of the data link layer controls the SAPs for establishment and release of channels.

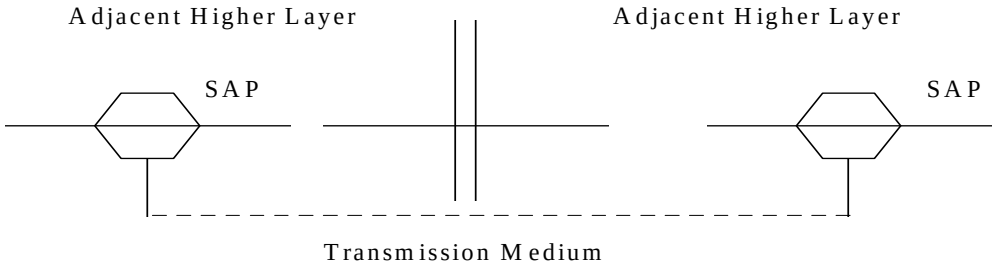

Figure 5.1.1: Service access point concept

On the physical layer of the GMR-2 system, a SAP is defined between the physical layer and the data link layer for each control channel (see figure 5.1.2). The characteristics of SAPs (channels) are listed in GMR-2 04.003 [4].

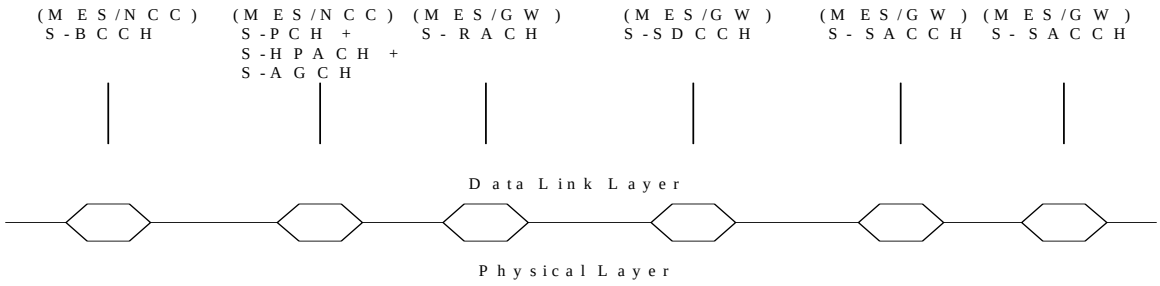

Figure 5.1.2: SAPs between the physical layer and the data link layer in the MES

5.2 Service of the physical layer

5.2.1 Access capabilities

The physical layer offers a transmission service on a limited set of logical channels. The network and MES access capabilities and the characteristics of logical channels (SAPs) are defined in GMR-2 04.003 [4].

NOTE: Between GMR-2 04.003 [4] and the GMR-2 05-series, there is a slight difference in terminology. The 'channels' mentioned in 04.003 are 'logical channels' according to the GMR-2 05-series (especially GMR-2 05.002 [11]). The 'S-CCCH,' a channel name commonly used in the GMR-2 04-series, covers the logical channels of the type S-RACH, S-PCH, S-HPACH and S-AGCH.

Logical channels are multiplexed on physical channels. Physical channels are the units scheduled on the radio medium. Some are reserved by the network for common use (a combination of S-CCCH and S-BCCH), others are assigned to connections with MESs (dedicated physical channels). In time the combination of logical channels used on an assigned dedicated physical channel may change. Allowed combinations of logical channels on a dedicated physical channel are defined in GMR-2 04.003 [4]. Data on SAPs of control channels are exchanged in discrete blocks with a size of 23 or 21 (S-SACCH) octets. Synchronization between layer 1 and layer 2 is provided for piggy-backing of RR (receive ready) frames, and the starting of timers (T200). See also GMR-2 04.006 [6].

5.2.2 Error detection

The physical layer offers an error protected transmission service, it includes error detection functions and to a lesser degree, error correction functions. Erroneous received frames are not offered to the data link layer. The probability of one or more errors in a physical block transferred by the physical layer is defined in GMR-2 05.003 [12]. Since quality detection methods are not specified, the probability of residual errors in transferred blocks may vary between implementations.

5.2.3 Encryption

Security implemented at the physical layer is described in GMR-2 03.020 [3].

An overview of the functions specified in the GMR-2 05-series which create the service of the physical layer can be found in GMR-2 05.001[10].

5.3 Specific services of the physical layer in the MES

The access capability service of the physical layer in the MES is different for dedicated physical channels than for S-BCCH or S-CCCHs.

5.3.1 Establishment of dedicated physical channels

Establishment of dedicated physical channels on the physical layer is controlled by the radio resources management of layer 3 (GMR-2 04.008 [8]). During operation on a dedicated physical channel, the physical layer measures the signal quality of used dedicated physical channels (GMR-2 05.008 [14]). Measurements are transferred to layer 3, measurement control information is offered by layer 3.

5.3.2 Spotbeam selection in Idle Mode

In idle mode, the physical layer selects the best spotbeam with its S-BCCH/S-CCCH in close cooperation with layer 3, meeting requirements for spotbeam selection. The idle mode procedures are not modeled within the present document. Examples of procedures for cell selection are described in GMR-2 05.008 [14].

6 Primitives of the physical layer

The physical layer interacts with other entities as illustrated in figure 4.1. The interactions with the data link layer of Dm channels are shown in terms of primitives where the primitives represent the logical exchange of information and control between the physical layer and adjacent layers. They do not specify or constrain implementations.

For the physical layer two sets of primitives are defined:

XX - Generic Name - Type (Parameters).

Where XX designates the layer providing the services. In the present document, XX is either MPH or PH for the physical layer.

Primitives between layers 1 and 2:

Generic name: PH , Type: Parameters

Primitives between layer 1 and the RR-management layer 3 entity:

Generic Name: MPH, Type: Parameters

6.1 Generic names of primitives between layers 1 and 2 for the transfer of layer 2 frames

The following primitive generic names are defined on the SAPs between the physical layer and the data link layer:

PH-DATA:
The PH-DATA primitives are used on a SAP (in the MES and network) to pass, to and from the physical layer, message units containing layer 2 frames used for data link layer peer-to-peer communications.

PH-RANDOM ACCESS:
The PH-RANDOM ACCESS (PH-RA) primitives are used on the SAP of the S-RACH to request and confirm (in the MES) the sending of a random access frame and to indicate (in the network) the arrival of a random access frame. The random access protocol is specified GMR-2 04.008 [8].

PH-CONNECT:
The PH-CONNECT primitive is used on a SAP to indicate that the physical connection on the corresponding control channel has been established.

PH-READY-TO-SEND:
The PH-READY-TO-SEND primitive is used by the physical layer to trigger if applicable piggy backing, the start of timer for layer 2 and the forwarding a data unit to layer 1. It is passed to layer 2 just before a new physical block is transmitted.

PH-EMPTY-FRAME:
The PH-EMPTY-FRAME primitive can be used by the data link layer to indicate that no frame has to be transmitted after receiving the PH-READY-TO-SEND primitive. It enables polling of several layer 2 entities by layer 1 and supports DTX (discontinuous transmission) mode.

6.2 Generic names of primitives between layer 1 and the RR-management entity of layer 3

The following primitive generic name is defined between layer 1 and the RR-management entity of layer 3:

a) MPH-INFORMATION:
MPH-INFORMATION (MPH-INFO) primitives are used for the control of the physical layer by the RR-management of layer 3. This information activates and deactivates, configures and de-configures, through connects and disconnects, physical and logical channels. It is also used for the transfer of measurements and measurement control information from layer 1 to layer 3.

6.3 Primitive types

The primitive types defined in the present document are:

a) REQUEST:
The REQUEST primitive type is used when a higher layer is requesting a service from a lower layer.

b) INDICATION:
The INDICATION primitive type is used by a layer providing a service to notify the next higher layer of activities in the layer. This activities are directly related to the occurrence of a REQUEST primitive on the peer-protocol side.

c) RESPONSE:
The RESPONSE primitive type is used by a layer to acknowledge receipt from the INDICATION primitive type.

d) CONFIRM:
The CONFIRM primitive type is used by the layer providing the requested service to confirm that the activity has been completed.

6.4 Parameter definition

Primitives contain a variable amount of parameters. The primitives with included parameters are listed in table 6.4-1.

Table 6.4-1: Primitives of the physical layer

Primitive	Entity R(L3)	Direction	Msg. Unit	DCCH Para's	Idle Mode Info.	Abs. Frame #	Measure-ments
MPH-INFO-REQ	MES/NCC	RR(L3) → L1		x	x		
MPH-INFO-CON	MES/NCC	L1 → RR(L3)		x	x		
MPH-INFO-IND	MES/NCC	L1 → RR(L3)		x	x		x
PH-CONNECT-IND	MES/GW/NCC	L1 → L2		x			
PH-DATA-REQ	MES/GW/NCC	L2 → L1	x	x			
PH-DATA-IND	MES/GW/NCC	L1 → L2	x	x			
PH-RA-REQ	MES	L2 → L1	x				
PH-RA-IND	NCC	L1 → L2	x			x	
PH-RA-CON	MES	L1 → L2	x			x	

Parameters involved in the primitive exchange with the physical layer are:

a) Message unit:
The message unit contains peer-to-peer information of a layer. It is transferred by the physical layer to the peer layer.

b) Dedicated channel control (S-DCCH) parameters:
These parameters contain information for channel control, specified in GMR-2 04.008 [8].

c) Idle mode system information:
This information is exchanged in the spotbeam selection procedures. It may also contain control information for DRX (sleep mode, see GMR-2 03.013 [2]).

d) Absolute frame number:
The absolute frame number is used (in combination with a random access identifier) to uniquely identify a random access.

e) Measurements:
This parameter is used to report the quality of a dedicated physical channel (MES and network) and to report the quality of surrounding S-BCCH carriers (MES only).

7 Physical layer procedures

The main body of physical layer procedures is specified in GMR-2 04.008 [8] and 05.008 [14].

7.1 States of the physical layer

In the physical layer of the MES the following states are defined:

- NULL: the equipment is switched off;
- SEARCHING BCH: the physical layer tracks the best S-BCCH;
- BCH: the physical layer listens to an S-BCCH/S-CCCH and is able to do random access;
- TUNING DCH: the physical layer seizes on a dedicated physical channel;
- DCH: the physical layer has seized a dedicated physical channel and may establish and through connect logical channels.

NOTE 1: BCH = Broadcast or common control channel physical channel,

NOTE 2: DCH = Dedicated physical channel.

Figure 7.1 gives a general state diagram of the physical layer at the MES. All state transitions of the physical layer are controlled by MPH-INFORMATION primitives.

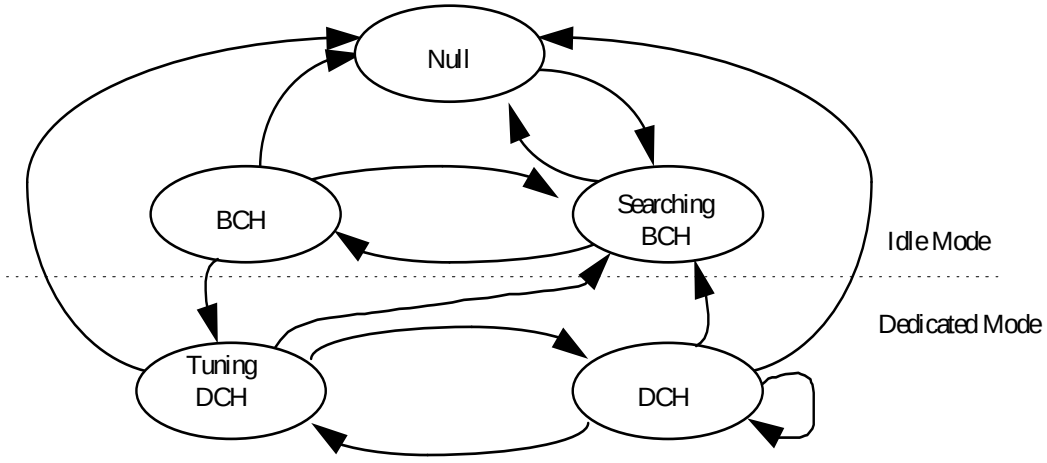

Figure 7.1: States of the physical layer in the MES

The states of the physical layer in the network are not specified. The states in the network will reflect the other characteristics of operation on channels.

7.2 Control procedures

Requirements and examples of procedures for idle mode operation of the MES are specified in GMR-2 05.008 [14]. In the idle mode, the physical layer tracks the S-BCCH of the best spotbeam and may tune their S-BCCH in order to enable layer 3 to read the system information of the S-BCCH. This system information of the S-BCCH is used in the selection process.

7.3 Physical layer interface procedures

Three types of primitives are defined for the communication between the physical layer and the data link layer, both in the MES and the network. When a control channel is being established, a PH-CONNECT-INDICATION is offered to the data link layer on the corresponding SAP. On an established dedicated control channel in both MES and network or on the established S-BCCH/S-CCCH in the MES, physical blocks received correctly are offered on the corresponding SAP in PH-DATA-INDICATION primitives. On a dedicated control channel or on the S-BCCH/S-CCCH in the network, the data link layer will offer physical blocks to be transmitted in PH-DATA-REQUEST primitives. In the MES in idle mode, random accesses can be offered in PH-RANDOM-ACCESS-REQUEST primitives. The physical layer of the MES will perform a random access as soon as possible. The physical layer of the MES will confirm to the data link layer the transmission of the random access in a PH-RANDOM-ACCESS-CONFIRM. This confirmation contains the absolute frame number in which the random access is transmitted. The physical layer of the NCC offers correctly received random accesses to the data link layer in a PH-RANDOM-ACCESS-INDICATION. This indication contains the absolute frame number in which the random access is received.

8 Physical layer protocol header

The physical layer implements a peer-to-peer protocol for the control of timing advance and power control for operation on dedicated physical channels. For this purpose a two octet physical header is defined on all blocks transferred via the S-SACCH, a logical channel always present on a dedicated physical channel.

8.1 Physical Layer Protocol Fields and Procedures

Procedures for handling the ordered and actual MES power level fields as well as the gateway power control level are specified in technical specifications GMR-2 05.005 [13] and 05.008 [14]. The ordered MEST power level field and the actual MES power level fields as well as the gateway power control level are coded as the binary representation of the "power control level," see GMR-2 05.005 [13]. The gateway is only required to report gateway power control levels in the range of 0 to 33. The MSB of the ordered and actual MES power control level is in bit 6 of octet 1. The MSB of the gateway power control level field is in bit 8 of Octet 1 with LSB in bit 6 of octet 2.

Procedures for handling the ordered- timing advance fields are specified in GMR-2 05.010 [15]. The ordered timing advance field contains a 5 bit binary-encoded number with MSB in bit 5 of octet 2.

9 Block transmission

9.1 S-SACCH forward block format

The originally 23 octets of S-SACCH blocks are used downlink in the following way:

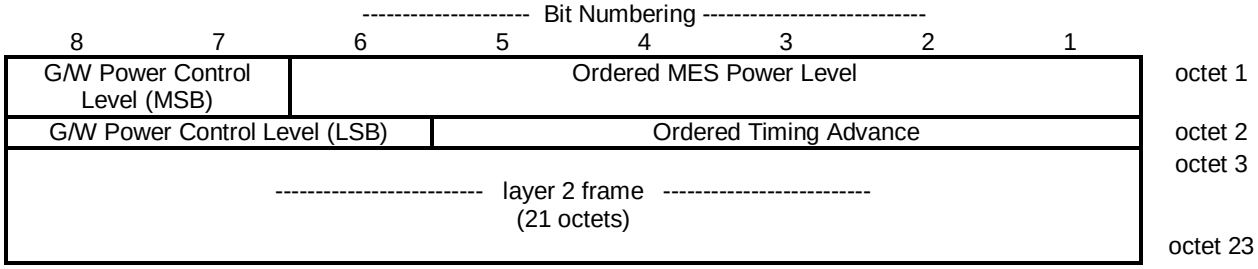

Figure 9.1.1: S-SACCH forward block format

NOTE: The numbering convention specified in GMR-2 04.006 [6] applies.

9.2 S-SACCH reverse block format

The originally 23 octets of S-SACCH blocks are used uplink in the following way:

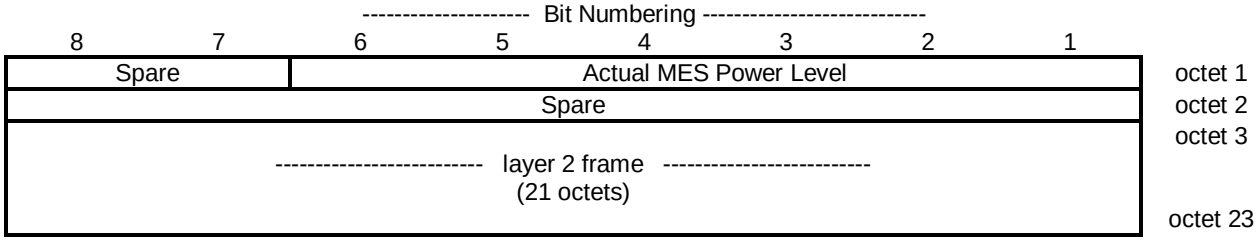

Figure 9.2.1: S-SACCH reverse block format

NOTE: The numbering convention specified in GMR-2 04.006 [6]applies.

9.3 S-FACCH/S-SDCCH/S-BCCH/S-AGCH/S-PCH block format

The originally 23 octets blocks are used downlink in the following way:

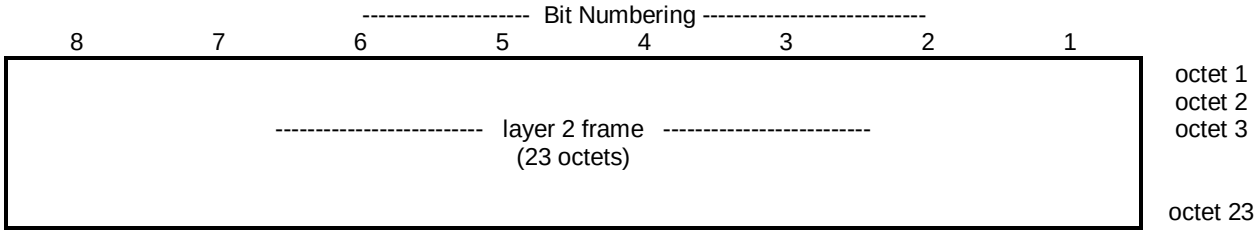

Figure 9.3.1: S-FACCH/S-SDCCH/S-BCCH/S-AGCH/S-PCH Block Format

NOTE: The numbering convention specified in GMR-2 04.006 [6] and GSM 04.12 [9] applies.

9.4 S-FACCH/S-SDCCH reverse block format

The originally 23 octets blocks are used uplink in the following way:

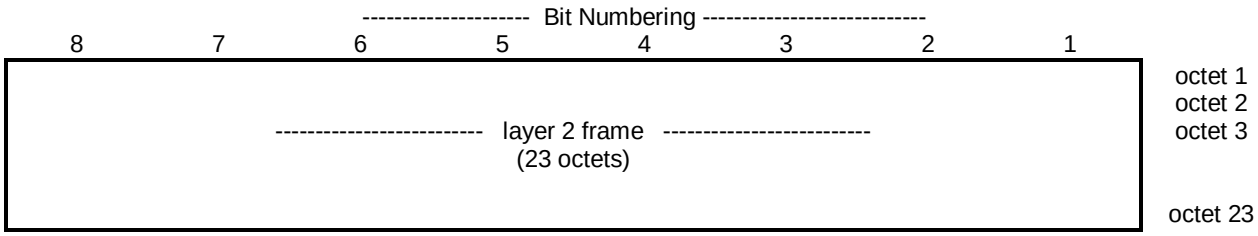

Figure 9.4.1: S-FACCH/S-SDCCH Reverse Block Format

NOTE: The numbering convention specified in GMR-2 04.006 [6] applies.

9.5 Order of bit transmission

On channels for normal burst transmission the 23 octets are mapped onto 184 bits, d(0) to d(183), defined in GMR-2 05.003 [12] clause 4 as follows:

- bit m of octet n shall be transmitted as bit d((n-1)*8+m-1) with m=(1..8) and n=(1..23).

For transmission which does not follow the normal burst transmission, i.e., messages that have less than 23 octets and with the last octet containing less than eight bits (refer, e.g., to GMR-2 04.008 [8] clause 9.1.8 CHANNEL REQUEST message, clause 9.1.44 H-BCCH Version Number, clause 9.1.43 Paging Request - HPACH IMSI and clause 9.1.30 SYNCHRONIZATION CHANNEL INFORMATION message) the following rule applies:

Bit m of octet n shall be transmitted as bit d((n-1)*8+m-1) with m=(1..8) and n=(1..y) where y = number of complete octets and d((n-1)*8+m-1) with m=(1..x) and n = number of last octet (number of complete octets + 1) where x = number of bits contained in last octet.

All incomplete octets are right (LSB) justified.

History

Document history		
V1.1.1	March 2001	Publication