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Technical Specification

**GEO-Mobile Radio Interface Specifications (Release 3);
Third Generation Satellite Packet Radio Service;
Part 4: Radio interface protocol specifications;
Sub-part 4: Layer 1 General Requirements;
GMR-1 3G 44.004**



Reference

RTS/SES-00315-4-4

Keywords

GMR, GSM, GSO, interface, layer 1, MES,
mobile, MSS, radio, satellite, S-PCN

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Satellite Earth Stations and Systems (SES).

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Version 3.m.n

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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 4, sub-part 4 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":

Sub-part 1: "Mobile Earth Station-Gateway Station System (MES-GSS) Interface";

Sub-part 2: "GMR-1 Satellite Network Access Reference Configuration";

Sub-part 3: "Channel Structures and Access Capabilities";

Sub-part 4: "Layer 1 General Requirements";

Sub-part 5: "Data Link Layer General Aspects";

Sub-part 6: "Mobile earth Station-Gateway Station Interface Data Link Layer Specifications";

Sub-part 7: "Mobile Radio Interface Signalling Layer 3 General Aspects";

Sub-part 8: "Mobile Radio Interface Layer 3 Specifications";

- Sub-part 9: "Performance Requirements on the Mobile Radio Interface";
 - Sub-part 10: "Rate Adaptation on the Access Terminal-Gateway Station Subsystem (MES-GSS) Interface";
 - Sub-part 11: "Radio Link Protocol (RLP) for Data Services";
 - Sub-part 12: "Mobile Earth Station (MES) - Base Station System (BSS) interface; Radio Link Control/Medium Access Control (RLC/MAC) protocol";
 - Sub-part 13: "Radio Resource Control (RRC) protocol; Iu Mode";
 - Sub-part 14: "Mobile Earth Station (MES) - Base Station System (BSS) interface; Radio Link Control/Medium Access Control (RLC/MAC) protocol; Iu Mode";
- 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.

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 specifications are not subject to this precedence rule. For example, a GMR 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 or 3GPP specifications is defined in GMR-1 3G 41.201 [2].

The clause numbering and the table numbering and figure numbering in the present document are aligned to the corresponding numbering of GMR-1 04.004 [3] as far as possible.

1 Scope

The present document defines the service offered by the physical layer to the upper layers of the MES-GS interface in the GMR-1 Mobile Satellite System. Its main objective is to provide guidance for the interface between the GMR-1 Technical Specifications in the 45-series and the 44-series. It also specifies the format of signalling channels, traffic channels (Iu mode) 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 [i.1] and X.210 [i.2].

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <http://docbox.etsi.org/Reference>.

NOTE: While any hyperlinks included in this clause were valid at the time of publication ETSI cannot guarantee their long term validity.

2.1 Normative references

The following referenced documents are necessary for the application of the present document.

In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] Void.
- [2] GMR-1 3G 41.201 (ETSI TS 101 376-1-2): "GEO-Mobile Radio Interface Specifications (Release 3) Third Generation Satellite Packet Radio Service; Part 1: General specifications; Sub-part 2: Introduction to the GMR-1 family".
- [3] GMR-1 04.004 (ETSI TS 101 376-4-4): "GEO-Mobile Radio Interface Specifications; Part 4: Radio interface protocol specifications; Sub-part 4: Layer 1 General Requirements".

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

- [4] GMR-1 3G 44.008 (ETSI TS 101 376-4-8): "GEO-Mobile Radio Interface Specifications (Release 3); Third Generation Satellite Packet Radio Service; Part 4: Radio interface protocol specifications; Sub-part 8: Mobile Radio Interface Layer 3 Specifications".
- [5] GMR-1 3G 45.003 (ETSI TS 101 376-5-3): "GEO-Mobile Radio Interface Specifications (Release 3); Third Generation Satellite Packet Radio Service; Part 5: Radio interface physical layer specifications; Sub-part 3: Channel Coding".
- [6] GMR-1 3G 44.060 (ETSI TS 101 376-4-12): "GEO-Mobile Radio Interface Specifications (Release 3); Third Generation Satellite 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".

2.2 Informative references

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] ITU-T Recommendation X.200: "Information technology - Open Systems Interconnection - Basic reference model: The basic model".
- [i.2] ITU-T Recommendation X.210: "Information technology - Open Systems Interconnection - Basic Reference Model: Conventions for the definition of OSI services".

3 Terminology and abbreviations

3.1 Terminology

For the purposes of the present document, the terms and definitions given in GMR-1 04.004 [3] apply.

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in GMR-1 04.004 [3] apply.

4 Interfaces to the physical layer

Same as clause 4 of GMR-1 04.004 [3].

4.1 Interface to the data link layer

Same as clause 4.1 of GMR-1 04.004 [3].

4.2 Interface to radio resource management

Same as clause 4.2 of GMR-1 04.004 [3].

4.3 Interface to other functional units

Same as clause 4.3 of GMR-1 04.004 [3].

5 Service of the physical layer

Same as clause 5 of GMR-1 04.004 [3].

5.1 Service Access Point

Same as clause 5.1 of GMR-1 04.004 [3].

5.2 Service of the physical layer

Same as clause 5.2 of GMR-1 04.004 [3].

5.2.1 Specific services of the physical layer in the MES

Same as clause 5.2.1 of GMR-1 04.004 [3].

6 Block transmission

6.1 SACCH3 block format (A/Gb mode only)

Same as clause 6.1 of GMR-1 04.004 [3].

6.2 SACCH6 block format (A/Gb mode only)

Same as clause 6.2 of GMR-1 04.004 [3].

6.3 SACCH9 block format (A/Gb mode only)

Same as clause 6.3 of GMR-1 04.004 [3].

6.4 BCCH/PCH/AGCH/CBCH block format

Same as clause 6.4 of GMR-1 04.004 [3].

6.5 BACH block format (A/Gb mode only)

Same as clause 6.5 of GMR-1 04.004 [3].

6.6 GBCH block format (A/Gb mode only)

Same as clause 6.6 of GMR-1 04.004 [3].

6.6a GBCH3 block format (lu mode only)

The 24 octets of GBCH3 blocks are used in the downlink in the following way.

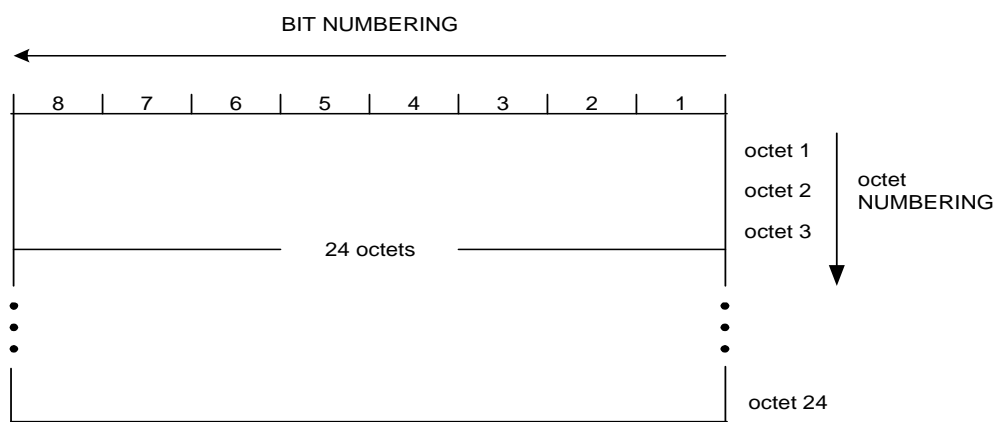


Figure 6.6a: GBCH3 block format

6.7 RACH block format (A/Gb mode only)

Same as clause 6.7 of GMR-1 04.004 [3].

6.7a RACH3 block format (lu mode only)

The 68 bits of RACH3 block are used in the uplink in the following way:

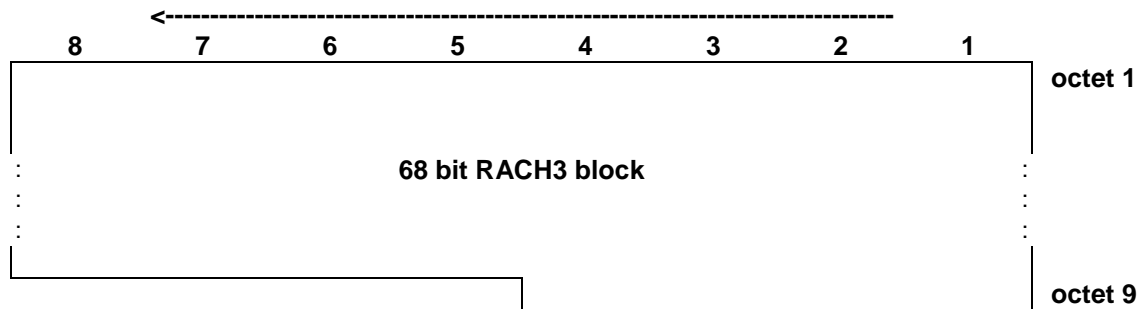


Figure 6.7a: RACH3 block format

6.8 SDCCH block format (A/Gb mode only)

Same as clause 6.8 of GMR-1 04.004 [3].

6.9 FACCH3 block format (A/Gb mode only)

Same as clause 6.9 of GMR-1 04.004 [3].

6.10 FACCH6 block format (A/Gb mode only)

Same as clause 6.10 of GMR-1 04.004 [3].

6.11 FACCH9 block format (A/Gb mode only)

Same as clause 6.11 of GMR-1 04.004 [3].

6.12 TACCH block format (A/Gb mode only)

Same as clause 6.12 of GMR-1 04.004 [3].

6.13 Packet Data Traffic Channel (PDTCH) block format

The PDCH block always occupies integer number of octets. The number of octets depends on the bandwidth of the packet data channel, the number of time slots used and the coding scheme used. See GMR-1 44.060 [6].

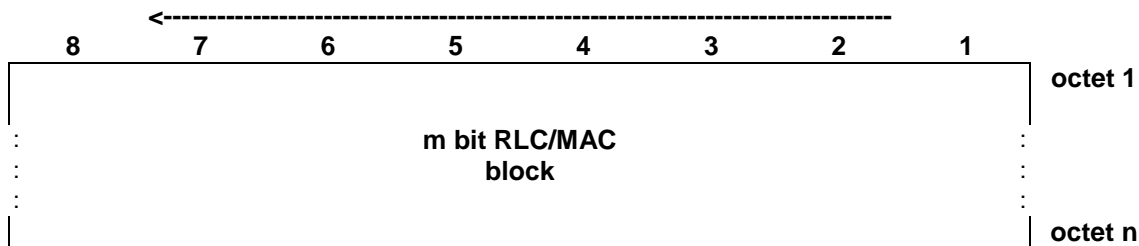


Figure 6.14: PDTCH block format

6.14 Dedicated Channel (DCH) block formats (lu mode only)

6.14.1 2,6 kbps DACCH Block

The 83 bits of 2,6 kbps DACCH block are used in the following way:

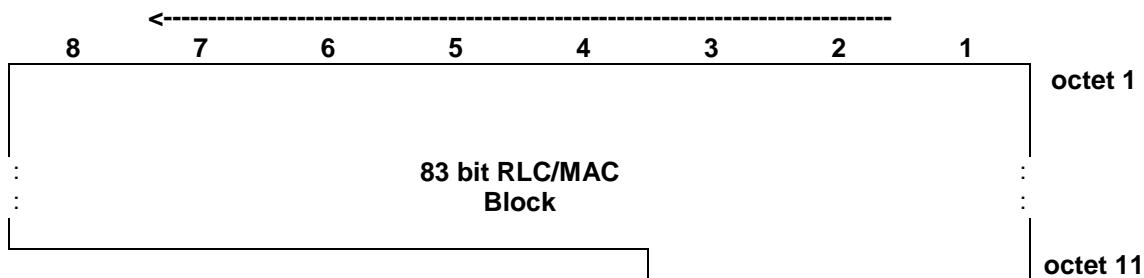


Figure 6.15: 2,6 kbps DACCH block format

6.14.2 4,0 kbps DACCH Block

The 139 bits of 4,0 kbps DACCH block are used in the following way:

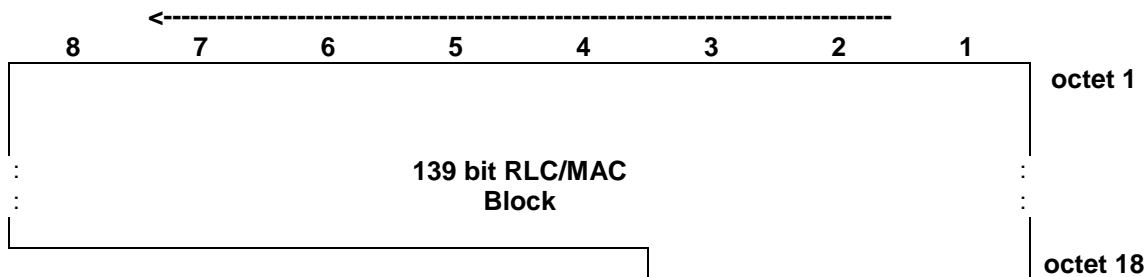


Figure 6.16: 4,0 kbps DACCH block format

6.14.3 2,45 kbps Speech Block

The 98 bits of 2,45 kbps Speech block are used in the following way:

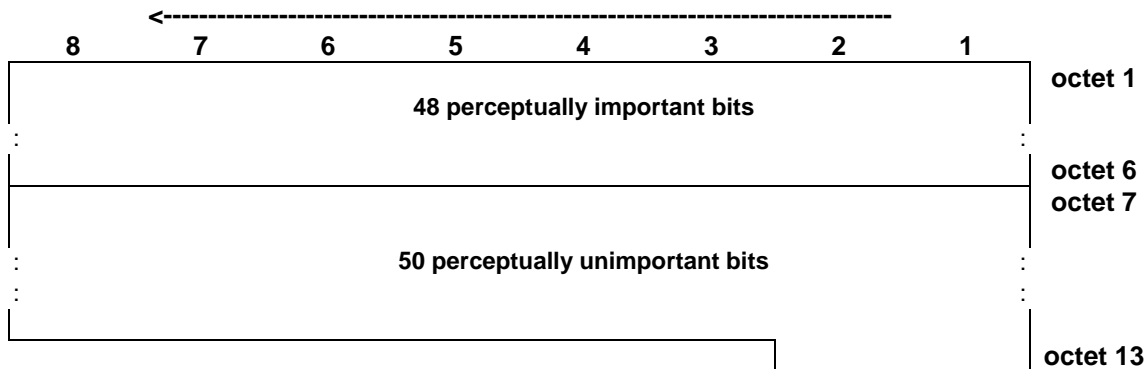


Figure 6.17: 2,45 kbps Speech block format

6.14.4 4,0 kbps Speech Block

The 160 bits of 4,0 kbps Speech block are used in the following way:

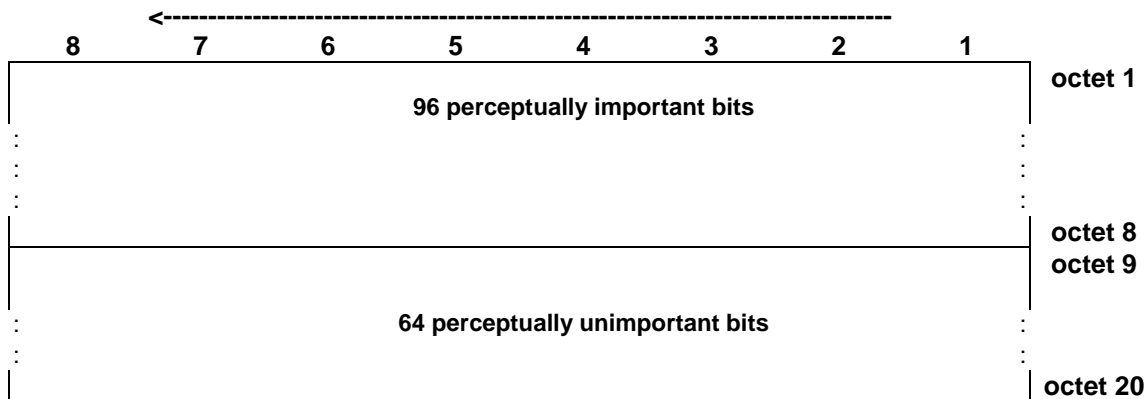


Figure 6.18: 4,0 kbps Speech block format

6.15 PRACH format (A/Gb mode)

The 64 bits of PRACH block are used in the uplink in the following way:

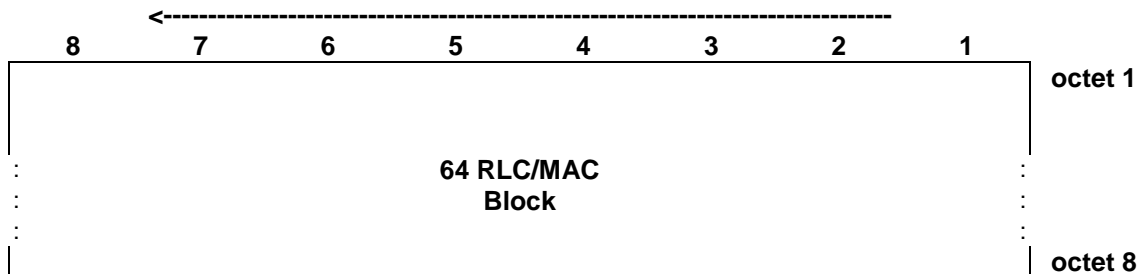


Figure 6.19: PRACH block format

6.15a PRACH3 format (lu mode)

The 68 bits of RACH3 block are used in the uplink in the following way:

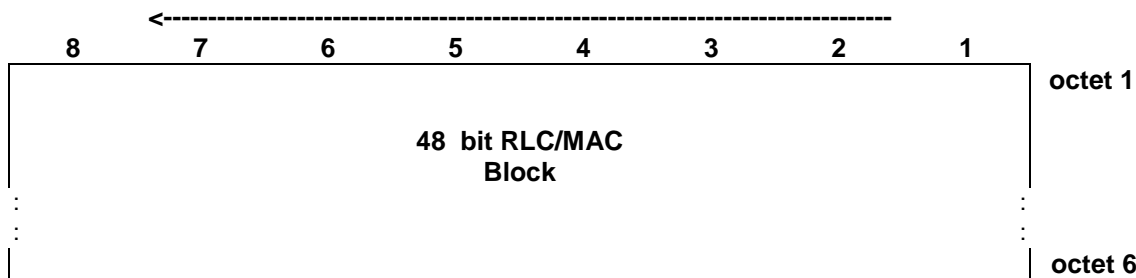


Figure 6.20: PRACH3 block format

6.16 Order of bit transmission

The following rule apply for order of bit transmission:

- Bit m of octet n shall be transmitted as bit $d((n-1) \times 8 + m-1)$ with $m = (1 \text{ to } x)$ and $n = (1 \text{ to } y)$ where x and y are given by the definition of the respective layer 3 information in GMR-1 3G 44.008 [4] and $d(i)$ are defined in GMR-1 3G 45.003 [5].

7 Power Control Status Field

Same as clause 4 of GMR-1 04.004 [3].

8 Public User Information (PUI)

The number of bits in PUI depends on the bandwidth of the packet data channel. The bits in PUI are used in the following way:

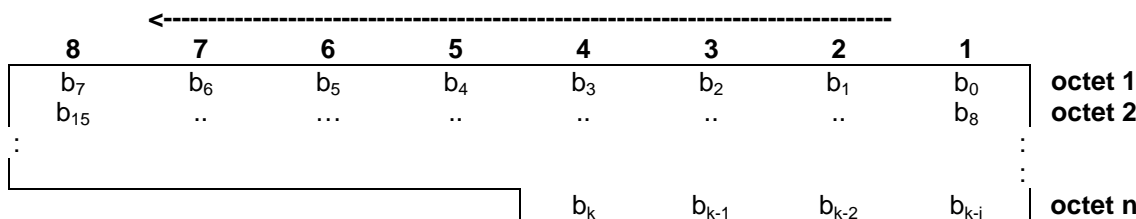


Figure 8.1: PUI format

b_k in Figure 8.1 is defined in GMR-1 3G 44.060 [6].

9 Uplink Map (ULMAP) (lu mode only)

The ULMAP block always occupies integer number of octets. The number of octets in ULMAP is specified in GMR-1 3G 44.060 [6]. The bits of ULMAP are used in the following way:

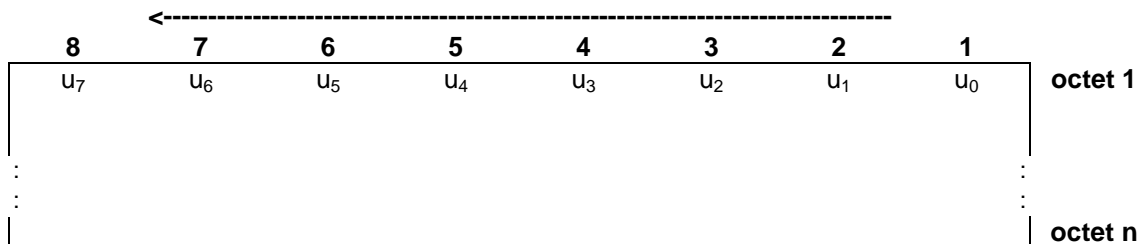


Figure 9.1: ULMAP format

Each octet in ULMAP carries a USF (Uplink Status Flag, See GMR-1 3G 44.060 [6]). u₀ is the least significant bit and u₇ is the most significant bit of USF.

Annex A (informative): Bibliography

GMPRS-1 01.004 (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".

NOTE: This is a reference to a GMR-1 Release 2 specification. See the introduction for more details.

History

Document history		
V3.2.1	February 2011	Publication