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Technical Specification

**GEO-Mobile Radio Interface Specifications (Release 3);
Third Generation Satellite Packet Radio Service;
Part 5: Radio interface physical layer specifications;
Sub-part 2: Multiplexing and Multiple Access;
Stage 2 Service Description;
GMR-1 3G 45.002**



Reference

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satellite, S-PCN, TDMA**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
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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:

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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 2 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";

Sub-part 2: "Multiplexing and Multiple Access; Stage 2 Service Description";

Sub-part 3: "Channel Coding";

Sub-part 4: "Modulation";

Sub-part 5: "Radio Transmission and Reception";

Sub-part 6: "Radio Subsystem Link Control";

Sub-part 7: "Radio Subsystem Synchronization";

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].

1 Scope

The present document defines the structure of the physical channels for the radio subsystem in the GMR-1 3G Mobile Satellite System. It describes the GMR-1 3G concept of logical channels and the timing concepts of TDMA frames, timeslots, and bursts. It defines the relationship between logical and physical channels, and defines the logical channels in terms of size, structure and timing relationships.

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] 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.

- [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 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".
- [4] 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".
- [5] GMR-1 3G 45.004 (ETSI TS 101 376-5-4): "GEO-Mobile Radio Interface Specifications (Release 3); Third Generation Satellite Packet Radio Service; Part 5: Radio interface physical layer specifications; Sub-part 4: Modulation".
- [6] GMR-1 3G 45.005 (ETSI TS 101 376-5-5): "GEO-Mobile Radio Interface Specifications (Release 3); Third Generation Satellite Packet Radio Service; Part 5: Radio interface physical layer specifications; Sub-part 5: Radio Transmission and Reception".
- [7] GMR-1 3G 45.010 (ETSI TS 101 376-5-7): "GEO-Mobile Radio Interface Specifications (Release 3); Third Generation Satellite Packet Radio Service; Part 5: Radio interface physical layer specifications; Sub-part 7: Radio Subsystem Synchronization".
- [8] GMR-1 3G 43.064 (ETSI TS 101 376-3-22): "GEO-Mobile Radio Interface Specifications (Release 3); Third Generation Satellite Packet Radio Service; Part 3: Network specifications; Sub-part 22: Overall description of the GMPRS radio interface; Stage 2".

- [9] 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".
- [10] GMR-1 05.002 (ETSI TS 101 376-5-2): "GEO-Mobile Radio Interface Specifications; Part 5: Radio interface physical layer specifications; Sub-part 2: Multiplexing and Multiple Access; Stage 2 Service Description".

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

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.

Not applicable.

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in GMR-1 3G 41.201 [2] apply.

3.2 Abbreviations

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

4 General

Same as clause 4 in GMR-1 05.002 [10].

5 Logical channels

5.1 General

Same as clause 5.1 in GMR-1 05.002 [10].

5.2 Traffic channels

5.2.1 General

TCHs are intended to carry either encoded speech or user data. Three general types of traffic channels are defined:

- 1) TCH3: This channel carries data at a gross rate of 5,20 kbps.
- 2) TCH6: This channel carries data at a gross rate of 10,75 kbps.
- 3) TCH9: This channel carries data at a gross rate of 16,45 kbps.

The data gross rate is defined as the number of encoded bits in NT3, NT6 and NT9 burst, respectively, excluding the number of power control bits, divided by 40 ms frame time.

All traffic channels are bidirectional.

The types of traffic channels capable of speech and user data are identified in the following clauses.

5.2.2 Speech traffic channels

Same as clause 5.2.2 in GMR-1 05.002 [10].

5.2.3 Data traffic channels

Same as clause 5.2.3 in GMR-1 05.002 [10].

5.2.4 Summary of traffic channel characteristics

Table 5.1 summarizes the characteristics of traffic channels, where the gross transmission rate is the channel transmission bit rate (2 times channel transmission symbol rate) multiplied by the duty cycle of the channel.

Table 5.1: Summary of traffic channel characteristics

| Channel type | User information capability | Gross transmission rate |
|--------------|--|-----------------------------|
| TCH3 | Encoded speech | 5,85 kbps (= 46,8 / 8) |
| TCH6 | User data: 4,8 kbps Fax: 2 kbps, 4 kbps or 4,8 kbps | 11,70 kbps (= 46,8 / 8 x 2) |
| TCH9 | User data: 9,6 kbps Fax: 2 kbps, 4 kbps, 4,8 kbps, or 9,6 kbps | 17,55 kbps (= 46,8 / 8 x 3) |

5.2.5 Packet Data Traffic CHannels (PDTCH) (A/Gb mode only)

The following Packet Data Traffic CHannels (PDTCH) apply to A/Gb mode.

A PDTCH corresponds to the resource allocated to a single MES on one physical channel for user data transmission. Different logical channels may be dynamically multiplexed on to the same PDTCH. The PDTCH uses $\pi/2$ -BPSK, $\pi/4$ -QPSK, 16 APSK, or 32 APSK modulation. All packet data traffic channels are unidirectional, either uplink (PDTCH/U), for a mobile-originated packet transfer or downlink (PDTCH/D) for a mobile-terminated packet transfer. PDTCH and PDTCH2 traffic data channels may be multiplexed on the same physical carrier.

PDTCHs are used to carry packet data traffic. Different PDTCHs are defined by the suffix (m,n) where m indicates the bandwidth of the physical channel in which the PDTCH is mapped, $m \times 31,25$ kHz, and n defines the number of timeslots allocated to this physical channel. Table 5.2 summarizes different types of packet traffic data channels, PDTCH (m, 3), (m = 4 and 5), where the burst duration is 5 ms, PDTCH (m, 6), (m = 1, 2), where the burst duration is 10 ms, and PDTCH (m, 12), (m = 5), where the burst duration is 20 ms.

Table 5.2: Packet Traffic Data Channels (Peak Transmission Rates)

| Channels | Direction (U: Uplink, D: Downlink) | Transmission symbol rate (ksps) | Channel Coding | Modulation | Peak payload transmission rate (without CRC) (kbps) | Peak payload transmission rate (with CRC) (kbps) |
|--------------|--|---------------------------------------|-------------------|---------------|---|--|
| PDTCH(4,3) | U/D | 93,6 | Conv. | $\pi/4$ -QPSK | 113,6 | 116,8 |
| PDTCH(5,3) | U/D | 117,0 | Conv. | $\pi/4$ -QPSK | 145,6 | 148,8 |
| PDTCH(1,6) | U | 23,4 | Conv. | $\pi/4$ -QPSK | 27,2 | 28,8 |
| PDTCH(2,6) | D | 46,8 | Conv. | $\pi/4$ -QPSK | 62,4 | 64,0 |
| PDTCH2(5,12) | D | 117,0 | LDPC | $\pi/4$ -QPSK | 199,2 | 199,6 |
| PDTCH2(5,12) | D | 117,0 | LDPC | 16-APSK | 354,8 | 355,2 |
| PDTCH2(5,12) | D | 117,0 | LDPC | 32-APSK | 443,6 | 444,0 |
| PDTCH2(5,12) | U | 117,0 | LDPC | $\pi/4$ -QPSK | 199,2 | 199,6 |
| PDTCH2(5,12) | U | 117,0 | LDPC | 16-APSK | 399,2 | 399,6 |
| PDTCH2(5,3) | U/D | 117,0 | LDPC | $\pi/4$ -QPSK | 169,6 | 171,2 |
| PDTCH2(5,3) | U/D | 117,0 | LDPC | 16-APSK | 342,4 | 344,0 |
| PDTCH2(5,3) | U/D | 117,0 | LDPC | 32-APSK | 380,8 | 382,4 |

The payload is the Private Information (PRI) delivered to the physical layer by the link layer. The PRI includes the MAC header and the other higher layer overhead. The peak payload transmission rate (without CRC) is defined as the maximum attainable PRI data rate with continuous transmission, i.e. using all 24 timeslots in a frame. The above peak-rates are achieved with rate 3/4 coding for PDTCH(4,3) and PDTCH(5,3) and are achieved with rate 4/5 for PDTCH(1,6) and PDTCH(2,6). The peak rates of LDPC coded PDTCH2(5,12) and LDPC coded PDTCH2(5,3) are achieved for different modulation schemes with the following coding rate combinations:

- Downlink: 32 APSK Rate 4/5, 16 APSK Rate 4/5, $\pi/4$ -QPSK Rate 9/10.
- Uplink: 16 APSK Rate 9/10, $\pi/4$ -QPSK Rate 9/10.

NOTE: All the above coding rates are approximate rates. Refer to GMR-1 3G 45.003 [4] for the exact coding rates.

5.2.5a Packet Data Traffic Channels (PDTCH3) (Iu mode only)

The following Packet Data Traffic Channels3 (PDTCH3) apply to Iu mode.

A PDTCH3 corresponds to the resource allocated to a single MES on one physical channel for user data transmission. Different logical channels may be dynamically multiplexed on to the same PDTCH3. The PDTCH3 uses $\pi/2$ -BPSK, $\pi/4$ -QPSK, 16 APSK, or 32 APSK modulation. All packet data traffic channels are unidirectional, either uplink (PDTCH3/U), for a mobile-originated packet transfer or downlink (PDTCH3/D) for a mobile-terminated packet transfer. PDTCH3 may not be multiplexed with PDTCH and PDTCH2 on the same physical carrier.

PDTCH3s are used to carry packet data traffic. Different PDTCH3s are defined by the suffix (m,n) where m indicates the bandwidth of the physical channel in which the PDTCH3 is mapped, $m \times 31,25$ kHz, and n defines the number of timeslots allocated to this physical channel. Table 5.3 summarizes different types of packet traffic data channels, PDTCH3(m, 3), (m = 1, 5 and 10), where the burst duration is 5 ms, PDTCH3(m, 6), (m = 1, 2), where the burst duration is 10 ms, and PDTCH3(m, 12), (m = 5), where the burst duration is 20 ms.

Table 5.3: Packet Traffic Data Channels (Peak Transmission Rates)

| Channels | Direction (U: Uplink, D: Downlink) | Transmission symbol rate (ksps) | Channel Coding | Modulation | Peak payload transmission rate (without CRC) (kbps) | Peak payload transmission rate (with CRC) (kbps) |
|--------------|--|---------------------------------------|-------------------|---------------|---|--|
| PDTCH3(1,6) | U/D | 23,4 | Conv. | $\pi/4$ -QPSK | 27,2 | 28,8 |
| PDTCH3(2,6) | D/D | 46,8 | Conv. | $\pi/4$ -QPSK | 62,4 | 64,0 |
| PDTCH3(2,6) | U/D | 46,8 | Turbo | $\pi/4$ -QPSK | 62,4 | 64,0 |
| PDTCH3(5,3) | U/D | 117,0 | Turbo | $\pi/4$ -QPSK | 156,8 | 160,0 |
| PDTCH3(5,3) | D | 117,0 | Turbo | 16-APSK | 252,8 | 256,0 |
| PDTCH3(5,12) | U/D | 117,0 | Turbo | $\pi/4$ -QPSK | 185,2 | 186,0 |
| PDTCH3(5,12) | D | 117,0 | Turbo | 16-APSK | 295,2 | 296,0 |
| PDTCH3(10,3) | D | 234,0 | Turbo | $\pi/4$ -QPSK | 344,0 | 347,2 |
| PDTCH3(10,3) | D | 234,0 | Turbo | 16-APSK | 587,2 | 590,4 |

The payload is the Private Information (PRI) delivered to the physical layer by the link layer. The PRI includes the MAC header and the other higher layer overhead. The peak payload transmission rate (without CRC) is defined as the maximum attainable PRI data rate with continuous transmission, i.e. using all 24 timeslots in a frame. The above peak-rates are achieved with rate 4/5 for PDTCH3(1,6) and PDTCH3(2,6). The peak rates of Turbo coded PDTCH3(5,12) and PDTCH3(5,3) are achieved for different modulation schemes with the following coding rate combinations:

- Downlink: 16 APSK Rate 2/3, $\pi/4$ -QPSK Rate 5/6.
- Uplink: $\pi/4$ -QPSK Rate 5/6.

The peak rates of Turbo coded PDTCH3(10,3) are achieved for different modulation schemes with the following coding rate combinations:

- Downlink: 16 APSK Rate 2/3, $\pi/4$ -QPSK Rate 5/6.

5.2.6 Packet Mode Dedicated Channels (Iu mode only)

The following Packet Mode Dedicated Channels apply to Iu mode.

A Dedicated Traffic Channel (DTCH) is used to carry user traffic when a dedicated channel (DCH) is allocated to the terminal in packet dedicated mode. A DTCH is unidirectional. DTCH/U is used for the uplink and a DTCH/D is used for the downlink. A DTCH may support either 2,45 kbps or 4,0 kbps encoded speech.

Table 5.4: Dedicated Traffic Channels (Peak Transmission Rates)

| Channels | Direction (U: Uplink, D: Downlink) | Transmission symbol rate (ksps) | Channel Coding | Modulation | Transmission bandwidth (kHz) | Peak payload transmission rate (without CRC) (kbps) | Peak payload transmission rate (with CRC) (kbps) |
|-----------|--|---------------------------------------|-------------------|---------------|------------------------------------|---|--|
| DTCH(1,3) | U/D | 23,4 | Conv. | $\pi/4$ -QPSK | 31,25 | 28,8 | 32,0 |
| DTCH(1,6) | U/D | 23,4 | Conv. | $\pi/2$ -BPSK | 31,25 | 14,4 | 16,0 |
| DTCH(1,6) | U/D | 23,4 | Conv. | $\pi/4$ -QPSK | 31,25 | 8,8 | 10,4 |
| DTCH(1,8) | U/D | 23,4 | Conv. | $\pi/2$ -BPSK | 31,25 | 10,8 | 12,0 |

5.3 Control channels

5.3.1 General

Same as clause 5.3.1 in GMR-1 05.002 [10].

5.3.2 Broadcast channels

5.3.2.1 Frequency Correction CHannel (FCCH)

Same as clause 5.3.2.1 in GMR-1 05.002 [10] with the following additional text:

The FCCH may be broadcast using the FCCH burst or the FCCH3 burst.

5.3.2.2 GPS Broadcast control CHannel (GBCH)

Same as clause 5.3.2.2 in GMR-1 05.002 [10] with the following additional text:

The GBCH shall be broadcast using the DC6 burst. The GBCH3 contains the same information as the GBCH but is formatted to fit a DC12 burst structure. Different channel codings are used for GBCH and GBCH3, as described in GMR-1 3G 45.003 [4].

5.3.2.3 Broadcast Control CHannel (BCCH)

The BCCH broadcasts system information to the MESs, and is downlink only. The BCCH system information parameters are described in GMR-1 3G 44.008 [3]. System information parameters that are referenced in the present document are summarized in clause 10.

The network shall indicate to the MES via BCCH whether or not packet-switched traffic is supported.

Whenever the FCCH3 is present on the downlink, the BCCH shall be broadcast using the DC12 burst structure. Different channel codings are used for BCCH when it is transmitted over DC12, as described in GMR-1 3G 45.003 [4].

5.3.3 Common Control Channel (CCCH)

Same as clause 5.3.3 in GMR-1 05.002 [10] with the following additional text.

The CCCH shall be transmitted using the DC6 burst when the FCCH burst is transmitted in the spot beam and the DC12 burst when the FCCH3 is used. Different channel codings are used for CCCH when it is transmitted over DC12, as described in GMR-1 3G 45.003 [4].

5.3.4 Dedicated control channels

Same as clause 5.3.4 in GMR-1 05.002 [10].

5.3.5 Cell Broadcast CHannel (CBCH)

Same as clause 5.3.5 in GMR-1 05.002 [10].

5.3.6 Packet Common Control CHannels (PCCCH)

If a PCCCH is not allocated, the information for packet-switched operation is transmitted on the CCCH. If a PCCCH is allocated, it may transmit information for the circuit-switched operation.

- 1) Packet Random Access Channel (PRACH): Uplink only, used to request allocation of one or several PDTCHs (for uplink or downlink direction).
- 2) Packet Access Grant Channel (PAGCH): Downlink only, used to allocate one or several PDTCHs.

5.3.7 Packet dedicated control channels

- 1) The Packet Associated Control Channel (PACCH): The PACCH is bidirectional. For description purposes PACCH/U is used for the uplink and PACCH/D for the downlink.
- 2) Packet Timing Advance Control Channel Uplink (PTCCH/U): Used to transmit packet normal bursts to allow estimation of the timing advance for one MES in packet transfer mode.
- 3) Packet Timing Advance Control Channel Downlink (PTCCH/D): Used to transmit timing advance updates for several MESs. One PTCCH/D is paired with several PTCCH/Us.
- 4) Dedicated Associated Control Channel (DACCH): The DACCH is unidirectional. For description purposes DACCH/U is used for the uplink and DACCH/D is used for the downlink. The DACCH is used to transmit dedicated associated control signalling when a terminal is allocated a DCH.

6 The physical resource

6.1 General

Same as clause 6.1 in GMR-1 05.002 [10].

6.2 Radio frequency channels

6.2.1 Spot beam allocation

Same as clause 6.2.1 in GMR-1 05.002 [10].

6.2.2 Downlink and uplink

Same as clause 6.2.2 in GMR-1 05.002 [10].

6.3 Timeslots and TDMA frames

6.3.1 General

Same as clause 6.3.1 in GMR-1 05.002 [10].

6.3.2 Timeslot number

Same as clause 6.3.2 in GMR-1 05.002 [10].

6.3.3 TDMA frame number

Same as clause 6.3.3 in GMR-1 05.002 [10].

7 Bursts

7.1 General

Same as clause 7.1 in GMR-1 05.002 [10], with the following additions. Tables 7.1 to 7.19 in GMR-1 05.002 [10] apply to the appropriate bursts described the present document.

The physical channel burst for PDCH(m,n) is denoted as a Packet Normal Burst, PNB(m,n) or PNB2(m,n). The physical channel burst for the PDCH3(m,n) is denoted as the PNB3(m,n). The exception to this rule is the PNB(1,6) burst which may be used in the uplink only of the PDCH(1,6) and both the downlink and the uplink for a PDCH3(1,6). Here, the bandwidth factor, m, refers to the integer multiple of the bandwidth, 31,25 kHz, of the basic channel, and the time factor, n, refers to the number of timeslots. The ranges of these two variables are as follows: for m = 4 and 5, n = 3, for m = 1 and 2, n = 6, and for m = 5, n = 12.

The PNB(m,n), PNB2(m,n) and PNB3(m,n) bursts may be n = 3, 6, 8 or 12 timeslots long. The burst data is modulated either using $\pi/4$ -QPSK, 16 APSK, or 32 APSK modulation, which maps two, four and five bits to one symbol, respectively. For additional details concerning the modulation of PNB(m,n), PNB2(m,n) and PNB3(m,n) bursts, see GMR-1 3G 45.004 [5].

The physical channel burst for PRACH is denoted as Packet Access Burst (PAB). The physical channel burst for PRACH3 is denoted as Packet Access Burst3 (PAB3). Both the PAB and the PAB3 are transmitted in the basic channel bandwidth 31,25 kHz. It occupies 4,3 ms in a 5 ms time-slot, which results in $\pm 0,35$ ms guard-time.

7.2 Timing

7.2.1 Half-symbol period

The fundamental unit of burst timing is the half-symbol period. The half-symbol period is a function of the bandwidth factor, m. A timeslot consists of $(78 \times m)$ half-symbol periods, each of $\frac{5}{234 \times m}$ ms duration. A particular half-symbol

period within a burst is referenced by a half-symbol number (HSN), with the first half-symbol period numbered 0. In the following clauses, the transmission timing of a burst is defined in terms of half-symbol numbers. The half symbol with the lowest half-symbol number is transmitted first.

7.2.2 Useful duration

Different types of bursts exist in the system. One characteristic of a burst is its useful duration. The useful duration of a burst for circuit service is defined as beginning with HSN5. This present document defines bursts with useful durations of 146, 224, 458, 614 and 692 half-symbol periods, based on total durations of 2, 3, 6, 8 and 9 timeslots.

The useful duration for packet normal bursts is defined as beginning with either HSN $5 \times m$ or with HSN 5. Table 7.0 lists the useful duration for different packet normal bursts.

Table 7.0: Useful Duration For Different Packet Normal Burst Types

| Burst | Direction | Beginning HSN | Useful Durations in Half-Symbol Periods |
|------------|-----------|---------------|---|
| PNB(1,6) | U/D | 5 | 458 |
| PNB(2,6) | D | 5 | 926 |
| PNB(4,3) | U/D | $5 \times m$ | 896 |
| PNB(5,3) | U/D | $5 \times m$ | 1 120 |
| PNB2(5,3) | U/D | $5 \times m$ | 1 120 |
| PNB2(5,12) | U/D | $5 \times m$ | 4 630 |
| PNB3(1,3) | U/D | 5 | 224 |
| PNB3(1,6) | U/D | 5 | 458 |
| PNB3(1,8) | U/D | 5 | 614 |
| PNB3(2,6) | U | $5 \times m$ | 916 |
| PNB3(2,6) | D | 5 | 926 |
| PNB3(5,3) | U | $5 \times m$ | 1 120 |
| PNB3(5,3) | D | 5 | 1 160 |
| PNB3(5,12) | U | $5 \times m$ | 4 630 |
| PNB3(5,12) | D | 5 | 4 670 |
| PNB3(10,3) | D | 5 | 2 330 |

7.2.3 Guard period

The period between the useful durations of successive bursts is termed the guard period. Each burst has a guard period with a duration of either $5 \times m$ or 5 half-symbol periods before its useful duration, and a similar guard period with a duration of $5 \times m$ or 5 half-symbol periods after its useful duration, which has the effect of centering a burst's useful duration within its timeslot(s).

7.3 Multiple unique word patterns in bursts

Many bursts contain a pattern of bits known as a unique word pattern, used to resolve phase ambiguities inherent in the modulation. The NT3, NT6, and NT9 bursts, described later, allow multiple patterns for the unique word to distinguish bursts that contain signalling (FACCH) from those that contain user information (speech/data). The SDCCH bursts use multiple unique word patterns to identify a subchannel associated with each SDCCH burst. Additional details concerning SDCCH subchannels use of multiple unique word patterns are in clause 8.5.4.

The PNB3(1,3) PNB3(1,6) and the PNB3(1,8) contain different unique word patterns to distinguish between speech and data. Data can be either user data or control signalling.

7.4 Types of bursts

Same as clause 7.4 in GMR-1 05.002 [10].

7.4.1 BACH burst

Same as clause 7.4.1 in GMR-1 05.002 [10].

7.4.2 BCCH burst

Same as clause 7.4.2 in GMR-1 05.002 [10].

7.4.3 CICH burst

Same as clause 7.4.3 in GMR-1 05.002 [10].

7.4.4 DC2 burst

Same as clause 7.4.4 in GMR-1 05.002 [10].

7.4.5 DC6 burst

Same as clause 7.4.5 in GMR-1 05.002 [10].

7.4.6 DKAB bursts

Same as clause 7.4.6 in GMR-1 05.002 [10].

7.4.6.1 KAB3 burst

The keep-alive bursts (KAB3s) burst for three, six, and eight-slot dedicated traffic channels (DTCH(1,3), DTCH(1,6), and DTCH(1,8)) are KAB3(1,3), KAB3(1,6), and KAB3(1,8), respectively. KAB3(1,3), KAB3(1,6) and KAB3(1,8) are all $\pi/2$ binary phase-shift keying (BPSK) modulated. Note that for $\pi/2$ BPSK modulation, two half-symbols only transfer one bit of information. The KAB3(1,3), KAB3(1,6) and KAB3(1,8) burst definitions and UW patterns are listed in table 7.7a, 7.7b and 7.7c, respectively.

Table 7.7a: KAB3(1,3) burst definition

| HSN | Length of field in half symbols | Contents of field |
|------------|---------------------------------|--------------------------------|
| 0 to 4 | 5 | Guard period in half symbols |
| 5 to 20 | 16 | Idle bits (No signals) |
| 21 to 36 | 16 | Unique word; [0 0 1 1 0 1 1 0] |
| 37 to 44 | 8 | Encoded bits e0 to e3 |
| 45 to 190 | 146 | Idle bits (No signals) |
| 191 to 198 | 8 | Encoded bits e4 to e7 |
| 199 to 212 | 14 | Unique word; [1 1 1 0 1 0 0] |
| 213 to 228 | 16 | Idle bits (No signals) |
| 229 to 233 | 5 | Guard period in half symbols |

Table 7.7b: KAB3(1,6) burst definition

| HSN | Length of field in half symbols | Contents of field |
|------------|---------------------------------|--------------------------------------|
| 0 to 4 | 5 | Guard period in half symbols |
| 5 to 20 | 16 | Idle bits (No signals) |
| 21 to 40 | 20 | Unique word; [0 1 0 1 0 1 1 0 1 0] |
| 41 to 48 | 8 | Encoded bits e0 to e3 |
| 49 to 214 | 166 | Idle bits (No signals) |
| 215 to 222 | 8 | Encoded bits e4 to e7 |
| 223 to 244 | 22 | Unique word; [0 0 1 1 0 1 0 1 0 0 1] |
| 245 to 252 | 8 | Encoded bits e8 to e11 |
| 253 to 418 | 166 | Idle bits (No signals) |
| 419 to 426 | 8 | Encoded bits e12 to e15 |
| 427 to 446 | 20 | Unique word; [0 1 0 1 0 1 1 0 1 0] |
| 447 to 462 | 16 | Idle bits (No signals) |
| 463 to 467 | 5 | Guard period in half symbols |

Table 7.7c: KAB3(1,8) burst definition

| HSN | Length of field in half symbols | Contents of field |
|------------|---------------------------------|--------------------------------------|
| 0 to 4 | 5 | Guard period in half symbols |
| 5 to 20 | 16 | Idle bits (No signals) |
| 21 to 36 | 16 | Unique word; [1 0 0 1 0 0 1 1] |
| 37 to 44 | 8 | Encoded bits e0 to e3 |
| 45 to 292 | 248 | Idle bits (No signals) |
| 293 to 300 | 8 | Encoded bits e4 to e7 |
| 301 to 322 | 22 | Unique word; [0 0 1 1 0 1 0 1 0 0 1] |
| 323 to 330 | 8 | Encoded bits e8 to e11 |
| 331 to 578 | 248 | Idle bits (No signals) |
| 579 to 586 | 8 | Encoded bits e12 to e15 |
| 587 to 602 | 16 | Unique word; [1 0 0 1 0 0 1 1] |
| 603 to 618 | 16 | Idle bits (No signals) |
| 619 to 623 | 5 | Guard period in half symbols |

7.4.7 FCCH burst

Same as clause 7.4.7 in GMR-1 05.002 [10].

7.4.7.1 FCCH3 burst

The FCCH3 burst occupies twelve timeslots, and it has the format shown in table 7.8a.

Table 7.8a: FCCH3 burst definition

| HSN | Length of field in half symbols | Contents of field |
|------------|---------------------------------|------------------------------|
| 0 to 4 | 5 | Guard period in half symbols |
| 5 to 930 | 926 | Chirp modulation |
| 931 to 935 | 5 | Guard period in half symbols |

For additional details concerning the modulation of the FCCH3 bursts, see GMR-1 3G 45.004 [5].

7.4.8 NT3 burst

Same as clause 7.4.8 in GMR-1 05.002 [10].

7.4.8.1 NT3 burst for encoded speech

Same as clause 7.4.8.1 in GMR-1 05.002 [10].

7.4.8.2 NT3 burst for FACCH

Same as clause 7.4.8.2 in GMR-1 05.002 [10].

7.4.9 NT6 burst

Same as clause 7.4.9 in GMR-1 05.002 [10].

7.4.10 NT9 burst

Same as clause 7.4.10 in GMR-1 05.002 [10].

7.4.11 RACH burst

Same as clause 7.4.11 in GMR-1 05.002 [10].

7.4.11.1 RACH3 burst

The RACH3 burst has a total duration of nine timeslots. The burst is $\pi/2$ BPSK modulated including UW and CW. Two half-symbols only transfer one bit of information. The burst format is as shown in table 7.17a.

Table 7.17a: RACH3 Burst definition and UW Patterns

| HSN | Length of field in half symbols | Contents of field |
|------------|---------------------------------|--|
| 0 to 4 | 5 | Guard period in half symbols |
| 5 to 50 | 46 | Unique word [0,0,0,0,0,1,0,1,0,0,1,1,0,0,1,1,0,1,0,1,1,1,1] |
| 51 to 222 | 172 | Encoded bits e0 to e85 |
| 223 to 306 | 84 | CW (coded as all 1 bits) |
| 307 to 394 | 88 | Encoded bits e86 to e129 |
| 395 to 478 | 84 | CW (coded as all 1 bits) |
| 479 to 650 | 172 | Encoded bits e130 to e215 |
| 651 to 696 | 46 | Unique word [0,0,0,0,0,1,0,1,0,0,1,1,0,0,1,1,0,1,0,1,1,1,1] |
| 697 to 701 | 5 | Guard period in half symbols |

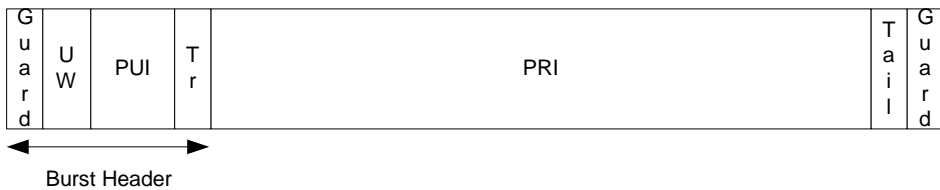
7.4.12 SDCCH burst

Same as clause 7.4.12 in GMR-1 05.002 [10].

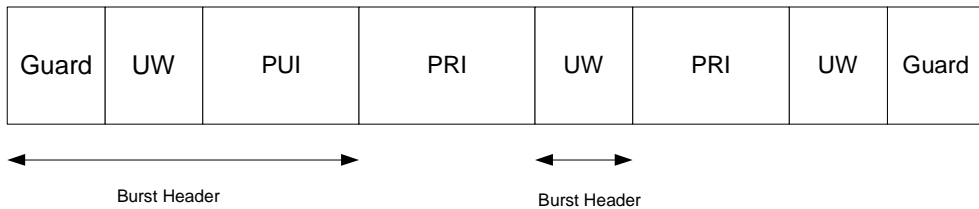
7.4.13 Packet Normal Bursts (PNB)

The Packet Normal Bursts (PNB) comprises of two parts.

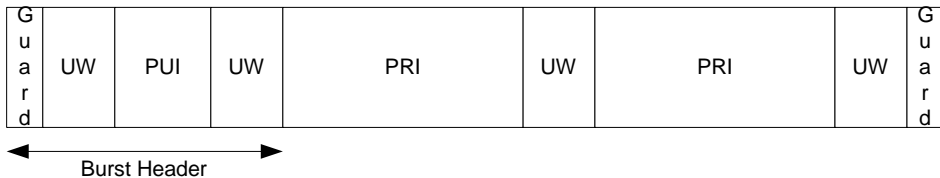
The first part, the burst header, is common to all PNBs that share the same suffix (m,n). The burst header comprises guard bits, a unique word, and encoded Public Information (PUI) field. The second part is the encoded Private Information (PRI). Pictorial description of the different PNB(m,n) and PNB2(m,n) is shown in figure 7.1 and for PNB3(m,n) is shown in figures 7.2 and 7.3. Refer to clauses 7.4.13.1 to 7.4.13.3 for a description on the different parts of PNB(m,n) and PNB2(m,n) shown in figure 7.1 and pnb3(m,n) shown in figures 7.2 and 7.3.



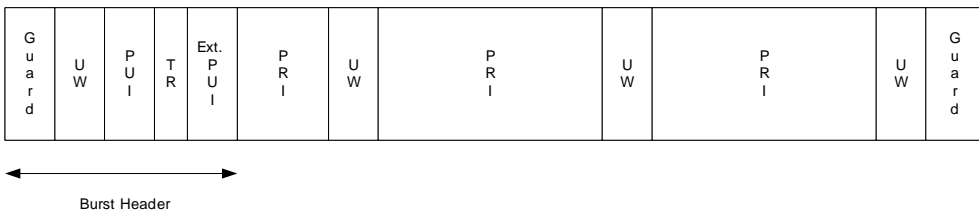
(a) Convolutionally coded PNB(4,3) and PNB(5,3) Downlink/Uplink



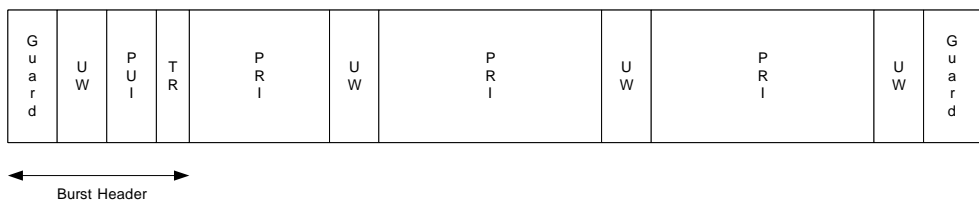
(b) PNB(1,6) Downlink/Uplink



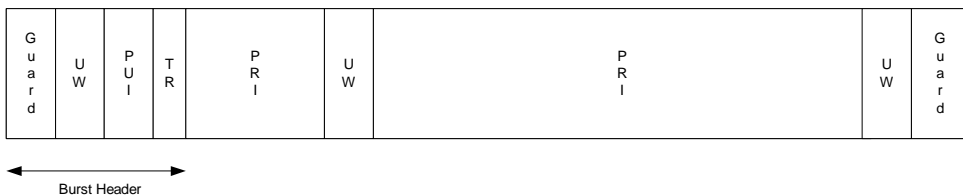
(c) PNB(2,6) Downlink



(d) LDPC coded PNB2(5,12) Downlink

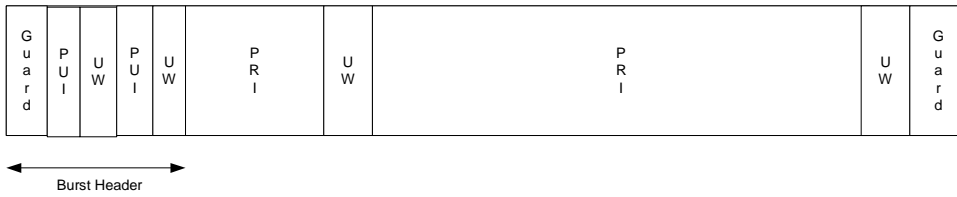


(e) LDPC coded PNB2(5,12) Uplink

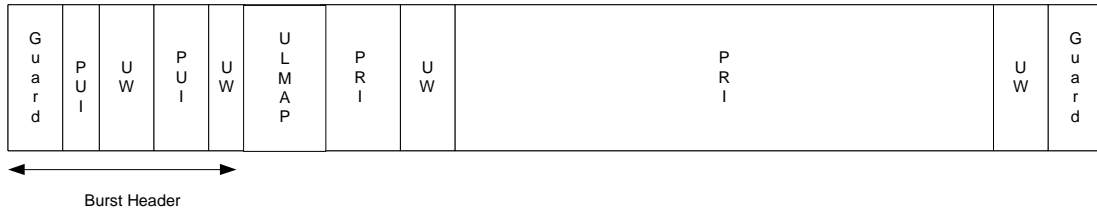


(f) LDPC coded PNB2(5,3) Downlink/Uplink

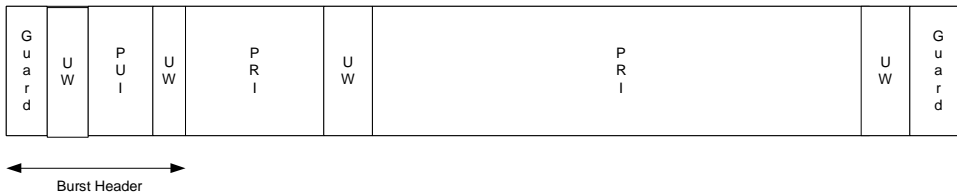
Figure 7.1: Burst header and PRI within PNB(m,n) and PNB2(m,n)



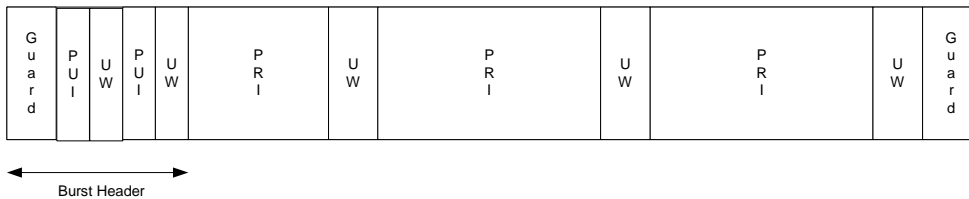
(a) PNB3(5,3) Downlink



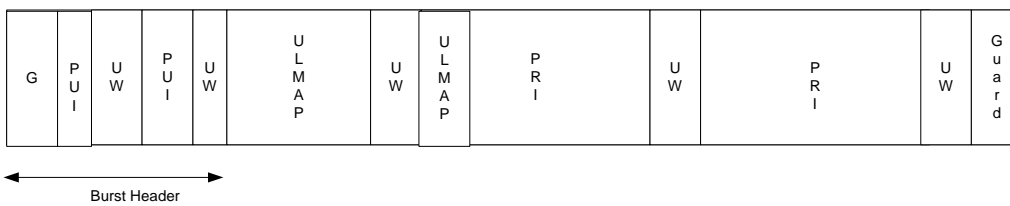
(b) PNB3(5,3) Downlink with UL-MAP



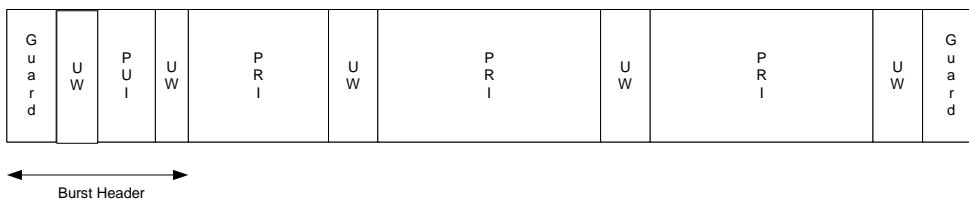
(c) PNB3(5,3) Uplink



(d) PNB3(5,12) Downlink

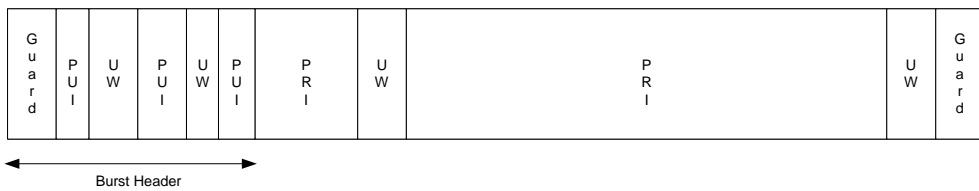


(e) PNB3(5,12) Downlink with UL-MAP

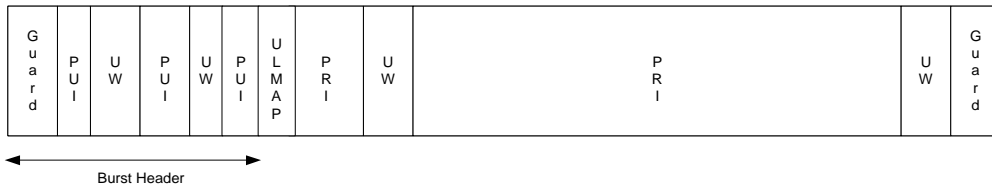


(f) PNB3(5,12) Uplink

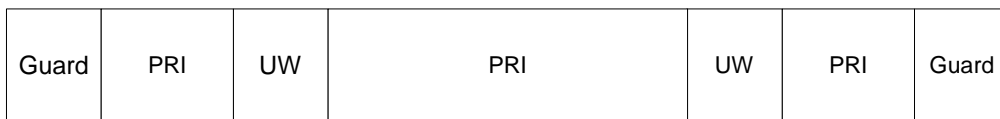
Figure 7.2: Burst header and PRI within PNB3(m,n)



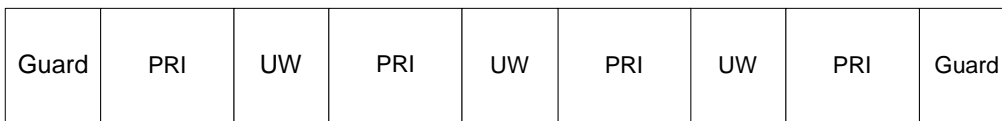
(a) PNB3(10,3) Downlink



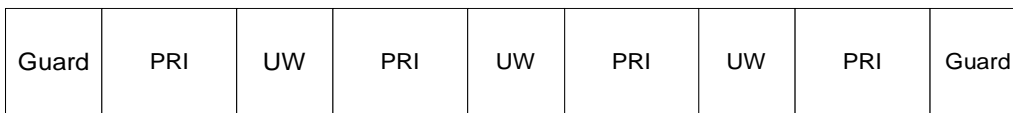
(b) PNB3(10,3) Downlink with UL-MAP



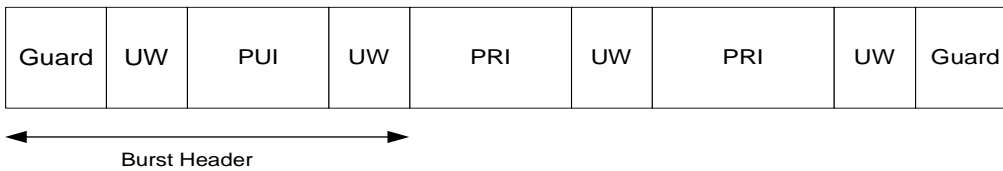
(c) PNB3(1,3) Downlink/Uplink



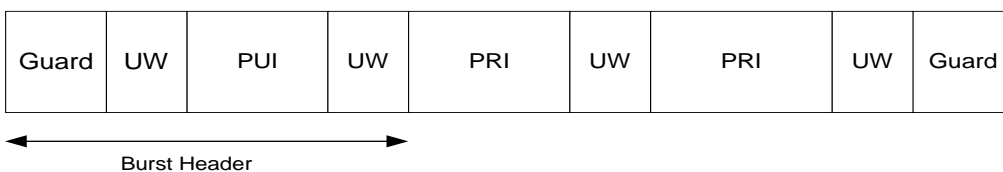
(d) PNB3(1,6) Downlink/Uplink



(e) PNB3(1,8) Downlink/Uplink



(f) PNB3(2,6) Downlink



(g) PNB3(2,6) Uplink

Figure 7.3: Burst header and PRI within PNB3(m,n)

An MES of terminal type C shall be able to transmit an uplink PNB(1,6) immediately after RX-TX switching time (see GMR-1 3G 45.005 [6]) from the reception of the last symbol of the burst header of downlink PNB(2,6). Consequently, an MES of terminal type C shall be capable of decoding and interpreting the burst header received prior to this transmission on uplink PNB(1,6). See also GMR-1 3G 45.010 [7] and GMR-1 3G 44.060 [9] for further description.

An MES of terminal types E and above which do not support full duplex operation shall be able to transmit an uplink PNB(1,6) or PNB3(m,n) immediately after RX-TX switching time (see GMR-1 3G 45.005 [6]) from the reception of the last symbol of the burst header of downlink PNB3(m,n) including ULMAP if any. Consequently, an MES of terminal type E and above which do not support full duplex operation shall be capable of decoding and interpreting the burst header received prior to this transmission on uplink PNB3(m,n) or PNB(1,6). See also GMR-1 3G 45.010 [7] and GMR-1 3G 44.060 [9] for further description.

7.4.13.1 Burst header

The burst header of the PNB(m,n) is modulated using $\pi/4$ -QPSK. The various fields of the burst header are described below.

7.4.13.1.1 Guard bits

If $m = 4$ or $m = 5$, the PNB(m,n) or PNB2(m,n) has $5 \times m$ guard bits at the beginning of the burst (as a part of the burst header) and $5 \times m$ guard bits at the end of the burst.

If $m = 1$ or $m = 2$, the PNB(m,n) has 5 guard bits at the beginning of the burst (as a part of the burst header) and 5 guard bits at the end of the burst.

PNB3(1,3), PNB3(1,6), PNB3(1,8) have 5 guard bits at the beginning of the burst and 5 guard bits at the end of the burst.

PNB3(5,3) and PNB3(5,12) uplink burst have 25 guard bits at the beginning of the burst (as a part of the burst header) and 25 guard bits at the end of the burst.

PNB3(5,3) and PNB3(5,12) downlink burst have 5 guard bits at the beginning of the burst (as a part of the burst header) and 5 guard bits at the end of the burst.

PNB3(10,3) has 5 guard bits at the beginning of the burst (as a part of the burst header) and 5 guard bits at the end of the burst.

7.4.13.1.2 Unique Word (UW)

The burst header of PNB(1,6) has 14 bits of Unique Word (UW). There are additional 30 bits of UW within the PRI portion of PNB(1,6).

The burst header of PNB(2,6) has total of 36 bits of UW; 18 UW bits are located before the PUI and another 18 UW bits are located after the PUI. There are additional 32 bits of UW within the PRI portion of PNB(2,6).

The Unique Word (UW) size for the PNB(m,3), ($m = 4, 5$) is $10 \times m$ bits. The entire UW is located within the burst header for convolutionally coded PNB(m,3), $m = 4$ or 5 .

The burst header of PNB2(5,12) has total of 50 bits of UW. There are additional 82 bits of UW within the PRI portion of PNB(5,12). The burst header of PNB2(5,3) has total of 50 bits of UW. There are additional 54 bits of UW within the PRI portion of PNB2(5,3).

The burst header of PNB3(5,12) has total of 60 bits of UW. There are additional 82 bits of UW within the PRI portion of PNB3(5,12). The burst header of PNB3(5,3) has total of 60 bits of UW. There are additional 54 bits of UW within the PRI portion of PNB3(5,3).

The burst header of PNB3(10,3) has total of 60 bits of UW. There are additional 54 bits of UW within the PRI portion of PNB3(10,3).

PNB3(1,3) has a total of 30 bits of UW except KAB3(1,3), which is $\pi/2$ -BPSK modulated and has 15 bits of UW. PNB3(1,6) 2,45 kbps has a total of 31 bits of UW, PNB3(1,6) 4,0 kbps has a total of 62 bits of UW and PNB3(1,8) has a total of 27 bits of UW. Note that, for PNB3(1,3) 2,45 kbps and 4,0 kbps and PNB3(1,6) 4,0 kbps, the unique words are QPSK modulated and there is no extra $\pi/4$ -rotation, although the payload portion of the burst is $\pi/4$ -QPSK modulated. For KAB3(1,3), PNB3(1,6) 2,45 kbps voice/data, KAB3(1,6), PNB3(1,8) 4,0 kbps voice/data, and KAB3(1,8) bursts, the modulation scheme is identical for both payload and unique words, which is $\pi/2$ -BPSK.

The UW is modulated with $\pi/4$ -QPSK or QPSK. For PNBs with payload modulated with 16 APSK and 32 APSK, the amplitude of all the UW will be equivalent to the amplitude of the outermost constellation of each payload modulation scheme. For the UW within the PRI portion of the PNB2(5,3), PNB3(5,3), PNB2(5,12), PNB3(5,12), and PNB3(10,3), a constant $\pi/4$ phase shift is performed across QPSK modulated UW, instead of $\pi/4$ QPSK modulation. In the transmission of the $\pi/4$ -QPSK PNB2(5,12) and PNB2(5,3) with rate $1/2$ LDPC coded payload, the amplitude of the UW symbols will be 2,04 dB (i.e. amplitude of 1,2658) higher than the payload amplitude. In the transmission of the downlink $\pi/4$ -QPSK PNB3(5,12), PNB3(5,3), and PNB3(10,3) with rate $1/2$ Turbo coded payload, the amplitude of the UW symbols will be 1,02 dB (i.e. amplitude of 1,125) higher than the payload amplitude.

7.4.13.1.3 Public Information (PUI) field

The size of the uplink and the downlink PUI is 12 bits. The size of encoded PUI is 48 bits. The size of downlink PUI3 that is transmitted over PNB3(5,3) is 32 bits (including 3 bit CRC), and the size of the encoded PUI3 is 128 bits. The size of downlink PUI3 that is transmitted over PNB3(5,12) is 80 bits (including 3 bit CRC), and the size of the encoded PUI3 is 320 bits. The size of downlink PUI3 that is transmitted over PNB3(10,3) is 64 bits (including 3 bit CRC), and the size of the encoded PUI3 is 256 bits. Refer to GMR-1 3G 44.060 [9] for detailed description of PUI and PUI3. The detailed description of the PUI coding is in GMR-1 3G 45.003 [4].

In addition to the PUI, the burst PNB2(5,12) in the down link has an extended PUI. The size of the downlink extended PUI is 30 bits. The size of encoded PUI is 96 bits. Refer to GMR-1 3G 44.060 [9] for detailed description of PUI. The detailed description of the extended PUI coding is in GMR-1 3G 45.003 [4].

The amplitude of both PUI and extended PUI will be equivalent to the amplitude of the outermost constellation of each payload modulation scheme. In the transmission of the $\pi/4$ -QPSK PNB2(5,12) and PNB2(5,3) with rate $1/2$ LDPC coded payload, the amplitude of PUI and extended PUI symbols will be 2,04 dB (i.e. amplitude of 1,2658) higher than the payload amplitude. In the transmission of the downlink $\pi/4$ -QPSK PNB3(5,12), PNB3(5,3), and PNB3(10,3) with rate $1/2$, the amplitude of PUI3 will be 1,02 dB (i.e. amplitude of 1,125) higher than the payload amplitude.

7.4.13.1.4 Transition symbols

Each PNB(m,n), except PNB(1,6) and PNB(2,6), has m symbols for transition between the two burst parts. There are no transition symbols for PNB(1,6) and PNB(2,6). PNB2(5,12) downlink has m symbols for transition between the PUI and the extended PUI.

The amplitude of transition symbols will be equivalent to the amplitude of the outermost constellation of each payload modulation scheme. In the transmission of the $\pi/4$ -QPSK PNB2(5,12) and PNB2(5,3) with rate $1/2$ LDPC coded payload, the amplitude of the transition symbols will be 2,04 dB (i.e. amplitude of 1,2658) higher than the payload amplitude.

7.4.13.2 Encoded Private Information (PRI)

The second part of the burst carries the Private Information (PRI) delivered to the physical layer. The PRI is modulated using either $\pi/4$ -QPSK, 16 APSK or 32 APSK.

The PRI includes the MAC layer header. Refer to GMR-1 3G 44.060 [9] for detailed description of PRI content.

The PRI in PNB(5,3) and PNB(4,3) is encoded using convolutional code with a constraint length of 7. The channel coding rate is variable, approximately 3/4, 5/8 or 1/2. The variable channel coding rate allows link margin control. The PRI in PNB(1,6) and PNB(2,6) is encoded using convolutional code with a constraint length of 9. The channel coding rate is variable, approximately 3/5, 7/10 or 4/5. The variable channel coding rate allows link margin control.

The PRI in PNB2(5,12) and PNB2(5,3) is encoded with LDPC. The channel coding rate is variable for each modulation scheme.

The PRI in PNB3(2,6), PNB3(5,12), PNB3(5,3), and PNB3(10,3) is encoded with Turbo Code. The channel coding rate is variable for each modulation scheme. In the downlink, PNB3(5,12), PNB3(5,3), and PNB3(10,3) may carry ULMAP (Uplink MAP) in a burst. In such case, the beginning portion of the PRI is replaced with ULMAP. Different coding will be applied to ULMAP and PRI, as described in GMR-1 3G 45.003 [4].

For further description of the modulation and channel coding schemes for the Public Information (PUI) field, the extended Public Information (PUI) field and the Private Information (PRI) bits, refer to GMR-1 3G 45.004 [5] and GMR-1 3G 45.003 [4], respectively.

7.4.13.3 Formats of packet normal burst

This clause specifies different PNB(m,n), PNB2(m,n) and PNB3(m,n) formats.

7.4.13.3.1 Void

7.4.13.3.2 PNB(4,3)

This burst has 468 symbols and 936 half symbols, which are transmitted in a three-timeslot (5 ms) duration. The channel transmission rate is 93,6 kbps (468 symbols/5 ms). The transmission bandwidth is 125 kHz. The modulation is $\pi/4$ -QPSK. See table 7.20.

Table 7.20: PNB(4,3) definition

| HSN | Length of field in half symbols | Contents of field |
|------------|---------------------------------|---|
| 0 to 19 | 20 | Guard period in half symbols |
| 20 to 59 | 40 | Unique word |
| 60 to 107 | 48 | Encoded public information (PUI) field c0,...,c23, c0,..., c23 |
| 108 to 115 | 8 | Burst transition (coded as all 1 bits) |
| 116 to 907 | 792 | Encoded bits e0 to e791 |
| 908 to 915 | 8 | Tail (coded as all 1 bits) |
| 916 to 935 | 20 | Guard period in half symbols |

The Unique Word pattern for PNB(4,3) burst is shown in table 7.21.

Table 7.21: PNB(4,3) unique word definition for PDCH(4,3)

| Unique word bBits (HSN20, HSN21 ...HSN59) |
|---|
| (00 01 00 01 00 01 11 10 11 01 00 10 11 10 11 01 11 01 11 01) |

7.4.13.3.3 PNB(5,3)

This burst has 585 symbols and 1 170 half symbols, which are transmitted in a three-timeslot (5 ms) duration. The channel transmission rate is 117 kbps (585 symbols/5 ms). The transmission bandwidth is 156,25 kHz. The modulation is $\pi/4$ -QPSK. See table 7.22.

Table 7.22: PNB(5,3) definition

| HSN | Length of field in half symbols | Contents of field |
|----------------|---------------------------------|---|
| 0 to 24 | 25 | Guard period in half symbols |
| 25 to 74 | 50 | Unique word |
| 75 to 122 | 48 | Encoded public information (PUI) field c0,...,c23, c0,..., c23 |
| 123 to 132 | 10 | Burst transition (coded as all 1 bits) |
| 133 to 1 134 | 1 002 | Encoded bits e0 to e1 001 |
| 1 135 to 1 144 | 10 | Tail (coded as all 1 bits) |
| 1 145 to 1 169 | 25 | Guard period in half symbols |

The unique word pattern for PNB(5,3) burst is shown in table 7.23.

Table 7.23: PNB(5,3) unique word definition for PDCH(5,3)

| |
|--|
| Unique word bits (HSN25, HSN26 ...HSN74) |
| (00 01 11 10 00 10 11 01 00 01 00 01 00 01 00 10 11 01 11 10 00 10 00) |

7.4.13.3.4 PNB(1,6)

This burst has 234 symbols and 468 half symbols, which are transmitted in a six-timeslot (10 ms) duration. The channel transmission rate is 23,4 ksp/s (234 symbols/10 ms). The transmission bandwidth is 31,25 kHz. The modulation is $\pi/4$ -QPSK. See table 7.24.

Table 7.24: PNB(1,6) definition

| HSN | Length of field in half symbols | Contents of field |
|------------|---------------------------------|---|
| 0 to 4 | 5 | Guard period |
| 5 to 18 | 14 | Unique word - UW1 |
| 19 to 66 | 48 | Encoded public information (PUI) field c0,...,c23, c0,..., c23 |
| 67 to 226 | 160 | PRI - Encoded bits e0 to e159 |
| 227 to 242 | 16 | Unique word - UW2 |
| 243 to 448 | 206 | PRI - Encoded bits e160 to e365 |
| 449 to 462 | 14 | Unique word - UW3 |
| 463 to 467 | 5 | Guard period |

The unique word pattern for PNB(1,6) burst is shown in table 7.25.

Table 7.25: PNB(1,6) unique word definition for PDCH(1,6)

| |
|--|
| Unique word bits (HSN5, HSN6 ...HSN18) |
| (00 01 11 01 00 10 00) |
| Unique word bits (HSN227, HSN228 ...HSN242) |
| (00 01 11 01 00 10 00 10) |
| Unique word bits (HSN449, HSN450 ...HSN462) |
| (00 01 11 01 00 10 00) |

7.4.13.3.5 PNB(2,6)

This burst has 468 symbols and 936 half symbols, which are transmitted in a six to timeslot (10 ms) duration. The channel transmission rate is 46,8 ksp/s (468 symbols/10 ms). The transmission bandwidth is 62,5 kHz. The modulation is $\pi/4$ -QPSK. See table 7.26.

Table 7.26: PNB(2,6) definition

| HSN | Length of field in half symbols | Contents of field |
|------------|---------------------------------|---|
| 0 to 4 | 5 | Guard period in half symbols |
| 5 to 22 | 18 | Unique word |
| 23 to 70 | 48 | Encoded public information (PUI) field c0, ...,c23, c0, ..., c23 |
| 71 to 88 | 18 | Unique word |
| 89 to 494 | 406 | Encoded bits e0 to e405 |
| 495 to 510 | 16 | Unique word |
| 511 to 914 | 404 | Encoded bits e406 to e809 |
| 915 to 930 | 16 | Unique word |
| 931 to 935 | 5 | Guard period in half symbols |

The unique word pattern for PNB(2,6) burst is shown in table 7.27.

Table 7.27: PNB(2,6) unique word definition for PDCH(2,6)

| |
|--|
| Unique word bits (HSN5, HSN6 ...HSN22) |
| (00 01 11 01 00 10 00 10 00) |
| Unique word bits (HSN71, HSN72 ...HSN88) |
| (00 01 11 01 00 10 00 10 00) |
| Unique word bits (HSN495, HSN496 ...HSN510) |
| (00 01 11 01 00 10 00 10) |
| Unique word bits (HSN915, HSN916 ...HSN930) |
| (00 01 11 01 00 10 00 10) |

7.4.13.3.6 LDPC coded PNB2(5,12)/Downlink

This burst has 2 340 symbols and 4 680 half symbols, which are transmitted in a twelve-timeslot (20 ms) duration. The channel transmission rate is 117 kbps (2 340 symbols/20 ms). The transmission bandwidth is 156,25 kHz. The modulation is $\pi/4$ -QPSK for the header including the first UW. The PRI is modulated with $\pi/4$ -QPSK, 16 APSK, or 32 APSK. The second, third and fourth UW is modulated with QPSK with a constant $\pi/4$ phase shift. See table 7.28.

Table 7.28: LDPC coded PNB2(5,12)/Downlink definition

| HSN | Length of field in half symbols | Contents of field |
|----------------|---------------------------------|---|
| 0 to 24 | 25 | Guard period in half symbols |
| 25 to 74 | 50 | Unique word |
| 75 to 122 | 48 | Encoded public information (PUI) field c0, ...,c23, c0, ..., c23 |
| 123 to 132 | 10 | Burst transition (coded as all 1 bits) |
| 133 to 228 | 96 | Encoded Extended public (PUI) field d0, ..., d96 |
| 229 to 420 | 192 | Encoded bits |
| 421 to 448 | 28 | Unique Word |
| 449 to 2 524 | 2 076 | Encoded bits |
| 2 525 to 2 550 | 26 | Unique Word |
| 2 551 to 4 616 | 2 076 | Encoded bits |
| 4 627 to 4 654 | 28 | Unique Word |
| 4 655 to 4 679 | 25 | Guard period in half symbols |

The unique word pattern for PNB2(5,12) burst is shown in table 7.29.

Table 7.29: LDPC coded PNB2(5,12) unique word definition for PDCH(5,12)/Downlink

| |
|---|
| Unique word bits (HSN25, HSN26 ...HSN74) |
| (00 01 11 10 00 10 11 01 00 01 00 01 00 01 00 01 00 10 11 01 11 10 00 10 00) |
| Unique word bits (HSN421, HSN422 ...HSN448) |
| (0 0 0 1 0 0 1 0 0 0 0 1 0 0 0 1 1 1 1 0 1 1 1 0 1 1 0 1) |
| Unique word bits (HSN2525, HSN2526 ...HSN2550) |
| (0 0 0 1 0 0 1 0 0 0 1 0 0 0 0 1 1 1 0 1 1 1 0 1 0 0) |
| Unique word bits (HSN4627, HSN4628 ...HSN4654) |
| (0 0 0 1 0 0 1 0 0 0 0 1 0 0 0 1 1 1 1 0 1 1 1 0 1 1 0 1) |

7.4.13.3.7 LDPC coded PNB2(5,12)/Uplink

This burst has 2 340 symbols and 4 680 half symbols, which are transmitted in a twelve-timeslot (20 ms) duration. The channel transmission rate is 117 ksp/s (2 340 symbols/20 ms). The transmission bandwidth is 156,25 kHz. The modulation is $\pi/4$ -QPSK for the header including the first UW. The PRI is modulated with $\pi/4$ -QPSK or 16 APSK. The second, third and fourth UW is modulated with QPSK with a constant $\pi/4$ phase shift. See table 7.30.

Table 7.30: LDPC coded PNB2(5,12)/Uplink definition

| HSN | Length of field in half symbols | Contents of field |
|----------------|---------------------------------|---|
| 0 to 24 | 25 | Guard period in half symbols |
| 25 to 74 | 50 | Unique word |
| 75 to 122 | 48 | Encoded public information (PUI) field c0,...,c23, c0,..., c23 |
| 123 to 132 | 10 | Burst transition (coded as all 1 bits) |
| 133 to 420 | 288 | Encoded bits |
| 421 to 448 | 28 | Unique Word |
| 449 to 2 524 | 2 076 | Encoded bits |
| 2 525 to 2 550 | 26 | Unique Word |
| 2 551 to 4 616 | 2 076 | Encoded bits |
| 4 627 to 4 654 | 28 | Unique Word |
| 4 655 to 4 679 | 25 | Guard period in half symbols |

The unique word pattern for PNB2(5,12) burst is shown in table 7.31.

Table 7.31: LDPC coded PNB2(5,12) unique word definition for PDCH(5,12)/Uplink

| |
|---|
| Unique word bits (HSN25, HSN26 ...HSN74) |
| (00 01 11 10 00 10 11 01 00 01 00 01 00 01 00 01 00 10 11 01 11 10 00 10 00) |
| Unique word bits (HSN421, HSN422 ...HSN448) |
| (0 0 0 1 0 0 1 0 0 0 0 1 0 0 0 1 1 1 1 0 1 1 1 0 1 1 0 1) |
| Unique word bits (HSN2525, HSN2526 ...HSN2550) |
| (0 0 0 1 0 0 1 0 0 0 1 0 0 0 0 1 1 1 0 1 1 1 0 1 0 0) |
| Unique word bits (HSN4627, HSN4628 ...HSN4654) |
| (0 0 0 1 0 0 1 0 0 0 0 1 0 0 0 1 1 1 1 0 1 1 1 0 1 1 0 1) |

7.4.13.3.8 LDPC coded PNB2(5,3)/Downlink

This burst has 585 symbols and 1 170 half symbols, which are transmitted in a three-timeslot (5 ms) duration. The channel transmission rate is 117 ksp/s (585 symbols/5 ms). The transmission bandwidth is 156,25 kHz. The modulation is $\pi/4$ -QPSK for the header including the first UW. The PRI is modulated with $\pi/4$ -QPSK, 16 APSK, or 32 APSK. The second, third and fourth UW is modulated with QPSK with a constant $\pi/4$ phase shift. See table 7.32.

Table 7.32: LDPC coded PNB2(5,3) definition

| HSN | Length of field in half symbols | Contents of field |
|----------------|---------------------------------|---|
| 0 to 24 | 25 | Guard period in half symbols |
| 25 to 74 | 50 | Unique word |
| 75 to 122 | 48 | Encoded public information (PUI) field c0,...,c23, c0,..., c23 |
| 123 to 132 | 10 | Burst transition (coded as all 1 bits) |
| 133 to 420 | 288 | Encoded bits |
| 421 to 448 | 28 | Unique Word |
| 449 to 1 118 | 670 | Encoded bits |
| 1 119 to 1 144 | 26 | Unique Word |
| 1 145 to 1 169 | 25 | Guard period in half symbols |

The unique word pattern for PNB2(5,3) burst is shown in table 7.33.

Table 7.33: LDPC coded PNB2(5,3) unique word definition for PDCH(5,3)

| |
|---|
| Unique word bits (HSN25, HSN26 ...HSN74) |
| (00 01 11 10 00 10 11 01 00 01 00 01 00 01 00 01 00 10 11 01 11 10 00 10 00) |
| Unique word bits (HSN421, HSN422 ...HSN448) |
| (0 0 0 1 0 0 1 0 0 0 0 1 0 0 0 0 1 1 1 1 0 1 1 1 0 1 1 0 1) |
| Unique word bits (HSN1 119, HSN1 120 ...HSN1 144) |
| (0 0 0 1 0 0 1 0 0 0 1 0 0 0 0 1 1 1 0 1 1 1 1 0 1 0 1 0 0) |

7.4.13.3.9 LDPC coded PNB2(5,3)/Uplink

This burst has 585 symbols and 1 170 half symbols, which are transmitted in a three-timeslot (5 ms) duration. The channel transmission rate is 117 ksps (585 symbols/5 ms). The transmission bandwidth is 156,25 kHz. The modulation is $\pi/4$ -QPSK for the header including the first UW. The PRI is modulated with $\pi/4$ -QPSK or 16 APSK. The second, third and fourth UW is modulated with QPSK with a constant $\pi/4$ phase shift. See table 7.34.

Table 7.34: LDPC coded PNB2(5,3)/Uplink definition

| HSN | Length of field in half symbols | Contents of field |
|----------------|---------------------------------|---|
| 0 to 24 | 25 | Guard period in half symbols |
| 25 to 74 | 50 | Unique word |
| 75 to 122 | 48 | Encoded public information (PUI) field c0,...,c23, c0,..., c23 |
| 123 to 132 | 10 | Burst transition (coded as all 1 bits) |
| 133 to 420 | 288 | Encoded bits |
| 421 to 448 | 28 | Unique Word |
| 449 to 1 118 | 670 | Encoded bits |
| 1 119 to 1 144 | 26 | Unique Word |
| 1 145 to 1 169 | 25 | Guard period in half symbols |

The unique word pattern for PNB2(5,3) burst is shown in table 7.35.

Table 7.35: LDPC coded PNB2(5,3) unique word definition for PDCH(5,3)/Uplink

| |
|---|
| Unique word bits (HSN25, HSN26 ...HSN74) |
| (00 01 11 10 00 10 11 01 00 01 00 01 00 01 00 01 00 10 11 01 11 10 00 10 00) |
| Unique word bits (HSN421, HSN422 ...HSN448) |
| (0 0 0 1 0 0 1 0 0 0 0 1 0 0 0 0 1 1 1 1 0 1 1 1 0 1 1 0 1) |
| Unique word bits (HSN1 119, HSN1 120 ...HSN1 144) |
| (0 0 0 1 0 0 1 0 0 0 1 0 0 0 0 1 1 1 0 1 1 1 1 0 1 0 1 0 0) |

Table 7.41: PNB3(5,3)/Uplink definition

| HSN | Length of field in half symbols | Contents of field |
|----------------|---------------------------------|---|
| 0 to 24 | 25 | Guard period in half symbols |
| 25 to 74 | 50 | Unique word |
| 75 to 122 | 48 | Encoded public information (PUI) field c0,...,c23, c0,..., c23 |
| 123 to 132 | 10 | Unique Word (coded as all 1 bits) |
| 133 to 420 | 288 | Encoded bits |
| 421 to 448 | 28 | Unique Word |
| 449 to 1 118 | 670 | Encoded bits |
| 1 119 to 1 144 | 26 | Unique Word |
| 1 145 to 1 169 | 25 | Guard period in half symbols |

The unique word pattern for PNB3(5,3) burst is shown in table 7.42.

Table 7.42: PNB3(5,3) unique word definition for PDCH3(5,3)/Uplink

| |
|---|
| Unique word bits (HSN25, HSN26 ...HSN74) |
| (00 01 11 10 00 10 11 01 00 01 00 01 00 01 00 10 11 01 11 10 00 10 00) |
| Unique word bits (HSN123, HSN124 ...HSN132) |
| (1 1) |
| Unique word bits (HSN421, HSN422 ...HSN448) |
| (0 0 0 1 0 0 1 0 0 0 0 1 0 0 0 1 1 1 1 0 1 1 1 0 1 1 0 1) |
| Unique word bits (HSN1 119, HSN1 120 ...HSN1 144) |
| (0 0 0 1 0 0 1 0 0 0 1 0 0 0 0 1 1 1 0 1 1 1 1 0 1 0 0) |

7.4.13.3.13 PNB3(5,3)/Downlink

This burst has 585 symbols and 1 170 half symbols, which are transmitted in a three-timeslot (5 ms) duration. The channel transmission rate is 117 ksps (585 symbols/5 ms). The transmission bandwidth is 156,25 kHz. The modulation is $\pi/4$ -QPSK for the header including the first and second UW. The PRI is modulated with $\pi/4$ -QPSK or 16 APSK The third and fourth UW is modulated with QPSK with a constant $\pi/4$ phase shift. See table 7.43.

Table 7.43: PNB3(5,3)/Downlink definition

| HSN | Length of field in half symbols | Contents of field |
|----------------|---------------------------------|---|
| 0 to 5 | 5 | Guard period in half symbols |
| 5 to 44 | 40 | Encoded public information (PUI) field c0,..., c39 |
| 45 to 94 | 50 | Unique word |
| 95 to 142 | 48 | Encoded public information (PUI) field c40,...,c87 |
| 143 to 152 | 10 | Unique Word (coded as all 1 bits) |
| 153 to 440 | 288 | Encoded bits |
| 441 to 468 | 28 | Unique Word |
| 469 to 1 138 | 670 | Encoded bits |
| 1 139 to 1 164 | 26 | Unique Word |
| 1 165 to 1 169 | 5 | Guard period in half symbols |

When the burst is carrying a UL-MAP, the burst definition is given in table 7.44.

Table 7.47: PNB3(10,3) Downlink with UL-MAP definition

| HSN | Length of field in half symbols | Contents of field |
|----------------|---------------------------------|--|
| 0 to 4 | 5 | Guard period in half symbols |
| 5 to 44 | 40 | Encoded public information (PUI) field c0,..., c39 |
| 45 to 94 | 50 | Unique word |
| 95 to 142 | 48 | Encoded public information (PUI) field c40,...,c87 |
| 143 to 152 | 10 | Unique Word (coded as all 1 bits) |
| 153 to 172 | 20 | Encoded public information (PUI) field C88,...,c107 |
| 173 to 428 | 256 | UL-MAP field |
| 429 to 728 | 300 | Encoded bits |
| 729 to 756 | 28 | Unique Word |
| 757 to 2 308 | 1 552 | Encoded bits |
| 2 309 to 2 334 | 26 | Unique Word |
| 2 334 to 2 339 | 5 | Guard period in half symbols |

The unique word pattern for PNB3(10,3) burst is shown in table 7.48.

Table 7.48: PNB3(10,3) unique word definition for PDCH3(10,3)

| |
|---|
| Unique word bits (HSN45, HSN46 ...HSN94) |
| (00 01 11 10 00 10 11 01 00 01 00 01 00 01 00 01 00 10 11 01 11 10 00 10 00) |
| Unique word bits (HSN143, HSN144 ...HSN152) |
| (1 1) |
| Unique word bits (HSN729, HSN730 ...HSN756) |
| (0 0 0 1 0 0 1 0 0 0 0 1 0 0 0 1 1 1 1 0 1 1 1 0 1 1 0 1 1 0 1) |
| Unique word bits (HSN2309, HSN2310 ...HSN2334) |
| (0 0 0 1 0 0 1 0 0 0 0 1 0 0 0 0 1 1 1 0 1 1 1 0 1 1 0 1 0 0) |

7.4.13.3.15 PNB3(1,3) Burst

PNB3(1,3) is intended to carry either encoded 2,45 kbps or 4,0 kbps speech or user data. The three-slot PNB3(1,3) burst contains the information shown in table 7.49. Since there are two types of information bits in speech, i.e. perceptually important and perceptually unimportant bits, to maximize interleaving gain the bits are arranged in a specific order. However, for data no such arrangement is required. For 2,45 kbps speech, the 194 encoded bits in the payload {e0,e1,...,e193} are assigned to the 112 perceptually important, {c0,c1,...,c111}, and 82 perceptually unimportant bits {c'0,c'1,...,c'81}, according to following arrangement; {e0,e1,...,e15}={c'0,c'1,...,c'15}, {e16,e17,...,e71}={c0,c1,...,c55}, {e72,e73,...,e121}={c'16,c'17,...,c'65}, {e122,e123,...,e177}={c56,c57,...,c111}, {e178,e179,...,e193}={c'66,c'67,...,c'81}. For 4,0 kbps speech, the arrangements are {e0,e1,...,e15}={c'0,c'1,...,c'15}, {e16,e17,...,e80}={c0,c1,...,c64}, {e81,e82,...,e112}={c'16,c'17,...,c'47}, {e113,e114,...,e177}={c65,c66,...,c129}, {e178,e179,...,e193}={c'48,c'49,...,c'63}. Note that for 4,0 kbps speech the perceptually unimportant bits are not actually encoded or punctured. So {c'0,c'1,...,c'63} refer to the information bits in this particular case.

Table 7.49: PNB3(1,3) burst

| HSN | Length of field in half symbols | Contents of field |
|------------|---------------------------------|------------------------------|
| 0 to 4 | 5 | Guard period in half symbols |
| 5 to 20 | 16 | Encoded bits e0 to e15 |
| 21 to 36 | 16 | Unique word |
| 37 to 198 | 162 | Encoded bits e16 to e177 |
| 199 to 212 | 14 | Unique word |
| 213 to 228 | 16 | Encoded bits e178 to e193 |
| 229 to 233 | 5 | Guard period in half symbols |

The 30-bit unique word pattern is shown in table 7.50. Note that, even though PNB3(1,3) payloads are $\pi/4$ -QPSK modulated, the UWs are only QPSK modulated.

Table 7.50: VoIP PNB3(1,3) burst unique word definition

| Unique word pattern | Unique word bits (HSN21, ...,HSN36; HSN199...HSN212) |
|-------------------------|---|
| 1 (2,45 kbps Speech) | (1 0 1 1 0 1 0 0 0 1 0 0 1 0 1 1 ---0 0 0 1 0 0 1 0 1 1 1 0 0 0) |
| 2 (2,45 kbps User Data) | (0 1 0 0 0 1 0 0 1 0 0 0 1 0 0 0 ---0 0 1 0 1 1 0 1 1 1 0 1 0 0) |
| 3 (4,0 kbps Speech) | (0 1 1 1 0 1 0 0 1 0 1 1 0 1 1 1 ---1 1 1 0 1 1 1 0 0 0 1 0 0 0) |
| 4 (4,0 kbps User Data) | (0 1 0 0 0 1 1 1 0 1 1 1 1 0 1 1 ---1 1 0 1 1 1 0 1 1 1 1 0 1 1) |

7.4.13.3.16 PNB3(1,6) burst

PNB3(1,6) is intended to carry either encoded 2,45 kbps or 4,0 kbps speech or user data. The PNB3(1,6) burst is either modulated by $\pi/2$ -BPSK or $\pi/4$ -QPSK. For 2,45 kbps speech, the 198 encoded bits in the payload {e0,e1,...,e197} are assigned to the 114 perceptually important, {c0,c1,...,c113}, and 84 perceptually unimportant bits {c'0,c'1,...,c'83}, according to following arrangement; {e0,e1,...,e7}={c'0,c'1,...,c'7}, {e8,e9,...,e35}={c0,c1,...,c27}, {e36,e37,...,e69}={c'8,c'9,...,c'41}, {e70,e71,...,e98}={c28,c29,...,c56}, {e99,e100,...,e127}={c57,c58,...,c85}, {e128,e129,...,e161}={c'42,c'43,...,c'75}, {e162,e163,...,e189}={c86,c87,...,c113}, {e190,e191,...,e197}={c'76,c'77,...,c'83}.

The six-slot $\pi/2$ -BPSK modulated PNB3(1,6) burst contains the information shown in table 7.51.

Table 7.51: PNB3(1,6) $\pi/2$ BPSK burst definition

| HSN | Length of field in half symbols | Contents of field |
|------------|---------------------------------|------------------------------|
| 0 to 4 | 5 | Guard period in half symbols |
| 5 to 20 | 16 | Encoded bits e0 to e7 |
| 21 to 40 | 20 | Unique word |
| 41 to 222 | 182 | Encoded bits e8 to e98 |
| 223 to 244 | 22 | Unique word |
| 245 to 426 | 182 | Encoded bits e99 to e189 |
| 427 to 446 | 20 | Unique word |
| 447 to 462 | 16 | Encoded bits e190 to e197 |
| 463 to 467 | 5 | Guard period in half symbols |

Where two 62-bit unique word patterns are defined for the $\pi/2$ -BPSK modulated PNB3(1,6) burst, as shown in table 7.52. For PNB3(1,6) 2,45 kbps burst, $\pi/2$ -BPSK modulation is applied across the whole burst including the unique words.

Table 7.52: PNB3(1,6) $\pi/2$ BPSK burst unique word definition

| Unique word pattern | Unique word bits (HSN21, HSN22 ...HSN40; HSN223 ... HSN244; HSN427, ..., HSN446) |
|-------------------------|--|
| 1 (2,45 kbps Speech) | (1 0 0 1 1 0 0 1 1 0---1 0 0 1 1 0 0 1 1 0 0----1 0 0 1 1 0 0 1 1 0) |
| 2 (2,45 kbps User Data) | (1 1 1 0 1 0 1 0 0 0---1 0 1 0 0 0 0 1 1 1 0 1----1 1 1 0 1 0 1 0 0 0) |

Table 7.56: PNB3(1,8) burst unique word definition

| Unique word pattern | Unique word bits (HSN21, HSN22 ...HSN36; HSN301 ... HSN322; HSN587, ..., HSN602) |
|---------------------|--|
| 1 (Speech) | (1 0 0 0 1 1 1 0 ---- 1 0 0 1 1 0 0 1 1 0 0 ---- 1 0 0 0 1 1 1 0) |
| 2 (User Data) | (0 0 1 1 0 1 1 0 ---- 1 0 1 0 0 0 1 1 1 0 1 ---- 0 0 1 1 0 1 1 0) |

7.4.13.3.18 PNB3(2,6)

This burst has 468 symbols and 936 half symbols, which are transmitted in a six to timeslot (10 ms) duration. The channel transmission rate is 46,8 kbps (468 symbols/10 ms). The transmission bandwidth is 62,5 kHz. The modulation is $\pi/4$ -QPSK.

The PNB3(2,6) uplink burst structure is defined in table 7.57.

Table 7.57: PNB3(2,6) Uplink definition and UW Patterns

| HSN | Length of field in half symbols | Contents of field |
|------------|---------------------------------|---|
| 0 to 9 | 10 | Guard period in half symbols |
| 10 to 27 | 18 | Unique word (00 01 11 01 00 10 00 10 00) |
| 28 to 75 | 48 | Encoded public information (PUI) field c0,...,c23, c0,..., c23 |
| 76 to 93 | 18 | Unique word (00 01 11 01 00 10 00 10 00) |
| 94 to 494 | 400 | Encoded bits e0 to e399 |
| 494 to 509 | 16 | Unique word (00 01 11 01 00 10 00 10) |
| 510 to 909 | 400 | Encoded bits e400 to e799 |
| 910 to 925 | 16 | Unique word (00 01 11 01 00 10 00 10) |
| 926 to 935 | 10 | Guard period in half symbols |

The PNB3(2,6) downlink burst structure is defined in table 7.58.

Table 7.58: PNB3(2,6) Downlink definition and UW Patterns

| HSN | Length of field in half symbols | Contents of field |
|------------|---------------------------------|--|
| 0 to 4 | 5 | Guard period in half symbols |
| 5 to 22 | 18 | Unique word (00 01 11 01 00 10 00 10 00) |
| 23 to 102 | 80 | Encoded public information (PUI3) field c0,...,c39, c0,..., c39 |
| 103 to 120 | 18 | Unique word (00 01 11 01 00 10 00 10 00) |
| 121 to 510 | 390 | Encoded bits e0 to e389 |
| 511 to 526 | 16 | Unique word (00 01 11 01 00 10 00 10) |
| 527 to 914 | 388 | Encoded bits e390 to e778 |
| 915 to 930 | 16 | Unique word (00 01 11 01 00 10 00 10) |
| 931 to 935 | 5 | Guard period in half symbols |

7.4.14 Packet Access Burst (PAB)

PAB has 8 byte information, PAB3 has 5 byte information.

The PAB has an 8-byte information field (64 bits) and is coded with K=7 convolutional code and PAB3 has a 5-byte information field (40 bits) and is coded with K=9 convolutional code. The information field of both PAB and PAB3 is encoded to 106 bits. The encoded bits, the CW, the UW bits and the guard bits form a total of 234 bits. The PAB and PAB3 use $\pi/4$ -QPSK modulation, in which two bits are mapped to one symbol. Thus, the PAB and PAB3 have 117 symbols transmitted at 23,4 ksps (117 symbols/5 ms). The transmission bandwidth is 31,25 kHz.

For additional details concerning the coding and the modulation of the PAB and PAB3, see GMR-1 3G 45.003 [4] and GMR-1 3G 45.004 [5], respectively. See table 7.59 for the burst format definition.

Table 7.59: PAB and PAB3 burst definition

| HSN | Length of field in half symbols | Contents of field |
|------------|---------------------------------|------------------------------|
| 0 to 15 | 16 | Guard period in half symbols |
| 16 to 47 | 32 | CW (coded as all 1 bits) |
| 48 to 59 | 12 | Unique word |
| 60 to 111 | 52 | Encoded bits e0 to e51 |
| 112 to 143 | 32 | CW (coded as all 1 bits) |
| 144 to 155 | 12 | Unique word |
| 156 to 209 | 54 | Encoded bits e52 to e105 |
| 210 to 217 | 8 | CW (coded as all 1 bits) |
| 218 to 233 | 16 | Guard period in half symbols |

The 12-bit Unique Word pattern is shown in table 7.60, which is common for both PAB and PAB3.

Table 7.60: PAB and PAB3 unique word definition

| |
|--|
| Unique word bits (HSN48, HSN49,...,HSN59) |
| Unique word bits (HSN144, HSN145,...,HSN155) |
| (00 00 11 00 11 10) |

7.4.15 Packet Keep-Alive Burst (PKAB)

The PKAB burst formats are the same as PNB(m,n) formats, except the PRI portion is not transmitted (no power). The PKAB burst formats corresponding to PNB(4,3) and PNB(5,3) are shown in tables 7.61 and 7.62 respectively.

Table 7.61: PKAB regarding PNB(4,3) definition

| HSN | Length of field in half symbols | Contents of field |
|------------|---------------------------------|---|
| 0 to 19 | 20 | Guard period in half symbols |
| 20 to 59 | 40 | Unique word |
| 60 to 107 | 48 | Encoded public information (PUI) field c0,...,c23, c0,..., c23 |
| 108 to 115 | 8 | Burst transition (coded as all 1 bits) |
| 116 to 907 | 792 | No transmission |
| 908 to 915 | 8 | Tail (coded as all 1 bits) |
| 916 to 935 | 20 | Guard period in half symbols |

Table 7.62: PKAB regarding PNB(5,3) definition

| HSN | Length of field in half symbols | Contents of field |
|----------------|---------------------------------|---|
| 0 to 24 | 25 | Guard period in half symbols |
| 25 to 74 | 50 | Unique word |
| 75 to 122 | 48 | Encoded public information (PUI) field c0,...,c23, c0,..., c23 |
| 123 to 132 | 10 | Burst transition (coded as all 1 bits) |
| 133 to 1 134 | 1 002 | No transmission |
| 1 135 to 1 144 | 10 | Tail (coded as all 1 bits) |
| 1 145 to 1 169 | 25 | Guard period in half symbols |

The PKAB burst format corresponding to PNB(2,6) is shown in table 7.34. The PKAB burst corresponding to PNB(2,6) comprises of two unique words separated by encoded PUI as shown in table 7.63.

Table 7.63: PKAB regarding PNB(2,6) definition

| HSN | Length of field in half symbols | Contents of Field |
|------------|---------------------------------|---|
| 0 to 4 | 5 | Guard period in half symbols |
| 5 to 22 | 18 | Unique word |
| 23 to 70 | 48 | Encoded public information (PUI) field c0,...,c23, c0,..., c23 |
| 71 to 88 | 18 | Unique word |
| 89 to 930 | 842 | No transmission |
| 931 to 935 | 5 | Guard period in half symbols |

The PKAB3 burst format corresponding to PNB3(2,6) is shown in table 7.34b. The PKAB burst corresponding to PNB3(2,6) comprises of two unique words separated by encoded PUI3 as shown in table 7.64.

Table 7.64: PKAB3 regarding PNB3(2,6) definition

| HSN | Length of field in half symbols | Contents of field |
|------------|---------------------------------|--|
| 0 to 4 | 5 | Guard period in half symbols |
| 5 to 22 | 18 | Unique word |
| 23 to 102 | 80 | Encoded public information (PUI3) field c0,...,c39, c0,..., c39 |
| 103 to 120 | 18 | Unique word |
| 121 to 930 | 810 | No transmission |
| 931 to 935 | 5 | Guard period in half symbols |

The PKAB3 burst format corresponding to PNB(1,6) is shown in table 7.34c. The PKAB3 burst corresponding to PNB(1,6) comprises of two unique words separated by encoded PUI as shown in table 7.65.

Table 7.65: PKAB3(1,6) definition

| HSN | Length of field in half symbols | Contents of field |
|------------|---------------------------------|---|
| 0 to 4 | 5 | Guard period in half symbols |
| 5 to 18 | 14 | Unique word - UW1 |
| 19 to 66 | 48 | Encoded public information (PUI) field c0,...,c23, c0,..., c23 |
| 67 to 226 | 160 | No transmission |
| 227 to 242 | 16 | Unique word - UW2 |
| 243 to 462 | 220 | No transmission |
| 463 to 467 | 5 | Guard period in half symbols |

The PKAB3 burst format corresponding to PNB3(5,3) is shown in table 7.66.

Table 7.66: PKAB3(5,3) definition

| HSN | Length of field in half symbols | Contents of field |
|----------------|---------------------------------|---|
| 0 to 5 | 5 | Guard period in half symbols |
| 5 to 44 | 40 | Encoded public information (PUI) field c0,..., c39 |
| 45 to 94 | 50 | Unique word |
| 95 to 142 | 48 | Encoded public information (PUI) field c40,...,c87 |
| 143 to 152 | 10 | Unique Word (coded as all 1 bits) |
| 153 to 280 | 128 | UL-MAP field |
| 281 to 440 | 160 | No transmission |
| 441 to 468 | 28 | Unique Word |
| 469 to 1 138 | 670 | No transmission |
| 1 139 to 1 164 | 26 | No transmission |
| 1 165 to 1 169 | 5 | Guard period in half symbols |

The PKAB3 burst format corresponding to PNB3(10,3) is shown in table 7.67.

Table 7.67: PKAB3(10,3) definition

| HSN | Length of field in half symbols | Contents of field |
|----------------|---------------------------------|--|
| 0 to 4 | 5 | Guard period in half symbols |
| 5 to 44 | 40 | Encoded public information (PUI) field c0,..., c39 |
| 45 to 94 | 50 | Unique word |
| 95 to 142 | 48 | Encoded public information (PUI) field c40,...,c87 |
| 143 to 152 | 10 | Unique Word (coded as all 1 bits) |
| 153 to 172 | 20 | Encoded public information (PUI) field c88,...,c107 |
| 173 to 428 | 256 | UL-MAP field |
| 429 to 728 | 300 | No transmission |
| 729 to 756 | 28 | Unique Word |
| 757 to 2 308 | 1 552 | No transmission |
| 2 309 to 2 334 | 26 | No transmission |
| 2 335 to 2 339 | 5 | Guard period in half symbols |

7.4.16 DC12 burst

The twelve-slot $\pi/2$ -BPSK modulated downlink control (DC12) burst contains the information shown in table 7.68.

Table 7.68: DC12 burst definition and UW patterns

| HSN | Length of field in half symbols | Contents of field |
|------------|---------------------------------|---|
| 0 to 4 | 5 | Guard period in half symbols |
| 5 to 20 | 16 | Encoded bits e0 to e7 |
| 21 to 40 | 20 | Unique word: [0, 0, 1, 0, 0, 0, 1, 1, 1, 1] |
| 41 to 456 | 416 | Encoded bits e8 to e215 |
| 457 to 478 | 22 | Unique word [0, 0, 1, 0, 0, 0, 1, 1, 1, 0, 1] |
| 479 to 894 | 416 | Encoded bits e216 to e423 |
| 895 to 914 | 20 | Unique word: [0, 0, 1, 0, 0, 0, 1, 1, 1, 1] |
| 915 to 930 | 16 | Encoded bits e424 to e431 |
| 931 to 935 | 5 | Guard period in half symbols |

8 Logical-physical channel mapping

8.1 General

Same as clause 8.1 in GMR-1 05.002 [10].

8.1.1 Frequency-domain description

Same as clause 8.1.1 in GMR-1 05.002 [10].

8.1.2 Time-domain description

8.1.2.1 Physical channels

Same as clause 8.1.2.1 in GMR-1 05.002 [10].

8.1.2.2 Logical channels

Same as clause 8.1.2.2 in GMR-1 05.002 [10].

8.2 Physical Channel (PC) types and names

Same as clause 8.2 in GMR-1 05.002 [10], with the following additional physical channels:

- PC12d a physical channel with a length of 12 timeslots for use only by the downlink.

8.3 Logical channel parameters

Same as clause 8.3 in GMR-1 05.002 [10] with the following additions:

Table 8.1a: Summary of logical channel parameters

| Channel designation | Direction | Burst type | Modulation type | Timeslots per burst | Frame assignment |
|---------------------|-----------|------------|-----------------|---------------------|----------------------|
| FCCH3 | D | FCCH3 | Dual Chirp | 12 | See sys. Info. Cycle |
| BCCH | D | DC12 | $\pi/2$ -BPSK | 12 | See sys. Info. Cycle |
| PCH | D | DC12 | $\pi/2$ -BPSK | 12 | See sys. Info. Cycle |
| AGCH | D | DC12 | $\pi/2$ -BPSK | 12 | See sys. Info. Cycle |
| GBCH3 | D | DC12 | $\pi/2$ -BPSK | 12 | All |
| RACH3 | U | RACH3 | $\pi/2$ -BPSK | 9 | All |

NOTE: Use of FCCH3 or FCCH is a network implementation choice. If FCCH3 used then RACH3 and DC12, carrying BCCH, PCH, GBCH3 and AGCH shall always be used.

8.4 Permitted channel configurations

Same as clause 8.4 in GMR-1 05.002 [10] with the following additions:

Table 8.2a: Permitted channel configurations

| Config. number | Physical channel type | Logical channel configuration |
|----------------|-----------------------|--|
| 13 | PC12d | FCCH3 + BCCH + CCCH (PCH + BACH + AGCH) + GBCH3 This channel configuration is also known as a BCCH/CCCH |
| 14 | PC12d | CCCH (PCH + BACH + AGCH) This channel configuration is also known as a "normal CCCH" |
| 15 | PC12d | CCCH (AGCH) This channel configuration is also known as an AGCH/CCCH |
| 16 | PC12u | RACH3 |

8.5 Logical channel frame sequencing concepts

Same as clause 8.5 in GMR-1 05.002 [10].

8.5.1 Simple frame sequence

Same as clause 8.5.1 in GMR-1 05.002 [10].

8.5.1.1 Simple frame sequence subchannels

Same as clause 8.5.1.1 in GMR-1 05.002 [10].

8.5.2 Simple paired-frame sequence

Same as clause 8.5.2 in GMR-1 05.002 [10].

8.5.2.1 Simple paired-frame sequence subchannels

Same as clause 8.5.2.1 in GMR-1 05.002 [10].

8.5.3 Configured paired-frame sequence

Same as clause 8.5.3 in GMR-1 05.002 [10].

8.5.3.1 CBCH configuration

Same as clause 8.5.3.1 in GMR-1 05.002 [10].

8.5.4 Statistically multiplexed paired-frame sequence

Same as clause 8.5.4 in GMR-1 05.002 [10].

8.5.4.1 Pool size

Same as clause 8.5.4.1 in GMR-1 05.002 [10].

8.5.4.2 Statistically multiplexed paired-frame sequence subchannels

Same as clause 8.5.4.2 in GMR-1 05.002 [10].

8.5.4.3 Example using SDCCH

Same as clause 8.5.4.3 in GMR-1 05.002 [10].

8.5.5 System information cycle sequencing

Same as clause 8.5.5 in GMR-1 05.002 [10].

8.5.5.1 Physical-Channel-Relative Timeslot Number (PCRTN)

Same as clause 8.5.5.1 in GMR-1 05.002 [10].

8.5.5.2 System-Information-Relative Frame Number (SIRFN)

Same as clause 8.5.5.2 in GMR-1 05.002 [10].

8.5.5.3 Graphical representation of system information cycle timeslots

Same as clause 8.5.5.3 in GMR-1 05.002 [10].

8.6 Mapping of logical channels to BCCH/CCCH

Same as clause 8.6 in GMR-1 05.002 [10].

8.6.1 Fixed reserved-slot logical channels

Same as clause 8.6.1 in GMR-1 05.002 [10].

8.6.1.1 FCCH

Same as clause 8.6.1.1 in GMR-1 05.002 [10].

8.6.1.1a FCCH3

Each system information cycle has eight FCCH3 bursts.

The FCCH3 burst positions are at:

| | | | |
|-------------|--------------|--------------|--------------|
| (0, 0, 12), | (16, 0, 12), | (32, 0, 12), | (48, 0, 12), |
| (8, 0, 12), | (24, 0, 12), | (40, 0, 12), | (56, 0, 12). |

8.6.1.2 CICH

Same as clause 8.6.1.2 in GMR-1 05.002 [10].

8.6.1.3 BCCH

Same as clause 8.6.1.3 in GMR-1 05.002 [10], with the following additions for BCCH when mapped to the DC12 burst.

DC12 bursts carrying the BCCH occur at the following ordered triples:

| | | | |
|--------------|--------------|--------------|--------------|
| (2, 0, 12), | (18, 0, 12), | (34, 0, 12), | (50, 0, 12), |
| (10, 0, 12), | (26, 0, 12), | (42, 0, 12), | (58, 0, 12). |

System information cycle when FCCH3 is used is shown in table 8.7a.

Table 8.7a: Fixed bursts in BCCH3/CCCH3 when mapped to PC12d

| S I R F N | PC12d-2 PCRTN | | | | | | | | | | | |
|-----------------------|------------------|---|---|---|---|---|---|---|---|---|----|----|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 11 | 11 |
| 0 | FCCH3 | | | | | | | | | | | |
| 1 | | | | | | | | | | | | |
| 2 | BCCH | | | | | | | | | | | |
| 3 | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | |
| 8 | FCCH3 | | | | | | | | | | | |
| 9 | | | | | | | | | | | | |
| 10 | BCCH | | | | | | | | | | | |
| 11 | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | |
| 13 | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | |

| S I R F N | PC12d-2 PCRTN | | | | | | | | | | | |
|-----------------------|------------------|---|---|---|---|---|---|---|---|---|----|----|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 11 | 11 |
| 16 | FCCH3 | | | | | | | | | | | |
| 17 | | | | | | | | | | | | |
| 18 | BCCH | | | | | | | | | | | |
| 19 | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | |
| 21 | | | | | | | | | | | | |
| 22 | | | | | | | | | | | | |
| 23 | | | | | | | | | | | | |
| 24 | FCCH3 | | | | | | | | | | | |
| 25 | | | | | | | | | | | | |
| 26 | BCCH | | | | | | | | | | | |
| 27 | | | | | | | | | | | | |
| 28 | | | | | | | | | | | | |
| 29 | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | |
| 31 | | | | | | | | | | | | |

| S I R F N | PC12d-2 PCRTN | | | | | | | | | | | |
|-----------------------|------------------|---|---|---|---|---|---|---|---|---|----|----|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 11 | 11 |
| 32 | FCCH3 | | | | | | | | | | | |
| 33 | | | | | | | | | | | | |
| 34 | BCCH | | | | | | | | | | | |
| 35 | | | | | | | | | | | | |
| 36 | | | | | | | | | | | | |
| 37 | | | | | | | | | | | | |
| 38 | | | | | | | | | | | | |
| 39 | | | | | | | | | | | | |
| 40 | FCCH3 | | | | | | | | | | | |
| 41 | | | | | | | | | | | | |
| 42 | BCCH | | | | | | | | | | | |
| 43 | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | |
| 45 | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | |
| 47 | | | | | | | | | | | | |

| S I R F N | PC12d-2 PCRTN | | | | | | | | | | | |
|-----------------------|------------------|---|---|---|---|---|---|---|---|---|----|----|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 11 | 11 |
| 48 | FCCH | | | | | | | | | | | |
| 49 | | | | | | | | | | | | |
| 50 | BCCH | | | | | | | | | | | |
| 51 | | | | | | | | | | | | |
| 52 | | | | | | | | | | | | |
| 53 | | | | | | | | | | | | |
| 54 | | | | | | | | | | | | |
| 55 | | | | | | | | | | | | |
| 56 | FCCH3 | | | | | | | | | | | |
| 57 | | | | | | | | | | | | |
| 58 | BCCH | | | | | | | | | | | |
| 59 | | | | | | | | | | | | |
| 60 | | | | | | | | | | | | |
| 61 | | | | | | | | | | | | |
| 62 | | | | | | | | | | | | |
| 63 | | | | | | | | | | | | |

8.6.2 Optional reserved-slot logical channels

Same as clause 8.6.2 in GMR-1 05.002 [10] with the following illustration (see table 8.8a) when FCCH3 and DC12 are used.

Table 8.8a: Reserved logical channel bursts in a BCCH3/CCCH3 when mapped to PC12d

| S I R | PC12d PCRTN | | | | | | | | | | | | | |
|-------------|----------------|---|---|---|---|---|---|---|---|---|---|----|---|---|
| | F | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 11 | N | 0 |
| 0 | FCCH3 | | | | | | | | | | | | | |
| 1 | GBCH3 | | | | | | | | | | | | | |
| 2 | BCCH | | | | | | | | | | | | | |
| 3 | PCH0 | | | | | | | | | | | | | |
| 4 | B | B | B | B | B | B | B | B | B | B | B | B | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C |
| | C | C | C | C | C | C | C | C | C | C | C | C | H | H |
| | H | H | H | H | H | H | H | H | H | H | H | H | 4 | 4 |
| | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 5 | GBCH3 | | | | | | | | | | | | | |
| 6 | B | B | B | B | B | B | B | B | B | B | B | B | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C |
| | C | C | C | C | C | C | C | C | C | C | C | C | H | H |
| | H | H | H | H | H | H | H | H | H | H | H | H | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | | | | | | | | | | | | | | |
| 8 | FCCH3 | | | | | | | | | | | | | |
| 9 | GBCH3 | | | | | | | | | | | | | |
| 10 | BCCH | | | | | | | | | | | | | |
| 11 | PCH1 | | | | | | | | | | | | | |
| 12 | B | B | B | B | B | B | B | B | B | B | B | B | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C |
| | C | C | C | C | C | C | C | C | C | C | C | C | H | H |
| | H | H | H | H | H | H | H | H | H | H | H | H | 2 | 2 |
| | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 13 | GBCH3 | | | | | | | | | | | | | |
| 14 | B | B | B | B | B | B | B | B | B | B | B | B | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C |
| | C | C | C | C | C | C | C | C | C | C | C | C | H | H |
| | H | H | H | H | H | H | H | H | H | H | H | H | 6 | 6 |
| | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| 15 | B | B | B | B | B | B | B | B | B | B | B | B | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C |
| | C | C | C | C | C | C | C | C | C | C | C | C | H | H |
| | H | H | H | H | H | H | H | H | H | H | H | H | 1 | 1 |
| | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 16 | FCCH3 | | | | | | | | | | | | | |
| 17 | GBCH3 | | | | | | | | | | | | | |
| 18 | BCCH | | | | | | | | | | | | | |
| 19 | PCH0 | | | | | | | | | | | | | |
| 20 | B | B | B | B | B | B | B | B | B | B | B | B | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C |
| | C | C | C | C | C | C | C | C | C | C | C | C | H | H |
| | H | H | H | H | H | H | H | H | H | H | H | H | 4 | 4 |
| | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 21 | GBCH3 | | | | | | | | | | | | | |
| 22 | B | B | B | B | B | B | B | B | B | B | B | B | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C |
| | C | C | C | C | C | C | C | C | C | C | C | C | H | H |
| | H | H | H | H | H | H | H | H | H | H | H | H | 5 | 5 |
| | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 23 | | | | | | | | | | | | | | |
| 24 | FCCH3 | | | | | | | | | | | | | |
| 25 | GBCH3 | | | | | | | | | | | | | |
| 26 | BCCH | | | | | | | | | | | | | |
| 27 | PCH1 | | | | | | | | | | | | | |
| 28 | B | B | B | B | B | B | B | B | B | B | B | B | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C |
| | C | C | C | C | C | C | C | C | C | C | C | C | H | H |
| | H | H | H | H | H | H | H | H | H | H | H | H | 2 | 2 |
| | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 29 | GBCH3 | | | | | | | | | | | | | |
| 30 | B | B | B | B | B | B | B | B | B | B | B | B | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C |
| | C | C | C | C | C | C | C | C | C | C | C | C | H | H |
| | H | H | H | H | H | H | H | H | H | H | H | H | 7 | 7 |
| | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |
| 31 | B | B | B | B | B | B | B | B | B | B | B | B | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C |
| | C | C | C | C | C | C | C | C | C | C | C | C | H | H |
| | H | H | H | H | H | H | H | H | H | H | H | H | 1 | 1 |
| | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 3 |
| 32 | FCCH3 | | | | | | | | | | | | | |
| 33 | GBCH3 | | | | | | | | | | | | | |
| 34 | BCCH | | | | | | | | | | | | | |
| 35 | PCH0 | | | | | | | | | | | | | |
| 36 | B | B | B | B | B | B | B | B | B | B | B | B | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C |
| | C | C | C | C | C | C | C | C | C | C | C | C | H | H |
| | H | H | H | H | H | H | H | H | H | H | H | H | 4 | 4 |
| | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 0 | 0 |
| 37 | GBCH3 | | | | | | | | | | | | | |
| 38 | B | B | B | B | B | B | B | B | B | B | B | B | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C |
| | C | C | C | C | C | C | C | C | C | C | C | C | H | H |
| | H | H | H | H | H | H | H | H | H | H | H | H | 5 | 5 |
| | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 39 | | | | | | | | | | | | | | |
| 40 | FCCH3 | | | | | | | | | | | | | |
| 41 | GBCH3 | | | | | | | | | | | | | |
| 42 | BCCH | | | | | | | | | | | | | |
| 43 | PCH1 | | | | | | | | | | | | | |
| 44 | B | B | B | B | B | B | B | B | B | B | B | B | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C |
| | C | C | C | C | C | C | C | C | C | C | C | C | H | H |
| | H | H | H | H | H | H | H | H | H | H | H | H | 6 | 6 |
| | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| 45 | GBCH3 | | | | | | | | | | | | | |
| 46 | B | B | B | B | B | B | B | B | B | B | B | B | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C |
| | C | C | C | C | C | C | C | C | C | C | C | C | H | H |
| | H | H | H | H | H | H | H | H | H | H | H | H | 7 | 7 |
| | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |
| 47 | B | B | B | B | B | B | B | B | B | B | B | B | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C |
| | C | C | C | C | C | C | C | C | C | C | C | C | H | H |
| | H | H | H | H | H | H | H | H | H | H | H | H | 3 | 3 |
| | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| 48 | FCCH3 | | | | | | | | | | | | | |
| 49 | GBCH3 | | | | | | | | | | | | | |
| 50 | BCCH | | | | | | | | | | | | | |
| 51 | PCH0 | | | | | | | | | | | | | |
| 52 | B | B | B | B | B | B | B | B | B | B | B | B | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C |
| | C | C | C | C | C | C | C | C | C | C | C | C | H | H |
| | H | H | H | H | H | H | H | H | H | H | H | H | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 53 | GBCH3 | | | | | | | | | | | | | |
| 54 | B | B | B | B | B | B | B | B | B | B | B | B | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C |
| | C | C | C | C | C | C | C | C | C | C | C | C | H | H |
| | H | H | H | H | H | H | H | H | H | H | H | H | 5 | 5 |
| | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 2 | 2 |
| 55 | | | | | | | | | | | | | | |
| 56 | FCCH3 | | | | | | | | | | | | | |
| 57 | GBCH3 | | | | | | | | | | | | | |
| 58 | BCCH | | | | | | | | | | | | | |
| 59 | PCH1 | | | | | | | | | | | | | |
| 60 | B | B | B | B | B | B | B | B | B | B | B | B | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C |
| | C | C | C | C | C | C | C | C | C | C | C | C | H | H |
| | H | H | H | H | H | H | H | H | H | H | H | H | 6 | 6 |
| | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| 61 | GBCH3 | | | | | | | | | | | | | |
| 62 | B | B | B | B | B | B | B | B | B | B | B | B | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C |
| | C | C | C | C | C | C | C | C | C | C | C | C | H | H |
| | H | H | H | H | H | H | H | H | H | H | H | H | 1 | 1 |
| | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 63 | B | B | B | B | B | B | B | B | B | B | B | B | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C |
| | C | C | C | C | C | C | C | C | C | C | C | C | H | H |
| | H | H | H | H | H | H | H | H | H | H | H | H | 3 | 3 |
| | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |

8.6.2.1 PCH

Same as clause 8.6.2.1 in GMR-1 05.002 [10] with the following additions.

When FCCH3 is used, the potential PCH bursts of every BCCH/CCCH and normal CCCHs are organized into either two or four paging groups, identified as PCH0 and PCH1 or PCH0, PCH1, PCH2 and PCH3. A PCH message is not transmitted if there are no pages for any MESs in a paging group. Every BCCH/CCCH and normal CCCH reserves the timeslots of at least one of these paging groups for PCH bursts, based on the value of the BCCH parameters SA_PCH_CONFIG and SA_PCH_CONFIG_ext, as follows in table 8.9b.

Table 8.9b: Paging groups reserved by SA_PCH_CONFIG

| SA_PCH_CONFIG value | SA_PCH_CONFIG_ext value | Paging cycle | Reserved paging groups | SA_PCH_GROUPS |
|---------------------|-------------------------|--------------|----------------------------|---------------|
| 01 | 0 | 640 ms | PCH0 | 1 |
| 10 | 0 | 640 ms | PCH1 | 1 |
| 11 | 0 | 640 ms | PCH0 and PCH1 | 2 |
| 01 | 1 | 1 280 ms | PCH0 | 1 |
| 10 | 1 | 1 280 ms | PCH1 | 1 |
| 11 | 1 | 1 280 ms | PCH0 and PCH1 | 2 |
| 00 | 1 | 1 280 ms | PCH0, PCH1, PCH2, and PCH3 | 4 |

When FCCH3 is used, PCH shall always use a DC12 burst. PCH bursts occur at the following ordered triples:

When SA_PCH_CONFIG_ext = 0

For PCH0 paging group:

(3, 0, 12), (19, 0, 12), (35, 0, 12) and (51, 0, 12).

For PCH1 paging group:

(11, 0, 12), (27, 0, 12), (43, 0, 12) and (59, 0, 12).

And when SA_PCH_CONFIG_ext = 1

For PCH0 paging group:

(3, 0, 12), and (35, 0, 12)

For PCH1 paging group:

(11, 0, 12), and (43, 0, 12)

For PCH2 paging group:

(19, 0, 12) and (51, 0, 12).

For PCH3 paging group:

(27, 0, 12), and (59, 0, 12).

Assignment of MESs to paging groups is described later, in clause 9.7.2.

8.6.2.2 BACH (A/Gb mode only)

Same as clause 8.6.2.2 in GMR-1 05.002 [10] with the following modifications:

Table 8.11: Bursts corresponding to alerting groups in correspondence with FCCH3

| Alerting Group | Bursts |
|----------------|--|
| BACH0 | (6, 0, 2), (6, 2, 2), (6, 4, 2), (6, 6, 2), (6, 8, 2), (6, 10, 2), (36, 0, 2), (36, 2, 2), (36, 4, 2), (52, 0, 2), (52, 2, 2), (52, 4, 2), (52, 6, 2), (52, 8, 2), (52, 10, 2) |
| BACH1 | (15, 0, 2), (15, 2, 2), (15, 4, 2), (15, 6, 2), (15, 8, 2), (15, 10, 2), (31, 0, 2), (31, 2, 2), (31, 4, 2), (62, 0, 2), (62, 2, 2), (62, 4, 2), (62, 6, 2), (62, 8, 2), (62, 10, 2) |
| BACH2 | (12, 0, 2), (12, 2, 2), (12, 4, 2), (12, 6, 2), (12, 8, 2), (12, 10, 2), (28, 0, 2), (28, 2, 2), (28, 4, 2), (28, 6, 2), (28, 8, 2), (28, 10, 2), (54, 0, 2), (54, 2, 2), (54, 4, 2) |
| BACH3 | (31, 0, 2), (31, 2, 2), (31, 4, 2), (47, 0, 2), (47, 2, 2), (47, 4, 2), (47, 6, 2), (47, 8, 2), (47, 10, 2), (63, 0, 2), (63, 2, 2), (63, 4, 2), (63, 6, 2), (63, 8, 2), (63, 10, 2) |
| BACH4 | (4, 0, 2), (4, 2, 2), (4, 4, 2), (4, 6, 2), (4, 8, 2), (4, 10, 2), (20, 0, 2), (20, 2, 2), (20, 4, 2), (20, 6, 2), (20, 8, 2), (20, 10, 2), (36, 0, 2), (36, 2, 2), (36, 4, 2) |
| BACH5 | (22, 0, 2), (22, 2, 2), (22, 4, 2), (22, 6, 2), (22, 8, 2), (22, 10, 2), (38, 0, 2), (38, 2, 2), (38, 4, 2), (38, 6, 2), (38, 8, 2), (38, 10, 2), (54, 0, 2), (54, 2, 2), (54, 4, 2) |
| BACH6 | (14, 0, 2), (14, 2, 2), (14, 4, 2), (44, 0, 2), (44, 2, 2), (44, 4, 2), (44, 6, 2), (44, 8, 2), (44, 10, 2), (60, 0, 2), (60, 2, 2), (60, 4, 2), (60, 6, 2), (60, 8, 2), (60, 10, 2) |
| BACH7 | (14, 0, 2), (14, 2, 2), (14, 4, 2), (30, 0, 2), (30, 2, 2), (30, 4, 2), (30, 6, 2), (30, 8, 2), (30, 10, 2), (46, 0, 2), (46, 2, 2), (46, 4, 2), (46, 6, 2), (46, 8, 2), (46, 10, 2) |

8.6.3 Unreserved-slot logical channels

Same as clause 8.6.3 in GMR-1 05.002 [10] with the following additions.

When FCCH3 is used AGCH shall always be mapped to a DC12 burst on the PC12d physical channel.

AGCH can use any of the PC12d frames that are unreserved due to the PCH or BACH channel configuration parameters in BCCH/CCCH.

AGCH can also use any of the PC12d frames that are optionally reserved, if the optionally-reserved-timeslot logical channel has no information to send in that frame.

8.7 Mapping of logical channels to normal CCCH

Same as clause 8.7 in GMR-1 05.002 [10] with the following illustration (see table 8.12a) of reserved channels when normal CCCH is mapped to PC12d.

Table 8.12a: Reserved logical channel bursts in a normal CCCH3 when mapped to PC12d

| S I R | PC12d PCRTN | | | | | | | | | | | | | | |
|-------------|----------------|---|---|---|---|---|---|---|---|---|---|----|---|---|---|
| | F | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 11 | N | 0 | 1 |
| 0 | [Shaded] | | | | | | | | | | | | | | |
| 1 | [Shaded] | | | | | | | | | | | | | | |
| 2 | [Shaded] | | | | | | | | | | | | | | |
| 3 | PCH0 | | | | | | | | | | | | | | |
| 4 | B | B | B | B | B | B | B | B | B | B | B | B | A | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C | C |
| | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H |
| | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 5 | [Shaded] | | | | | | | | | | | | | | |
| 6 | B | B | B | B | B | B | B | B | B | B | B | B | A | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C | C |
| | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | [Shaded] | | | | | | | | | | | | | | |
| 8 | [Shaded] | | | | | | | | | | | | | | |
| 9 | [Shaded] | | | | | | | | | | | | | | |
| 10 | [Shaded] | | | | | | | | | | | | | | |
| 11 | PCH1 | | | | | | | | | | | | | | |
| 12 | B | B | B | B | B | B | B | B | B | B | B | B | A | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C | C |
| | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H |
| | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 13 | [Shaded] | | | | | | | | | | | | | | |
| 14 | B | B | B | B | B | B | B | B | B | B | B | B | A | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C | C |
| | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H |
| | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| 15 | B | B | B | B | B | B | B | B | B | B | B | B | A | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C | C |
| | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H |
| | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

| S I R | PC12d PCRTN | | | | | | | | | | | | | | |
|-------------|----------------|---|---|---|---|---|---|---|---|---|---|----|---|---|---|
| | F | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 11 | N | 0 | 1 |
| 16 | [Shaded] | | | | | | | | | | | | | | |
| 17 | [Shaded] | | | | | | | | | | | | | | |
| 18 | [Shaded] | | | | | | | | | | | | | | |
| 19 | PCH0 | | | | | | | | | | | | | | |
| 20 | B | B | B | B | B | B | B | B | B | B | B | B | A | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C | C |
| | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H |
| | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 21 | [Shaded] | | | | | | | | | | | | | | |
| 22 | B | B | B | B | B | B | B | B | B | B | B | B | A | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C | C |
| | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H |
| | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 23 | [Shaded] | | | | | | | | | | | | | | |
| 24 | [Shaded] | | | | | | | | | | | | | | |
| 25 | [Shaded] | | | | | | | | | | | | | | |
| 26 | [Shaded] | | | | | | | | | | | | | | |
| 27 | PCH1 | | | | | | | | | | | | | | |
| 28 | B | B | B | B | B | B | B | B | B | B | B | B | A | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C | C |
| | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H |
| | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 29 | [Shaded] | | | | | | | | | | | | | | |
| 30 | B | B | B | B | B | B | B | B | B | B | B | B | A | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C | C |
| | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H |
| | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |
| 31 | B | B | B | B | B | B | B | B | B | B | B | B | A | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C | C |
| | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H |
| | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

| S I R | PC12d PCRTN | | | | | | | | | | | | | | |
|-------------|----------------|---|---|---|---|---|---|---|---|---|---|----|---|---|---|
| | F | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 11 | N | 0 | 1 |
| 32 | [Shaded] | | | | | | | | | | | | | | |
| 33 | [Shaded] | | | | | | | | | | | | | | |
| 34 | [Shaded] | | | | | | | | | | | | | | |
| 35 | PCH0 | | | | | | | | | | | | | | |
| 36 | B | B | B | B | B | B | B | B | B | B | B | B | A | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C | C |
| | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H |
| | 4 | 4 | 4 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 37 | [Shaded] | | | | | | | | | | | | | | |
| 38 | B | B | B | B | B | B | B | B | B | B | B | B | A | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C | C |
| | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H |
| | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 39 | [Shaded] | | | | | | | | | | | | | | |
| 40 | [Shaded] | | | | | | | | | | | | | | |
| 41 | [Shaded] | | | | | | | | | | | | | | |
| 42 | [Shaded] | | | | | | | | | | | | | | |
| 43 | PCH1 | | | | | | | | | | | | | | |
| 44 | B | B | B | B | B | B | B | B | B | B | B | B | A | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C | C |
| | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H |
| | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| 45 | [Shaded] | | | | | | | | | | | | | | |
| 46 | B | B | B | B | B | B | B | B | B | B | B | B | A | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C | C |
| | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H |
| | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |
| 47 | B | B | B | B | B | B | B | B | B | B | B | B | A | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C | C |
| | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H |
| | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |

| S I R | PC12d PCRTN | | | | | | | | | | | | | | |
|-------------|----------------|---|---|---|---|---|---|---|---|---|---|----|---|---|---|
| | F | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 11 | N | 0 | 1 |
| 48 | [Shaded] | | | | | | | | | | | | | | |
| 49 | [Shaded] | | | | | | | | | | | | | | |
| 50 | [Shaded] | | | | | | | | | | | | | | |
| 51 | PCH0 | | | | | | | | | | | | | | |
| 52 | B | B | B | B | B | B | B | B | B | B | B | B | A | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C | C |
| | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 53 | [Shaded] | | | | | | | | | | | | | | |
| 54 | B | B | B | B | B | B | B | B | B | B | B | B | A | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C | C |
| | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H |
| | 5 | 5 | 5 | 5 | 5 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 55 | [Shaded] | | | | | | | | | | | | | | |
| 56 | [Shaded] | | | | | | | | | | | | | | |
| 57 | [Shaded] | | | | | | | | | | | | | | |
| 58 | [Shaded] | | | | | | | | | | | | | | |
| 59 | PCH1 | | | | | | | | | | | | | | |
| 60 | B | B | B | B | B | B | B | B | B | B | B | B | A | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C | C |
| | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H |
| | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| 61 | [Shaded] | | | | | | | | | | | | | | |
| 62 | B | B | B | B | B | B | B | B | B | B | B | B | A | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C | C |
| | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H |
| | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 63 | B | B | B | B | B | B | B | B | B | B | B | B | A | A | A |
| | A | A | A | A | A | A | A | A | A | A | A | A | C | C | C |
| | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H |
| | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |

8.7a Mapping of logical channels to SI extended/AGCH/CCCH (Iu mode only)

When PC12d is used in Iu mode, one AGCH/CCCH may be used within a spot beam to support the optional extended SI. Such as use would be configuration 18 in table 8.2a and is indicated by the value of the System Information Extended information element (see GMR-1 3G 44.008 [3]). The optional extended SI is illustrated in table 8.12b.

DC12 bursts carrying the extended SI may occur at the following ordered triples:

| | | | |
|------------|-------------|-------------|-------------|
| (7, 0, 12) | (23, 0, 12) | (39, 0, 12) | (55, 0, 12) |
|------------|-------------|-------------|-------------|

Table 8.12b: Optional extended SI in a normal CCCH3 when mapped to PC12d

| S I R F N | PC12d-2 PCRTN | | | | | | | | | | | |
|-----------------------|------------------|---|---|---|---|---|---|---|---|---|----|----|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 11 | 11 |
| 0 | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | |
| 7 | Extended SI | | | | | | | | | | | |
| 8 | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | |
| 13 | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | |

| S I R F N | PC12d-2 PCRTN | | | | | | | | | | | |
|-----------------------|------------------|---|---|---|---|---|---|---|---|---|----|----|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 11 | 11 |
| 16 | | | | | | | | | | | | |
| 17 | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | |
| 19 | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | |
| 21 | | | | | | | | | | | | |
| 22 | | | | | | | | | | | | |
| 23 | Extended SI | | | | | | | | | | | |
| 24 | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | |
| 26 | | | | | | | | | | | | |
| 27 | | | | | | | | | | | | |
| 28 | | | | | | | | | | | | |
| 29 | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | |
| 31 | | | | | | | | | | | | |

| S I R F N | PC12d-2 PCRTN | | | | | | | | | | | |
|-----------------------|------------------|---|---|---|---|---|---|---|---|---|----|----|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 11 | 11 |
| 32 | | | | | | | | | | | | |
| 33 | | | | | | | | | | | | |
| 34 | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | |
| 36 | | | | | | | | | | | | |
| 37 | | | | | | | | | | | | |
| 38 | | | | | | | | | | | | |
| 39 | Extended SI | | | | | | | | | | | |
| 40 | | | | | | | | | | | | |
| 41 | | | | | | | | | | | | |
| 42 | | | | | | | | | | | | |
| 43 | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | |
| 45 | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | |
| 47 | | | | | | | | | | | | |

| S I R F N | PC12d-2 PCRTN | | | | | | | | | | | |
|-----------------------|------------------|---|---|---|---|---|---|---|---|---|----|----|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 11 | 11 |
| 48 | | | | | | | | | | | | |
| 49 | | | | | | | | | | | | |
| 50 | | | | | | | | | | | | |
| 51 | | | | | | | | | | | | |
| 52 | | | | | | | | | | | | |
| 53 | | | | | | | | | | | | |
| 54 | | | | | | | | | | | | |
| 55 | Extended SI | | | | | | | | | | | |
| 56 | | | | | | | | | | | | |
| 57 | | | | | | | | | | | | |
| 58 | | | | | | | | | | | | |
| 59 | | | | | | | | | | | | |
| 60 | | | | | | | | | | | | |
| 61 | | | | | | | | | | | | |
| 62 | | | | | | | | | | | | |
| 63 | | | | | | | | | | | | |

8.8 Mapping in time of packet logical channels onto physical channels

8.8.1 General

A physical channel allocated to carry packet logical channels is called a Packet Data Channel (PDCH) or a PDCH3. A PDCH/ PDCH3 shall carry packet logical channels only. A PDCH/ PDCH3 is of size (m,n), where m is the bandwidth index and n is the number of timeslots. The logical channels PACCH and PDTCH use the PNB(m,n) associated with the physical channel PDCH(m,n) onto which they are mapped. The logical channels PACCH and PDTCH use the PNB3(m,n) associated with the physical channel PDCH3(m,n) onto which they are mapped with the exception that PNB(1,6) may also be used.

Packet-switched logical channels are mapped dynamically onto a 16-multiframe.

A multiframe consists of 16 consecutive frames, (see GMR-1 3G 45.010 [7] and GMR-1 3G 43.064 [8]). Figure 8.2 indicates the numbering of consecutive frames for the entire multiframe.



Figure 8.2: Multiframe structure for PDCH

The mapping of logical channels onto the successive MAC-slots or D-MAC-slots in a multiframe is defined GMR-1 3G 43.064 [8]. Each MAC-slot or a D-MAC-slot carries a single RLC block.

In the downlink direction, the logical channel type is indicated by the message type.

In the uplink part for channels other than PRACH, the logical channel type shall be indicated by the message type. For the PRACH case the logical channel type is indicated by the USF (GMR-1 3G 44.060 [9]), set on the corresponding block on the downlink on a frame-by-frame basis.

8.8.2 Mapping of the uplink channels

8.8.2.1 Mapping of uplink packet traffic channel (PDTCH/U) and PACCH/U

The PDCHs where the MES may expect occurrence of its PDTCH/U(s) or PACCH/U for a mobile-originated transfer is indicated in resource allocation messages (see GMR-1 3G 44.060 [9]). PACCH/U shall be allocated respecting the resources allocated to the MES and the MES multislot class. A single USF (6 bits), is allocated to the MES for all the PDCHs that it has been allocated. Some of the PDCHs allocated in extended dynamic mode may not be associated with the allocated USF. See GMR-1 3G 43.064 [8] for further details.

The occurrence of the PDTCH/U and/or the PACCH/U for a given MES on a given PDCH shall be indicated by the value of the USF contained in the header of the block transmitted in the downlink MAC-slot of the same PDCH. When the network transmits on a PDTCH(2,6) carrier, it will do so on D-MAC slots 0, 1, 2 and 3. As a result, an MES listening to a PDTCH(2,6) will receive the USF on D-MAC slots 0, 1, 2, and 3. When the network transmits on a PDTCH(4,3) and PDTCH(5,3) it will do so on all the MAC slots, and the MES listening to a PDTCH(4,3) or PDTCH(5,3) will receive the USF on all MAC slots. The relationship between the downlink MAC-slot in which the block containing the USF is transmitted and the uplink MAC-slot to which it applies is described in GMR-1 3G 45.010 [7]. The relationship between the downlink D-MAC-slot in which the block containing the USF is transmitted and the uplink D-MAC-slot to which it applies is described in GMR-1 3G 45.010 [7]. The MES may transmit on any of the uplink MAC-slots allocated to the MES. The MES shall transmit on every D-MAC-slot allocated to the MES. The occurrence of the PACCH/U associated to a PDTCH/D shall be indicated by the network by polling the MES (see GMR-1 3G 44.060 [9]).

NOTE: This clause specifies how the network signals that the MES is allowed to use the uplink. The operation of the MES is specified in GMR-1 3G 44.060 [9]. In particular cases of fixed allocation or extended dynamic allocation, the MES may not need to monitor the USF on all allocated PDCHs.

8.8.2.2 Mapping of the packet timing advance control channel (PTCCH/U) (A/Gb mode only)

When an MES transmits a PTCCH/U on the same carrier as a PDTCH(4,3) or a PDTCH(5,3), the PTCCH/U shall be mapped to one of the MAC-slots 0, 2, 4, or 6 for an even numbered multiframe and slots 1, 3, 5, 7 in an odd numbered multiframe. When an MES transmits a PTCCH/U on the same carrier as a PDTCH(1,6), the PTCCH/U shall be mapped to one of the D-MAC-slots 0, 1, 2, or 3. PTCCH/U shall be allocated respecting the resources allocated to the MES and the MES multislot class. An MES shall be allocated a subchannel of the PTCCH/U, where the subchannel number is derived from the Timing Advance Index (TAI), indicated in the uplink/downlink assignment or immediate assignment message (see GMR-1 3G 44.060 [9] and GMR-1 3G 43.064 [8]). See GMR-1 3G 45.010 [7] for details regarding deriving the PTCCH/U slot from the Timing Advance Index.

8.8.2.3 Mapping of the uplink PCCCH, i.e. PRACH (A/Gb mode only)

The PRACH is dynamically allocated on individual PDCH MAC-slots. The occurrence of a PRACH3 opportunity on the uplink is indicated by $USF = USF_FREE$ in the PUI of the block which is received in the corresponding MAC-slot on the downlink.

Similarly, the PRACH3 may be dynamically allocated on individual PDCH D-MAC-slots. If an MES, which is receiving PDTCH(2,6) on downlink, detects a USF value equal to USF_FREE in a D-MAC-slot k ($k = 0, 1, 2$ or 3) beginning at timeslot T ($T = 0, 1, 2, \dots, \text{or } 23$) of a downlink frame F , the MES may transmit the PRACH either on timeslots

$T, T + 1, T + 2$ or on timeslots $T + 3, T + 4, T + 5$, where timeslot T is in the uplink frame $F + USF_DELAY$ and the timeslot numbers $T + 1$ to $T + 5$ are modulo 24 (see GMR-1 3G 45.010 [7]). The MES shall randomly select either timeslot T or timeslot $T + 3$ as the start of the PRACH transmission.

Fixed PRACH3 opportunities may be statically allocated on individual PDCH D-MAC-slots on the paired 31,25 kHz carrier as described in annex B.

For a PDTCH(4,3) or a PDTCH(5,3), multiple PRACHs, of up to a maximum of m (where $m = 4$ or 5), may be overlaid on the same PDCH MAC-slot where $m \times 31,25$ kHz is the PDCH bandwidth ($m = 4$ and 5). This is possible because the PRACH uses bandwidth of 31,25 kHz only, whereas the PDCH bandwidth is an integral multiple of 31,25 kHz. The multiple PRACH bursts overlaid on a single MAC-slot use different carrier frequencies that are spaced 31,25 kHz apart. Number of overlaid channels supported by the network is indicated by BCCH system information parameters PRACH Overlay and Uplink PRACH Channels, see GMR-1 3G 44.008 [3]. The MES shall randomly select one of the overlaid PRACH frequencies for transmission, see GMR-1 3G 43.064 [8].

Table 8.1 shows valid PRACH frequencies when multiple PRACHs are overlaid on the same PDCH MAC-slot. Uplink frequency is derived from frequency parameters as specified in GMR-1 3G 45.005 [6].

Table 8.1: Overlaid PRACH frequencies

| Bandwidth | PRACH frequency |
|-----------|---|
| m = 4 | PRACH-1 = Uplink frequency - 48,875 kHz |
| | PRACH-2 = Uplink frequency - 15,625 kHz |
| | PRACH-3 = Uplink frequency + 15,625 kHz |
| | PRACH-4 = Uplink frequency + 48,875 kHz |
| m = 5 | PRACH-1 = Uplink frequency - 62,50 kHz |
| | PRACH-2 = Uplink frequency - 31,25 kHz |
| | PRACH-3 = Uplink frequency |
| | PRACH-4 = Uplink frequency + 31,25 kHz |
| | PRACH-5 = Uplink frequency + 62,50 kHz |

8.8.2.3a Mapping of the uplink PCCCH, i.e. PRACH3 (lu mode only)

The PRACH3 is dynamically allocated on individual PDCH3 MAC-slots. The occurrence of a PRACH3 opportunity on the uplink is indicated by $USF = USF_FREE$ in the PUI or the ULMAP of the block which is received in the corresponding MAC-slot on the downlink. Similarly, the PRACH3 may be dynamically allocated on individual PDCH3 D-MAC-slots.

GMR-1 3G 44.060 [9] describes the dynamic allocation of PRACH3 in PDCH3 channels.

8.8.3 Mapping of the downlink channels

8.8.3.1 Mapping of the (PDTCH/D) and PACCH/D

The PDCH where the MES may expect occurrence of its PDTCH/D(s) for a mobile-terminated transfer, or its PACCH/D for both mobile-originated and mobile-terminated transfers, are indicated in resource allocation messages (see GMR-1 3G 44.060 [9]). The logical channel type shall be indicated in the message header. The messages on these channels shall address the MES by the TFI (see GMR-1 3G 44.060 [9]).

PDTCH/D or PACCH/D mapped to either PDCH(4,3) or PDCH(5,3) is carried on a MAC-slot (i.e. MAC-slot 0, 1, 2, ..., or 7). PDTCH/D or PACCH/D mapped to PDCH(2,6) is carried on a D-MAC-slot (i.e. D-MAC-slot 0, 1, 2, or 3).

8.8.3.2 Mapping of the PTCCH/D (A/Gb mode only)

The PTCCH/D carries signalling messages containing timing advance and frequency correction information for MESs sharing the PTCCH/U on the same PDCH.

PTCCH/D mapped to downlink PDCH(4,3) or downlink PDCH(5,3) is always carried in a fixed frame B9 of PDCH on MAC-slot 0. The location of MAC-slot 0 with respect to the downlink frame boundary is defined using the parameter $MAC_FORWARD_TS_OFFSET$ in the system information.

PTCCH/D mapped to downlink PDCH(2,6) is always carried in a fixed frame B9 of PDCH on D-MAC-slot 0 (refer to Figure 8.2). The location of D-MAC-slot 0 with respect to the downlink frame boundary is defined using the parameter $MAC_FORWARD_TS_OFFSET$ in the system information.

8.8.3.3 Mapping of the PBCCH

The use of the PBCCH is currently not defined for the GMR-1 packet data service.

8.8.3.4 Mapping of the PCCCH

The PCCCH and its different logical channels (PAGCH) and the PDTCH and PACCH can be mapped dynamically and are identified by the message header.

8.8.4 Mapping of PBCCH data

The use of the PBCCH is currently not defined for GMR-1.

8.8.5 Permitted combination of packet data channels

The following combinations of packet logical channels are permitted on PDCH(4,3) and PDCH(5,3).

- i) PAGCH + PDTCH/D + PACCH/D + PTCCH/D on downlink.
- ii) PDTCH/U + PACCH/U + PTCCH/U on uplink.

Similarly, the following combinations of packet logical channels are permitted on PDCH(1,6) and PDCH(2,6).

- i) PAGCH + PDTCH/D + PACCH/D + PTCCH/D on PDCH(2,6) on downlink.
- ii) PDTCH/U + PACCH/U + PTCCH/U on PDCH(1,6) on uplink.

Similarly, the following combinations of packet logical channels are permitted on PDCH3(m,n).

- i) PAGCH + PDTCH/D + PACCH/D + DCH on PDCH3(m,n) on downlink.
- ii) PDTCH/U + PACCH/U + DCH on PDCH3(m,n) on uplink.
- iii) DCH includes DTCH + DACCH.

8.9 Multislot configurations

A multislot configuration consists of multiple circuit or packet-switched traffic channels together with associated control channels, allocated to the same MES. The multislot configuration occupies up to eight PDCH(4,3) or PDCH(5,3) per frame. Similarly, the multislot configuration occupies up to four PDCH(2,6) or PDCH(1,6) per frame. The physical channels in a multislot configuration are with different Timeslots Numbers (TN) but with the same Absolute Radio Frequency Channel Number (ARFCN).

8.9.1 Multislot configurations for circuit switched connections

The use of multislot configurations for circuit-switched connections is not currently supported by GMR-1.

8.9.2 Multislot configurations for packet switched connections

An MES may be allocated several PDTCH/Us or PDTCH/Ds for one mobile-originated or one mobile-terminated communication, respectively. In this context, allocation refers to the list of PDCH that may dynamically carry the PDTCHs for that specific MES. The PACCH may be mapped onto any of the allocated PDCHs.

The occupied physical channels shall consist of a combination of configurations i, and ii, as defined in clause 8.8.5. The network shall leave a gap of at least one radio block between the old and the new configurations when the allocation is changed and the PDCHs with the lowest numbered timeslot are not the same in the old and new configurations.

9 Operation of channels

Same as clause 9 in GMR-1 05.002 [10].

9.1 PC6d and PC12u pairing

Same as clause 9.1 in GMR-1 05.002 [10].

9.1a PC12d and PC12u pairing

A number of PC12d may be required in a spot beam to support the amount of paging or alerting traffic in that spot beam. One BCCH/CCCH is always assigned in every spot beam on the BCCH carrier.

Every PC12d shall be assigned in combination with a PC12u (RACH3) physical channel. In other words, the number of PC12u (RACH3) is equal to the number of normal CCCHs, plus the number of AGCH/CCCHs, plus 1 (for the BCCH/CCCH) and each RACH3's radio-frequency channel number shall be specified on the system information.

The PC12u shall start in the return link timeslots specified by the parameter RACH_TS_OFFSET, broadcast in BCCH. This relationship is shown by example in figure 9.2, where the value of RACH_TS_OFFSET can range from 0 to 23. The starting timeslot of the PC12u/R is equal to the starting timeslot of the corresponding PC12d/R plus RACH_TS_OFFSET, modulo 24.

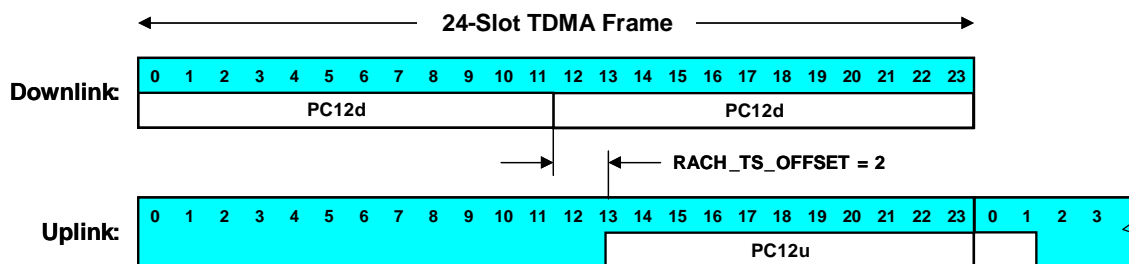


Figure 9.2: A RACH_TS_OFFSET example when PC12d and PC12u is used

A number of RACH3s may be required in a spot beam to support the amount of random access traffic in that spot beam. Additional PC12u physical channels required to support the RACH3 messages shall be paired on the forward link with PC12d physical channels on which the entire CCCH or only the AGCH may be mapped.

9.2 Bidirectional channel timeslot assignments

Same as clause 9.2 in GMR-1 05.002 [10].

9.3 GBCH

Same as clause 9.3 in GMR-1 05.002 [10].

9.3a GBCH3

GBCH3 shall be multiplexed on the same PC12d used for BCCH as shown in table 8.8a.

9.4 DKABs

Same as clause 9.4 in GMR-1 05.002 [10].

9.5 FCCH and CICH

- Same as clause 9.5 in GMR-1 05.002 [10] with the following additions: The FCCH3 and BCCH on a BCCH/CCCH carrier are used by the MESs for initial synchronization and spot beam selection. CICH shall not be present when FCCH3 is used.

9.6 TACCH/2

Same as clause 9.6 in GMR-1 05.002 [10].

9.7 MES monitoring of paging and alerting groups

Same as clause 9.7 in GMR-1 05.002 [10].

9.7.1 Determination of assigned CCCH

Same as clause 9.7.1 in GMR-1 05.002 [10].

9.7.2 Determination of assigned paging group

Same as clause 9.7.2 in GMR-1 05.002 [10] with the following additions.

- When FCCH3 is used: There may be one, two or four paging groups reserved per CCCH, determining the assigned paging group from the paging index reduces to the cases shown in table 9.2b.

Table 9.2b: Determining assigned paging group

| N | SA_PCH_CONFIG | Paging groups in assigned CCCH | Paging index | Assigned paging group |
|---|---------------|--------------------------------|--------------|-----------------------|
| 1 | 01 | PCH0 | 0 | PCH0 |
| 1 | 10 | PCH1 | 0 | PCH1 |
| 2 | 11 | PCH0, PCH1 | 0 | PCH0 |
| 2 | 11 | PCH0, PCH1 | 1 | PCH1 |
| 4 | 00 | PCH0, PCH1, PCH2, PCH3 | 0 | PCH0 |
| 4 | 00 | PCH0, PCH1, PCH2, PCH3 | 1 | PCH1 |
| 4 | 00 | PCH0, PCH1, PCH2, PCH3 | 2 | PCH2 |
| 4 | 00 | PCH0, PCH1, PCH2, PCH3 | 3 | PCH3 |

9.7.3 Determination of alerting group

Same as clause 9.7.3 in GMR-1 05.002 [10].

9.7.4 Determination of PCCCH_GROUP and PAGING_GROUP for MES in GMPRS attached mode

In the absence of PCCCH, CCCH shall be used in the GMPRS-attached mode for paging and access. If the determination of the specific paging multiframe and paging block index, as specified in this clause, are not supported on CCCH by both the MES and the BTS, the method defined in clauses 9.7.1 and 9.7.2 shall be used. This is negotiated at GMPRS attach.

9.8 MES selection of PC12U

Same as clause 9.8 in GMR-1 05.002 [10] with the following addition:

If the MES reads a system information from BCCH on a PC12d then it shall use a PC12u with RACH3 burst type.

9.9 SDCCH vs. CBCH

Same as clause 9.9 in GMR-1 05.002 [10].

9.10 MES monitors paired CCCH for AGCH

Same as clause 9.10 in GMR-1 05.002 [10].

9.11 Additional air interface constraints

Same as clause 9.11 in GMR-1 05.002 [10].

10 BCCH parameters

Same as clause 10 in GMR-1 05.002 [10].

10.1 Types of BCCH parameters

Same as clause 10.1 in GMR-1 05.002 [10].

10.2 Information used to obtain synchronization

Same as clause 10.2 in GMR-1 05.002 [10].

10.3 Channel meta-information

- SA_CCCH_CHANS** (5 bits) Gives the total number of normal CCCHs + BCCH/CCCHs. The value can range from a minimum of 1 in very low traffic spot beams to a maximum value of 31 in the most highly congested spot beams.
- SA_AGCH_CHANS** (5 bits) The number of additional AGCH/CCCHs in the spot beam. The value can range from 0 to 31.
- SA_PCCCH_CHANS** (5 bits) This indicates the total number of PCCCHs of a supported bandwidth category and may occur more than once in a system information cycle if different bandwidths are supported.

10.4 Beam-configurable multichannel information

Same as clause 10.4 in GMR-1 05.002 [10] with the following additions.

When FCCH3 is used:

- SA_PCH_CONFIG** (2 bits) Provides a bitmap of configured paging groups, as shown in table 8.10, which is the same for all normal CCCHs and the BCCH/CCCH of a logical cell. SA_PCH_CONFIG may also be used to compute SA_PCH_GROUPS since the number of bits set to one in SA_PCH_CONFIG is equal to SA_PCH_GROUPS when SA_PCH_CONFIG_ext = 0. When SA_PCH_CONFIG_ext = 1, SA_PCH_GROUPS shall be defined as per table 8.9.

10.5 Information specific to one instance of a channel

Same as clause 10.5 in GMR-1 05.002 [10].

Annex A (normative): Multislot capability

A.1 MES classes for multislot capability

When an MES supports the use of multiple timeslots it shall belong to a multislot class as defined in table A.1.

Table A.1: Multislot class

| Multislot class | Number of slots | | | Minimum number of slots | | | | Type |
|-------------------------------|-----------------|-------------------|-----|-------------------------|-----------------|-----------------|-----------------|---------------|
| | Rx | Tx | Sum | T _{ta} | T _{tb} | T _{ra} | T _{rb} | |
| 1 | 24 (max) | 24 (max) | NA | NA | 0 | 6 | 0 | A, H, I, L, M |
| 2 | 24 (max) | 9 (avg) note 1 | NA | NA | 0 | 0 | 0 | C |
| 3 | 24 (max) | 8 (avg) note 2 | NA | NA | 0 | 0 | 0 | C, J, K |
| 4 | 24 (max) | 12(max) note 3 | NA | NA | 0 | 0 | 0 | C |
| 5 | 24 (max) | 6 (max) note 4 | NA | NA | 0 | 0 | 0 | E, F, G, H, I |
| All other values are reserved | | | | | | | | reserved |

NOTE 1: Average of 3 DMAC slots out of 8 DMAC slots yields an average of 9 transmit slots (slot = 1,667 ms) out of 24 slots.
NOTE 2: For example, 1-ON, 2-OFF (implying 1 DMAC slot ON followed by 2 DMAC slots OFF) transmission pattern yields an average of 8 transmit slots (slot = 1,667 ms) out of 24 slots.
NOTE 3: For example, 2-ON, 2-OFF (implying 2 DMAC slot ON followed by 2 DMAC slots OFF) transmission pattern yields 12 transmit slots (slot = 1.667 ms) out of 24 slots.
NOTE 4: Transmit slots are contiguous.

Multislot class 1 MESs are required to be able to transmit and receive at the same time.

Multislot class 2, 3, 4 and 5 MESs are not required to transmit and receive at the same time.

- Rx** Rx describes the maximum number of receive timeslots that the MES can use per TDMA frame (see table A.1). The MES must be able to support all integer values of receive TS from 0 to Rx (depending on the services supported by the MES). The receive TS need not be contiguous. For type C, E, F, G, J, K MESs, the receive timeslots shall be allocated within window of size Rx. The network shall take into account the terminal multi-slot class and transmission capabilities into account while allocating Rx timeslots to MES (refer to annex C).
- Tx** Tx describes the number of transmit timeslots that the MES can use per TDMA frame (see table A.1). The MES must be able to support all integer values of transmit TS from 0 to Tx (depending on the services supported by the MES). Unless stated otherwise, the transmit TS need not be contiguous. The network shall take into account the terminal multi-slot class and transmission capabilities into account while allocating Tx timeslots to MES (refer to annex C).
- Sum** Sum is the total number of uplink and downlink TS that can actually be used by the MES per TDMA frame. The MES must be able to support all combinations integer values of Rx and Tx TS where $1 \leq Rx + Tx \leq Sum$ (depending on the services supported by the MES). Sum is not applicable to all classes.
- T_{ta}** T_{ta} relates to the time needed for the MES to perform adjacent spot-beam signal level measurement and get ready to transmit.
- T_{tb}** T_{tb} relates to the time needed for the MES to get ready to transmit. This minimum requirement will only be used when adjacent spot-beam power measurements are not required by the service selected.

It is the minimum number of timeslots that will be allowed between the end of the last transmit burst in a TDMA frame and the first transmit burst in the next TDMA frame.

T_{ra} T_{ra} relates to the time needed for the MES to perform adjacent spot-beam signal level measurement and get ready to receive.

It is the minimum number of timeslots that will be allowed between the end of the last receive burst in a TDMA frame and the first receive burst in the next TDMA frame.

T_{rb} T_{rb} relates to the time needed for the MES to get ready to receive. This minimum requirement will only be used when adjacent spot-beam power measurements are not required by the service selected.

It is the minimum number of timeslots that will be allowed between the end of the last receive burst in a TDMA frame and the first receive burst in the next TDMA frame.

A.2 Constraints imposed by the service selected

The service selected will impose certain restrictions on the allowed combinations of transmit and receive timeslots. Such restrictions are not imposed by this annex but should be derived from the description of the services. For example, in the case of circuit switched data the TS numbers used in the uplink will be a subset of those used in the downlink.

The service selected will determine whether or not adjacent cell power measurements are required and therefore whether T_{ra} or T_{rb} is allowed for.

A.3 Network requirements for supporting MES multislots classes

The multislots class of the MES will limit the combinations and configurations allowed when supporting multislots communication.

It is necessary for the network to decide whether requested or current multislots configuration can be supported by distant MES. If actual TA is great enough it may be necessary for network to downgrade requested resources or it may be necessary for network to downgrade current resources.

It is necessary for the network to decide whether the MES needs to perform adjacent cell power measurement for the type of multislots communication intended and whether the service imposes any other constraints before the full restrictions on TS assignments can be resolved.

Annex B (informative): Asymmetrical pairing of PDCH/D(2,m) with PDCH/U(1,m)

The downlink 62,5 kHz PDCH carrier (carrying PDCH(2,m)) is coupled with two uplink 31,25 kHz carriers; one carrying PDCH(1,6) and the other carrying PRACH. This is shown in the following diagram. Refer to GMR-1 3G 43.064 [8] and GMR-1 3G 44.008 [3] for description on how the network conveys the information to the MES regarding its assignment of the one downlink 62,5 kHz channel and the corresponding two 31,25 kHz uplink channels.

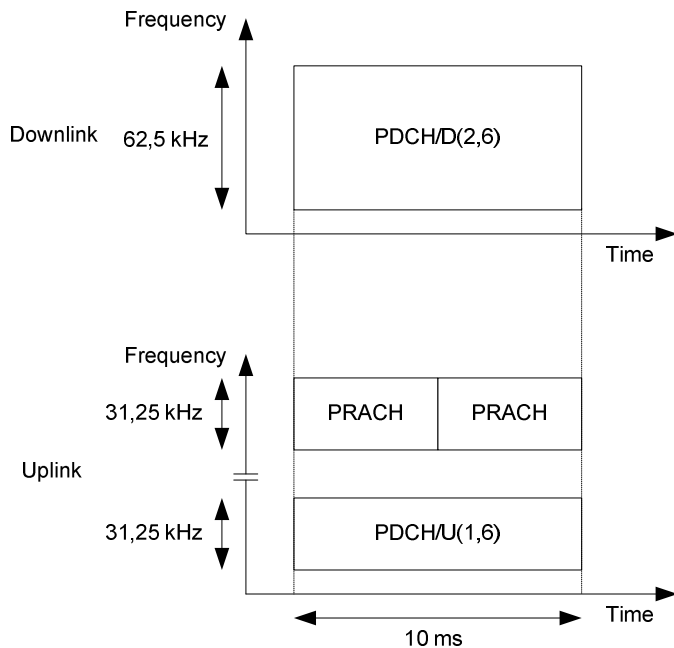


Figure B.1: Asymmetrical Pairing of PDCH/D(2,6) with PDCH/U(1,6)

Annex C (normative): GMR-1 3G Terminal Types

GMR-1 3G supports multiple terminal types. The terminal type is determined based on the following MES attributes:

- MES RF power capability.
- MES multislot class.
- Types of physical channels supported.
- Transmission capability.
- Mode of use.
- Use with a specific network infrastructure.

This information is conveyed to the network in CHANNEL REQUEST TYPE-1, CHANNEL REQUEST TYPE-2 or PACKET CHANNEL REQUEST message.

Assignment of GMR-1 3G terminal type identifier to a MES is the responsibility of the network operator.

Table C.1: GMPRS Terminal Type Identifier

| GMR-1 3G terminal type identifier (in binary) $b_7b_6b_5b_4b_3b_2b_1$ | GMPRS multislot class (See annex-A) | Power class (See GMR-1 3G 45.005 [6]) | Supported channel type(s) (See clause 5) | Transmission capability | Mode of use | Types of services supported | Antenna Type | Network interfaces supported | Operating Band |
|--|-------------------------------------|---------------------------------------|--|--|-------------|---|--------------|------------------------------|----------------|
| 1 0 0 0 0 0 0 | Reserved | | | | | | | | |
| 1 0 0 1 0 0 0 | 1 | 8 (Terminal type A) | PDCH(5,3) PDCH(4,3) PRACH BCCH/CCCH | Full duplex | Fixed | 144 kbps GMPRS packet switched services only | Internal | Gb | L-Band |
| 0 0 0 1 0 0 1 | 2 | 1 (Terminal type C) | PDCH(2,6) PDCH(1,6) PRACH BCCH/CCCH TCH3/6/9 FACCH3/6/9 SACCH6/9 | Half duplex | Handheld | GMR Circuit switched services and 60 kbps GMPRS packet switched services. | Internal | A/Gb | L-Band |
| 0 0 0 1 0 1 0 | 3 | 1 (Terminal type C) | PDCH(2,6) PDCH(1,6) PRACH BCCH/CCCH TCH3/6/9 FACCH3/6/9 SACCH6/9 | Half duplex with partial burst decoding capability (see clause 7.4.13) | Handheld | GMR Circuit switched services and 60 kbps GMPRS packet switched services. | Internal | A/Gb | L-Band |
| 0 0 0 1 0 1 1 | 4 | 1 (Terminal type C) | PDCH(2,6) PDCH(1,6) PRACH BCCH/CCCH TCH3/6/9 FACCH3/6/9 SACCH6/9 | Half duplex | Handheld | GMR Circuit switched services and 60 kbps GMPRS packet switched services. | Internal | A/Gb | L-Band |
| 0 0 0 1 1 0 0 | 1 | 1 (Terminal type C) | PDCH(2,6) PDCH(1,6) PRACH BCCH/CCCH TCH3/6/9 FACCH3/6/9 SACCH6/9 | Full duplex | Handheld | GMR Circuit switched services and 60 kbps GMPRS packet switched services. | Internal | A/Gb | L-Band |

| GMR-1 3G terminal type identifier (in binary) $b_7b_6b_5b_4b_3b_2b_1$ | GMPRS multislot class (See annex-A) | Power class (See GMR-1 3G 45.005 [6]) | Supported channel type(s) (See clause 5) | Transmission capability | Mode of use | Types of services supported | Antenna Type | Network interfaces supported | Operating Band |
|--|-------------------------------------|---------------------------------------|---|---|-------------|---|------------------|------------------------------|----------------|
| 0 0 0 1 1 0 1 | 1 | 9 (Terminal type D) | PDCH(5,3) PDCH(5,12) PRACH BCCH/CCCH | Full duplex | Fixed | 444 kbps GMPRS packet switched services in downlink; 202 kbps GMPRS packet switched services in uplink | Internal | Gb | L-Band |
| 0 0 0 1 1 1 0 | 1 | 9 (Terminal type D) | PDCH(5,3) PDCH(5,12) PRACH BCCH/CCCH | Full duplex | Fixed | 444 kbps GMPRS packet switched services in downlink; 384 kbps GMPRS packet switched services in uplink | Passive external | Gb | L-Band |
| 0 0 0 1 1 1 1 | 1 | 9 (Terminal type D) | PDCH(5,3) PDCH(5,12) PRACH BCCH/CCCH | Full duplex | Fixed | 444 kbps GMPRS packet switched services in downlink; 384 kbps GMPRS packet switched services in uplink | Active external | Gb | L-band |
| 0 0 1 0 0 0 0 | 5 | 1 (Terminal type E) | PDCH3(10,3)/D PDCH3(5,12)/D PDCH3(5,3)/D PDCH3(2,6)/D PDCH(1,6)/D DCH(1,3)/D DCH(1,6)/D PDCH3(5,3)/U PDCH3(2,6)/U PDCH3(1,6)/U DCH(1,3)/U DCH(1,6)/U PRACH3 BCCH FCCH3 RACH3 PCH AGCH GBCH3 | Half duplex with partial burst decoding capability (see clause 7.4.13) Maximum transmit duty cycle of 25 % In-Call Vocoder rate change supported Full Link adaptation support Only Blind Handoff is supported | Handheld | 590 kbps GMR-1 3G packet switched services in downlink; 16 kbps GMR-1 3G packet switched services in uplink. | Internal | Iu-PS | S-band |
| 0 0 1 0 0 0 1 | 5 | 1 (Terminal type E) | PDCH3(5,12)/D PDCH3(5,3)/D PDCH3(2,6)/D PDCH3(1,6)/D DCH(1,3)/D DCH(1,6)/D | Half duplex with partial burst decoding capability (see clause 7.4.13) | Handheld | 186 kbps GMR-1 3G packet switched services in downlink; 16 kbps GMR-1 3G packet switched services in uplink. | Internal | Iu-PS | S-band |

| GMR-1 3G terminal type identifier (in binary) $b_7b_6b_5b_4b_3b_2b_1$ | GMPRS multislot class (See annex-A) | Power class (See GMR-1 3G 45.005 [6]) | Supported channel type(s) (See clause 5) | Transmission capability | Mode of use | Types of services supported | Antenna Type | Network interfaces supported | Operating Band |
|--|-------------------------------------|---------------------------------------|--|---|-------------|---|--------------|------------------------------|----------------|
| | | | PDCH3(5,3)/U PDCH3(2,6)/U PDCH3(1,6)/U DCH(1,3)/U DCH(1,6)/U PRACH3 BCCH FCCH3 RACH3 PCH AGCH GBCH3 | Maximum transmit duty cycle of 25 % In-Call Vocoder rate change supported Full Link adaptation support Only Blind Handoff is supported | | | | | |
| 0 0 1 0 0 1 0 | 5 | 1 (Terminal type E) | PDCH3(5,3)/D PDCH3(2,6)/D PDCH3(1,6)/D DCH(1,6)/D PDCH3(5,3)/U PDCH3(2,6)/U PDCH3(1,6)/U DCH(1,6)/U PRACH3 BCCH FCCH3 RACH3 PCH AGCH GBCH3 | Half duplex with partial burst decoding capability (see clause 7.4.13) Maximum transmit duty cycle of 25 % In-Call Vocoder rate change not supported Link adaptation and Handoff not supported | Handheld | 96 kbps GMR-1 3G packet switched services in downlink; 16 kbps GMR-1 3G packet switched services in uplink. | Internal | Iu-PS | S-band |
| 0 0 1 0 1 0 1 | 3 | 1 (Terminal type F) | PDCH3(10,3)/D PDCH3(5,12)/D PDCH3(5,3)/D PDCH3(2,6)/D PDCH3(1,6)/D DCH(1,6)/D DCH(1,3)/D PDCH3(5,3)/U PDCH3(2,6)/U PDCH3(1,6)/U DCH(1,6)/U DCH(1,3)/U PRACH3 BCCH | Half duplex with partial burst decoding capability (see clause 7.4.13) Maximum transmit duty cycle of 33 % In-Call Vocoder rate change supported | Handheld | 590 kbps GMR-1 3G packet switched services in downlink; 16 kbps GMR-1 3G packet switched services in uplink. | Internal | Iu-PS | S-band |

| GMR-1 3G terminal type identifier (in binary) $b_7b_6b_5b_4b_3b_2b_1$ | GMPRS multislot class (See annex-A) | Power class (See GMR-1 3G 45.005 [6]) | Supported channel type(s) (See clause 5) | Transmission capability | Mode of use | Types of services supported | Antenna Type | Network interfaces supported | Operating Band |
|--|-------------------------------------|---------------------------------------|--|---|-------------|---|--------------|------------------------------|----------------|
| | | | FCCH3 RACH3 PCH AGCH GBCH3 | Full Link adaptation support Only Blind Handoff is supported | | | | | |
| 0 0 1 1 0 1 0 | 3 | 1 (Terminal type G) | PDCH3(10,3)/D PDCH3(5,12)/D PDCH3(5,3)/D PDCH3(2,6)/D PDCH3(1,6)/D PDCH3(5,3)/U PDCH3(2,6)/U PDCH3(1,6)/U DCH(1,3)/D DCH(1,6)/D DCH(1,3)/U DCH(1,6)/U PRACH3 BCCH FCCH3 RACH3 PCH AGCH GBCH3 | Half duplex with partial burst decoding capability (see clause 7.4.13) Maximum transmit duty cycle of 33 % In-Call Vocoder rate change supported Full Link adaptation support Only Blind Handoff is supported | Handheld | 590 kbps GMR-1 3G packet switched services in downlink; 16 kbps GMR-1 3G packet switched services in uplink. | Internal | u-PS | S-band |

| GMR-1 3G terminal type identifier (in binary) $b_7b_6b_5b_4b_3b_2b_1$ | GMPRS multislot class (See annex-A) | Power class (See GMR-1 3G 45.005 [6]) | Supported channel type(s) (See clause 5) | Transmission capability | Mode of use | Types of services supported | Antenna Type | Network interfaces supported | Operating Band |
|--|-------------------------------------|---------------------------------------|---|---|-------------|--|--------------|------------------------------|----------------|
| 0 0 1 1 1 1 1 | 1 | 2 (Terminal type H) | PDCH3(10,3)/D PDCH3(5,12)/D PDCH3(5,3)/D PDCH3(2,6)/D PDCH3(5,12)/U PDCH3(5,3)/U PDCH3(2,6)/U PDCH3(1,6)/D PDCH3(1,6)/U DCH(1,3)/D DCH(1,6)/D DCH(1,3)/U DCH(1,6)/U PRACH3 BCCH FCCH3 RACH3 PCH AGCH GBCH3 | Full duplex. No transmit duty cycle restrictions In-Call Vocoder rate change supported Full Link adaptation support Only Blind Handoff is supported | Vehicular | 590 kbps GMR-1 3G packet switched services in downlink; 186 kbps GMR-1 3G packet switched services in uplink. | Internal | Iu-PS | S-band |
| 0 1 0 0 0 0 0 | 5 | 2 (Terminal type H) | PDCH3(10,3)/D PDCH3(5,12)/D PDCH3(5,3)/D PDCH3(2,6)/D PDCH3(5,12)/U PDCH3(5,3)/U PDCH3(2,6)/U PDCH3(1,6)/D PDCH3(1,6)/U DCH(1,3)/D DCH(1,6)/D DCH(1,3)/U DCH(1,6)/U PRACH3 BCCH FCCH3 RACH3 PCH AGCH GBCH3 | Full duplex. Maximum transmit duty cycle of 25 % In-Call Vocoder rate change supported Full Link adaptation support Only Blind Handoff is supported | Vehicular | 590 kbps GMR-1 3G packet switched services in downlink; 40 kbps GMR-1 3G packet switched services in uplink. | Internal | Iu-PS | S-band |

| GMR-1 3G terminal type identifier (in binary) $b_7b_6b_5b_4b_3b_2b_1$ | GMPRS multislot class (See annex-A) | Power class (See GMR-1 3G 45.005 [6]) | Supported channel type(s) (See clause 5) | Transmission capability | Mode of use | Types of services supported | Antenna Type | Network interfaces supported | Operating Band |
|--|-------------------------------------|---------------------------------------|---|--|-------------|--|--------------|------------------------------|----------------|
| 0 1 0 0 1 0 0 | 1 | 9 (Terminal type I) | PDCH3(10,3)/D PDCH3(5,12)/D PDCH3(5,3)/D PDCH3(2,6)/D PDCH3(5,12)/U PDCH3(5,3)/U PDCH3(2,6)/U PDCH3(1,6)/D PDCH3(1,6)/U DCH(1,3)/D DCH(1,6)/D DCH(1,3)/U DCH(1,6)/U PRACH3 BCCH FCCH3 RACH3 PCH AGCH GBCH3 | Full duplex No transmit duty cycle restrictions In-Call Vocoder rate change supported Full Link adaptation support Handoff not supported | Fixed | 590 kbps GMR-1 3G packet switched services in downlink; 186 kbps GMR-1 3G packet switched services in uplink. | Internal | Iu-PS | S-band |
| 0 1 0 0 1 0 1 | 5 | 9 (Terminal type I) | PDCH3(10,3)/D PDCH3(5,12)/D PDCH3(5,3)/D PDCH3(2,6)/D PDCH3(5,12)/U PDCH3(5,3)/U PDCH3(2,6)/U PDCH3(1,6)/D PDCH3(1,6)/U DCH(1,3)/D DCH(1,6)/D DCH(1,3)/U DCH(1,6)/U PRACH3 BCCH FCCH3 RACH3 PCH AGCH GBCH3 | Full duplex Maximum transmit duty cycle of 25 % In-Call Vocoder rate change supported Full Link adaptation support Handoff not supported | Fixed | 590 kbps GMR-1 3G packet switched services in downlink; 40 kbps GMR-1 3G packet switched services in uplink. | Internal | Iu-PS | S-band |
| 0 1 0 1 0 0 1 | 3 | (Terminal type J) | PDCH3(10,3)/D PDCH3(5,3)/D PDCH3(2,6)/D | Half-duplex Maximum transmit | Handheld | 590 kbps GMR-1 3G packet switched services in downlink; | Internal | Iu-PS | L-band |

| GMR-1 3G terminal type identifier (in binary) $b_7b_6b_5b_4b_3b_2b_1$ | GMPRS multislot class (See annex-A) | Power class (See GMR-1 3G 45.005 [6]) | Supported channel type(s) (See clause 5) | Transmission capability | Mode of use | Types of services supported | Antenna Type | Network interfaces supported | Operating Band |
|--|-------------------------------------|---------------------------------------|---|---|-------------|---|--------------|------------------------------|----------------|
| | | | PDCH3(1,6)/D DCH(1,6)/D DCH(1,8)/D DCH(1,6)/U DCH(1,8)/U PRACH3 BCCH FCCH3 RACH3 PCH AGCH GBCH3 | duty cycle of 33 % In-Call Vocoder rate change supported | | 16 kbps GMR-1 3G packet switched services in uplink. | | | |
| 0 1 0 1 1 1 0 | 3 | (Terminal type K) | PDCH3(10,3)/D PDCH3(5,3)/D PDCH3(2,6)/D PDCH3(1,6)/D DCH(1,6)/D DCH(1,8)/D DCH(1,6)/U DCH(1,8)/U PRACH3 BCCH FCCH3 RACH3 PCH AGCH GBCH3 | Half-duplex Maximum transmit duty cycle of 33 % In-Call Vocoder rate change not supported | Handheld | 590 kbps GMR-1 3G packet switched services in downlink; 16 kbps GMR-1 3G packet switched services in uplink. | Internal | Iu-PS | L-band |

| GMR-1 3G terminal type identifier (in binary) $b_7b_6b_5b_4b_3b_2b_1$ | GMPRS multislot class (See annex-A) | Power class (See GMR-1 3G 45.005 [6]) | Supported channel type(s) (See clause 5) | Transmission capability | Mode of use | Types of services supported | Antenna Type | Network interfaces supported | Operating Band |
|--|-------------------------------------|---------------------------------------|---|---|-------------|---|--------------|------------------------------|----------------|
| 0 1 1 0 0 1 1 | 1 | (Terminal type L) | PDCH3(10,3)/D PDCH3(5,3)/D PDCH3(2,6)/D PDCH3(2,6)/U PDCH3(1,6)/D PDCH3(1,6)/U DCH(1,6)/D DCH(1,8)/D DCH(1,6)/U DCH(1,8)/U PRACH3 BCCH FCCH3 RACH3 PCH AGCH GBCH3 | Full-duplex Maximum transmit duty cycle of 33 % In-Call Vocoder rate change not supported | Handheld | 590 kbps GMR-1 3G packet switched services in downlink; 64 kbps GMR-1 3G packet switched services in uplink. | Internal | Iu-PS | L-band |
| 0 1 1 1 0 0 0 | 1 | (Terminal type M) | PDCH3(10,3)/D PDCH3(5,3)/D PDCH3(2,6)/D PDCH3(5,3)/U PDCH3(2,6)/U PDCH3(1,6)/D PDCH3(1,6)/U DCH(1,6)/D DCH(1,8)/D DCH(1,6)/U DCH(1,8)/U PRACH3 BCCH FCCH3 RACH3 PCH AGCH GBCH3 | Full-duplex No transmit duty cycle restrictions In-Call Vocoder rate change not supported | Fixed | 590 kbps GMR-1 3G packet switched services in downlink; 186 kbps GMR-1 3G packet switched services in uplink. | external | Iu-PS | L-band |
| All other values are reserved | | | | | | | | | |

Annex D (informative): Bibliography

- GMR-1 03.022 (ETSI TS 101 376-3-10): "GEO-Mobile Radio Interface Specifications; Part 3: Network specifications; Sub-part 10: Functions related to Mobile Earth station (MES) in idle mode".

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

- GMR-1 04.008 (ETSI TS 101 376-4-8): "GEO-Mobile Radio Interface Specifications; Part 4: Radio interface protocol specifications; Sub-part 8: Mobile Radio Interface Layer 3 Specifications".

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

- GMR-1 04.003 (ETSI TS 101 376-4-3): "GEO-Mobile Radio Interface Specifications; Part 4: Radio interface protocol specifications; Sub-part 3: Channel Structures and Access Capabilities".

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

- GMR-1 04.006 (ETSI TS 101 376-4-6): "GEO-Mobile Radio Interface Specifications; Part 4: Radio interface protocol specifications; Sub-part 6: Mobile earth Station-Gateway Station Interface Data Link Layer Specifications".

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

- GMR-1 05.005 (ETSI TS 101 376-5-5): "GEO-Mobile Radio Interface Specifications; Part 5: Radio interface physical layer specifications; Sub-part 5: Radio Transmission and Reception".

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

- GMR-1 05.008 (ETSI TS 101 376-5-6): "GEO-Mobile Radio Interface Specifications; Part 5: Radio interface physical layer specifications; Sub-part 6: Radio Subsystem Link Control".

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

- GMR-1 05.003 (ETSI TS 101 376-5-3): "GEO-Mobile Radio Interface Specifications; Part 5: Radio interface physical layer specifications; Sub-part 3: Channel Coding".

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

- GMR-1 05.004 (ETSI TS 101 376-5-4): "GEO-Mobile Radio Interface Specifications; Part 5: Radio interface physical layer specifications; Sub-part 4: Modulation".

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

- GMR-1 05.010 (ETSI TS 101 376-5-7): "GEO-Mobile Radio Interface Specifications; Part 5: Radio interface physical layer specifications; Sub-part 7: Radio Subsystem Synchronization".

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

- GMR-1 3G 43.022 (ETSI TS 101 376-3-10): "GEO-Mobile Radio Interface Specifications (Release 3); Third Generation Satellite Packet Radio Service; Part 3: Network specifications; Sub-part 10: Functions related to Mobile Earth Station (MES) in idle mode".

- GMR-1 3G 45.008 (ETSI TS 101 376-5-6): "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".

History

| Document history | | |
|-------------------------|---------------|-------------|
| V3.1.1 | July 2009 | Publication |
| V3.2.1 | February 2011 | Publication |
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