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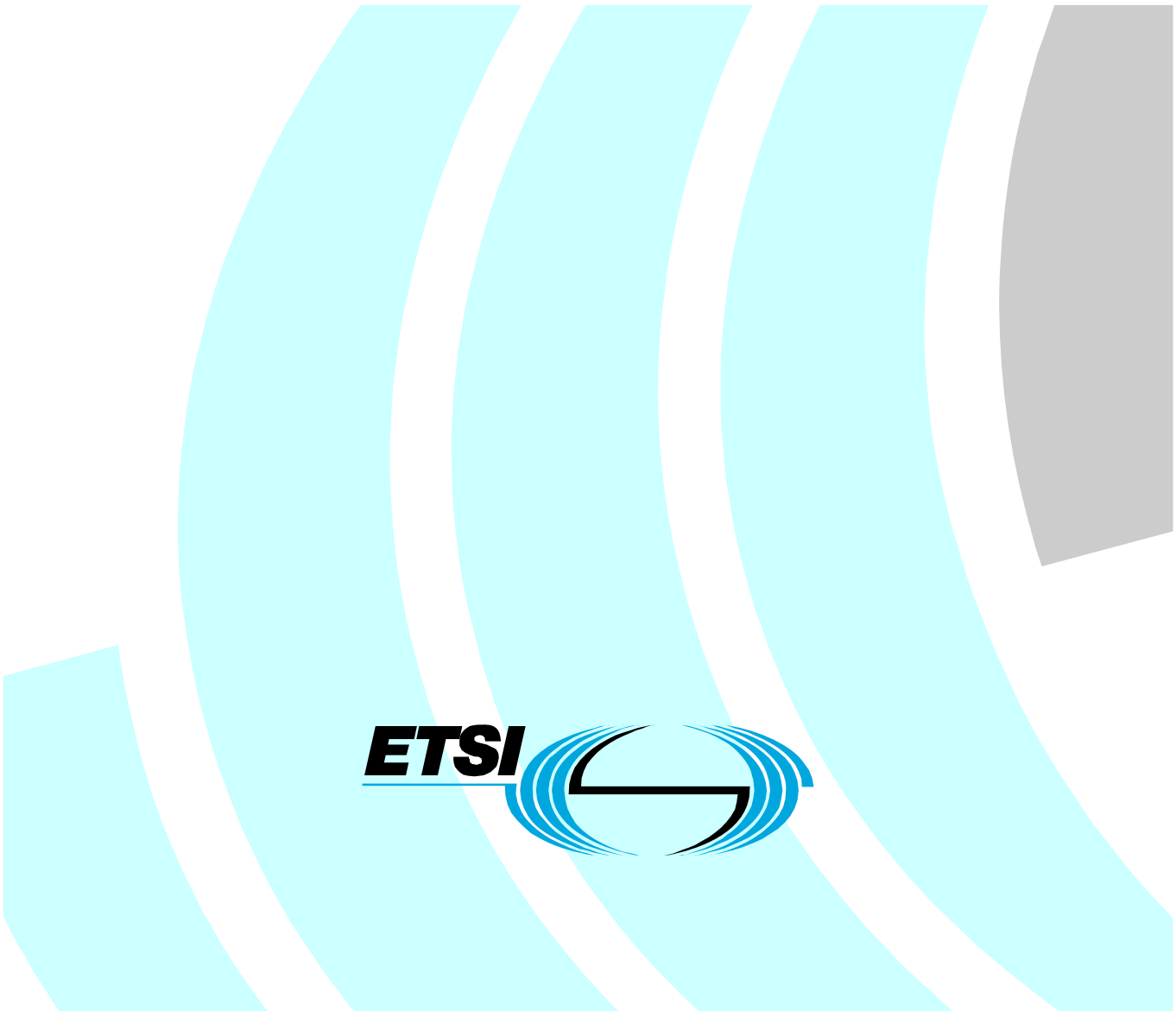

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Foreword

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

The contents of the present document are subject to continuing work within TC-SES and may change following formal TC-SES approval. Should TC-SES modify the contents of the present document it will then be republished by ETSI with an identifying change of release date and an increase in version number as follows:

Version 2.m.n

where:

- the third digit (n) is incremented when editorial only changes have been incorporated in the specification;
- the second digit (m) is incremented for all other types of changes, i.e. technical enhancements, corrections, updates, etc.

The present document is part 4, sub-part 8 of a multi-part deliverable covering the GEO-Mobile Radio Interface Specifications (Release 2) General Packet Radio Service, as identified below:

Part 1: "General specifications";

Part 2: "Service specifications";

Part 3: "Network specifications";

Part 4: "Radio interface protocol specifications":

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

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

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

Sub part 4: "Layer 1 General Requirements";

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

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

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

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

Sub part 9: "Performance Requirements on the Mobile Radio Interface";

Sub part 10: "Rate Adaptation on the Access Terminal-Gateway Station Subsystem (MES-GSS) Interface";

Sub part 11: "Radio Link Protocol (RLP) for Data Services";

Sub-part 12: "Mobile Earth Station (MES) - Base Station System (BSS) interface; Radio Link Control/ Medium Access Control (RLC/MAC) protocol";

Part 5: "Radio interface physical layer specifications";

Part 6: "Speech coding specifications";

Part 7: "Terminal adaptor specifications".

Introduction

GMR stands for GEO (Geostationary Earth Orbit) Mobile Radio interface, which is used for mobile satellite services (MSS) utilizing geostationary satellite(s). GMR is derived from the terrestrial digital cellular standard GSM and supports access to GSM core networks.

The present document is part of the GMR Release 2 specifications. Release 2 specifications are identified in the title and can also be identified by the version number:

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

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

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

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

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

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

where:

- xx.0yy (z = 0) is used for GMR specifications that have a corresponding GSM specification. In this case, the numbers xx and yy correspond to the GSM numbering scheme.
- xx.2yy (z = 2) is used for GMR specifications that do not correspond to a GSM specification. In this case, only the number xx corresponds to the GSM numbering scheme and the number yy is allocated by GMR.
- n denotes the first (n = 1) or second (n = 2) family of GMR specifications.

A GMR system is defined by the combination of a family of GMR specifications and GSM specifications as follows:

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

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

- If a GMR specification does not exist, the corresponding GSM specification may or may not apply. The applicability of the GSM specifications is defined in GMPRS-1 01.201 [2].

The clause numbering and the table numbering and figure numbering in the present document are aligned to the corresponding numbering of GMR-1 04.008 [19] as far as possible. In several places, this means that the table numbering and figure numbering is non-contiguous in the present document in order to maintain this alignment. The following rules apply:

- A table that uses the same table number replaces the corresponding table in GMR-1 04.008 [19];

- A table that uses a different table number is a new additional table.

1 Scope

1.1 Scope of the present document

The present document describes the procedures used at the radio interface (Reference point Um, see GMR-1 04.002 [6]) for Call Control (CC), of circuit switched services, Session Management(SM) for GMPRS services and Mobility Management (MM), and Radio Resource (RR) management for circuit switched and GMPRS services. These procedures are described in terms of messages exchanged over the control channels of the radio interface in the GMR-1 system. The control channels are described in GMR-1 04.003 [7].

The structured functions and procedures of this protocol and the relationship with other layers and entities are described in general terms in GMPRS-1 04.007 [11].

The present document does not cover the complete specifications but only describes where it differs from GMR-1 04.008 [19] for circuit switched services and GSM 04.08 [21] for packet services.

In the present document the clause numbering is based on the clause numbering in GMR-1 04.008 [19]. When a clause of GMR-1 04.008 [19] is not used, the GSM heading is retained and the words "This function is not currently supported in GMR-1" are inserted to maintain the numbering in subsequent clauses.

The messages and information elements defined in the present document are based on the GSM messages and information elements as defined in GMR-1 04.008 [19]. In all cases, if a GMR-1 message or information element is defined, this GMR-1 definition takes precedence over the GSM definition. This precedence rule operates independently for messages and information elements and the GMR-1 defined information elements shall take precedence over the corresponding GSM definitions for all messages, including messages that have the same structure as GSM. For example, if a GMR-1 message is defined to be the same as the corresponding GSM message, this does not imply that all the information elements are the same as GSM.

The present document is based on GMR-1 04.008 [19].

1.2 Application to the interface structures

The Layer 3 (L3) procedures apply to the interface structure provided by Layer 2 (L2), which is defined in GMR-1 04.005 [9] and GMR-1 04.006 [10]. GMR-1 04.007 [11] gives a general description of L3, including procedures, message formats, and error handling.

1.3 Structure of Layer 3 procedures

Same as clause 1.3 of GMR-1 04.008 [19].

1.4 Use of logical channels

The logical control channels are defined in GMR-1 05.002 [12]. In the following list, control channels that carry signalling information or specific types of user packet information are considered:

a) Broadcast Control Channel (BCCH): downlink only, used to broadcast cell-specific information;

b) GPS Broadcast Channel (GBCH): downlink only, used to broadcast the ephemeris data of the Global Positioning System (GPS) satellites;

c) Paging Channel (PCH): downlink only, used to send page requests and GPS Almanac Data to MESs;

d) Random Access Channel (RACH): uplink only, used to request a DCCH (Dedicated Control Channel);

e) Access Grant Channel (AGCH): downlink only, used to allocate a DCCH;

f) Standalone Dedicated Control Channel (SDCCH): bidirectional;

g) Fast Associated Control Channel (FACCH): bidirectional, associated with a Traffic Channel (TCH);

h) Slow Associated Control Channel (SACCH): bidirectional, associated with a TCH;

i) Terminal-to-terminal Associated Control Channel (TACCH): downlink only, used to provide signalling from a Gateway Station (GS) to an MES during a Terminal-to-Terminal (TtT) call;

j) Cell Broadcast Channel (CBCH): downlink only, used for general (not point-to-point) short message information;

k) Broadcast Alerting Channel (BACH): downlink only, used to send alert requests to MESs.

Three service access points that are determined by their Service Access Point Identifiers (SAPIs) (see GMR-1 04.006 [10]) are defined on signalling L2.

1) SAPI = 0: supports the transfer of signalling information including user-user information;

2) SAPI = 2: supports the transfer of signalling information between MESs during a TtT call;

3) SAPI = 3: supports the transfer of user Short Messages Service (SMS).

L3 selects the service access point, the logical control channel, and the mode of operation of L2 (acknowledged, unacknowledged, or random access, see GMR-1 04.005 [9] and GMR-1 04.006 [10]), as required for each individual message.

1.5 Overview of control procedures

1.5.1 List of procedures

The following procedures are addressed in the present document.

Clause 4 specifies elementary procedures for RR management:

1) Contention resolution (before and during link establishment)

2) System Information (SI) and GPS ephemeris data broadcasting

3) RR connection establishment:

   - Immediate assignment procedure;
   - Paging and Alerting procedure.

4) RR connection transfer phase:

   - Position-reporting procedure;
   - Intracell change of channels;
   - Channel mode change procedure;
   - Ciphering mode setting procedure;
   - Classmark update procedure;
   - Power Control parameter update procedure;
   - Dual-Tone Multifrequency (DTMF) transmission and reception procedures;
   - Link correction procedures;
   - Guard time violation reporting procedure;
   - Diagnostic information reporting procedure;
   - Channel parameter reporting procedure.

5) Radio resources connection release.

6) RR procedures on CCCH related to temporary block flow establishment:

   - Packet paging using CCCH;
   - Packet access using CCCH;
   - Packet Downlink Assignment using CCCH.

7) RR procedures on CCCH to support dark beam operations.

Clause 5 specifies elementary procedures for MM:

1) MM common procedures:

   - Temporary Mobile Subscriber Identity (TMSI) reallocation procedure;
   - Authentication procedure;
   - Identification procedure;
   - International Mobile Subscriber Identity (IMSI) detach procedure;
   - Abort procedure.

2) MM-specific procedures:

   - Generic location-updating procedure;
   - Location-updating procedure;
   - Periodic updating;
   - IMSI attach procedure;
   - Connection management sublayer service provision;
   - MM connection establishment;
   - MM connection information transfer phase;
   - MM connection release.

3) GMM common procedures:

   - GPRS P-TMSI reallocation procedure;
   - GPRS authentication and ciphering procedure;
   - GPRS identification procedure.

4) GMM specific procedures:

   - GPRS attach procedure;
   - GPRS detach procedure;
   - GPRS routing area updating procedure.

Clause 6 specifies elementary procedures for circuit-switched CC comprising the following elementary procedures:

1) Mobile-originating call establishment;

2) Mobile-terminating call establishment;

3) Signalling procedures during the Active state:

   - User notification procedure;
   - Call rearrangements;
   - In-call modification.

4) Call clearing initiated by the mobile earth station

5) Call clearing initiated by the network

6) Miscellaneous procedures:

   - In-band tones and announcements;
   - Status enquiry procedure;
   - Call reestablishment procedure.

Clause 7 specifies elementary procedures for GPRS session management:

1) GPRS session management procedures:

   - PDP context activation;
   - PDP context modification;
   - PDP context deactivation.

Elementary procedures can be combined to form structured procedures. Examples of such structured procedures are given in clause 8. This part of the present document is provided only to guide in assisting implementations.

Clause 9 specifies actions to be taken for various error conditions.

1.6 Applicability of implementations

1.6.1 Packet services

For mobile stations supporting packet services, it is explicitly mentioned throughout the present document if a certain procedure is applicable only for such a service and, if necessary, how mobile stations not supporting such a service shall behave.

A MES may only operate in the following MES operations mode:

- MES operation mode B; or
- MES operation mode C.

The MES operation mode depends on the services that the MES is attached to, i.e. only packet services or both packet and circuit switch services, and upon the MESs capabilities to operate packet and other circuit switched services simultaneously. Mobile earth stations that are capable of operating in packet services are referred to as GMPRS MESs.

NOTE: Other GMPRS technical specifications may refer to the MES operation modes B and C as GMPRS class-B MES and GMPRS class-C MES.

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific.

- For a specific reference, subsequent revisions do not apply.
- Non-specific reference may be made only to a complete document or a part thereof and only in the following cases:
  - if it is accepted that it will be possible to use all future changes of the referenced document for the purposes of the referring document;
  - for informative references.

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

For online referenced documents, information sufficient to identify and locate the source shall be provided. Preferably, the primary source of the referenced document should be cited, in order to ensure traceability. Furthermore, the reference should, as far as possible, remain valid for the expected life of the document. The reference shall include the method of access to the referenced document and the full network address, with the same punctuation and use of upper case and lower case letters.

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

[1] Void.

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

[3] ETSI GMPRS-1 03.003 (ETSI TS 101 376-3-3): "GEO-Mobile Radio Interface Specifications (Release 2); General Packet Radio Service; Part 3: Network specifications; Sub-part 3: Numbering, Addressing and Identification".

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

[5] ETSI GMPRS-1 03.297 (ETSI TS 101 376-3-19): "GEO-Mobile Radio Interface Specifications (Release 2) General Packet Radio Service (GMPRS); Part 3: Network specifications; Sub-part 19: Optimal Routing technical realization".

[6] ETSI GMR-1 04.002 (ETSI TS 101 376-4-2): "GEO-Mobile Radio Interface Specifications; Part 4: Radio interface protocol specifications; Sub-part 2: GMR-1 Satellite Network Access Reference Configuration".

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

[7] ETSI 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.

[8] Void.

[9] ETSI GMR-1 04.005 (ETSI TS 101 376-4-5): "GEO-Mobile Radio Interface Specifications; Part 4: Radio interface protocol specifications; Sub-part 5: Data Link Layer General Aspects".

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

[10] 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.

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

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

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

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

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

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

[17] 3GPP TS 04.08 (ETSI TS 100 557): "Digital cellular telecommunications system (Phase 2); Mobile radio interface; Layer 3 specification (Phase 2)".

[18] 3GPP TS 24.008 (ETSI TS 124 008): "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS);Mobile radio interface Layer 3 specification; Core network protocols; Stage 3 (Release 1999)".

[19] GMR-1 04.008 (ETSI TS 101 376-4-8) V1.3.1: "GEO-Mobile Radio Interface Specifications (Release 2) General Packet Radio Service (GMPRS); 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.

[20] GMPRS-1 04.060 (ETSI TS 101 376-4-12): "GEO-Mobile Radio Interface Specifications (Release 2) General Packet Radio Service (GMPRS); 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".

[21] 3GPP TS 04.08 (TS 100 940): "Digital Cellular Telecommunications System (Phase 2+): Mobile radio interface layer 3 Specification (Release 1998)".

[22] GSM 04.10 (ETSI ETS 300 558): "Digital cellular telecommunications system (Phase 2); Mobile radio interface layer 3; Supplementary services specification; General aspects; (GSM Phase 2)".

[23] GMPRS-1 03.064 (ETSI TS 101 376-3-22): "GEO-Mobile Radio Interface Specifications (Release 2) General Packet Radio Service (GMPRS); Part 3: Network specifications; Sub-part 22: Overall description of the GMPRS radio interface; Stage 2".

[24] 3GPP TS 03.60 (ETSI TS 101 344) V6.11.0: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS) Service description; Stage 2 (Release 1997)".

[25] ITU-T Recommendation E212: "The international identification plan for mobile terminals and mobile users".

2.2 Informative references

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

[i.1] 3GPP TS 48.018 (ETSI TS 148 018): "Digital cellular telecommunications system (Phase 2+);General Packet Radio Service (GPRS); Base Station System (BSS) - Serving GPRS Support Node (SGSN); BSS GPRS Protocol (BSSGP)".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in GMR-1 04.008 [19] apply.

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in GMR-1 04.008 [19] and the following apply:

GU GPRS Update
RAU Routing Area Update

A number of concepts and abbreviations are borrowed from the 3GPP TS 04.08 [17]. The mapping in table 3.1 could be useful for proper association of GSM to GMR-1 abbreviations.

Table 3.1: Mapping of GSM terms to GMR-1 terms

Usage in GSM	Usage in GMR-1
MS (Mobile Station)	MES (Mobile Earth Station)
BS (Base Station)	GS (Gateway Station)
Dm (D channel for GSM)	Sat (Satellite channel for GMR-1)
GSM *nn.nn* (*for reference*)	GMR-1 *nn.nnn* (*if reference exists*)

3.3 Random values

Same as clause 3.3 of GMR-1 04.008 [19].

4 Radio resource management procedures

4.1 Overview/general

4.1.1 General

Same as clause 4.1.1 of GMR-1 04.008 [19].

If packet point-to-point procedures are supported, the radio resource management procedures includes functions related to the management of transmission resources on packet data physical channels. This includes the broadcast of system information to support a mobile station in packet idle and packet transfer modes, see GMPRS-1 04.060 [20].

4.1.2 Services provided to upper layers

4.1.2.1 Idle mode

Same as clause 4.1.2.1 of GMR-1 04.008 [19].

4.1.2.2 Establishment and release of an RR connection

Same as clause 4.1.2.2 of GMR-1 04.008 [19].

4.1.2.3 RR connected mode

Same as clause 4.1.2.3 of GMR-1 04.008 [19].

4.1.2.4 Packet idle mode

Only applicable for mobile stations supporting packet services.

In packet idle mode, no temporary block flow exists. Upper layers may require the transfer of a LLC PDU, which implicitly triggers the establishment of a temporary block flow.

The RR sublayer also provides GMPRS suspension and resumption services to the MM sublayer.

4.1.2.5 Packet transfer mode

Only applicable for mobile stations supporting packet services.

In packet transfer mode, the mobile station is allocated radio resource providing a temporary block flow on one or more packet data physical channels. The RR sublayer provides the following services:

- Transfer of LLC PDUs in acknowledged mode.
- Transfer of LLC PDUs in unacknowledged mode.

Depending on the GMPRS mode of operation (class B), the mobile earth station may leave both packet idle mode and packet transfer mode before entering dedicated mode.

4.1.3 Services required from data link and physical layers

Same as clause 4.1.3 of 04.008 [19].

4.1.4 RR states

Same as clause 4.1.4 of GMR-1 04.008 [19].

4.1.5 Change of dedicated channels

Same as clause 4.1.5 of GMR-1 04.008 [19].

4.1.6 Procedure for service request and contention resolution

Same as clause 4.1.6 of GMR-1 04.008 [19].

4.2 Idle mode procedures

4.2.1 Mobile Earth Station (MES) side

Same as clause 4.2.1 of GMR-1 04.008 [19].

4.2.2 Network side

4.2.2.1 System information broadcasting

Same as clause 4.2.2.1 of GMR-1 04.008 [19].

4.2.2.1.1 Classes and segments

Same as clause 4.2.2.1.1 of GMR-1 04.008 [19].

4.2.2.1.1.1 Class 1

This class contains information pertaining to the RACH/PRACH access procedure, which changes very fast and also shall be acquired by the MES prior to a RACH/PRACH attempt. A full cycle of this information should be transmitted at least once every 2 BCCH bursts (BCCH bursts occur at 320 ms intervals).

4.2.2.1.1.2 Class 2

This class currently contains information pertaining to spot beam and camping on procedures. This class also contains information which indicates if GMPRS related parameters are carried on other segments or not. A full cycle of this information should be transmitted at least once every eight BCCH bursts.

4.2.2.1.1.3 Class 3

This class contains information pertaining to the PLMN selection, initial spot beam selection, packet related GMPRS flags, GMPRS BCCH options, PCCCH Organization and frequency parameters. A full cycle of this information should be transmitted at least once every 16 BCCH bursts.

4.2.2.1.1.4 Class 4

Same as clause 4.2.2.1.1.4 of GMR-1 04.008 [19].

4.2.2.1.1.5 Segment

Same as clause 4.2.2.1.1.5 of GMR-1 04.008 [19].

4.2.2.1.2 Transmission schedules

Same as clause 4.2.2.1.2 of GMR-1 04.008 [19].

4.2.2.1.3 Change information

Same as clause 4.2.2.1.3 of GMR-1 04.008 [19].

4.2.2.1.4 Encoding and decoding rules

The following rules shall apply to the encoding and decoding of SI messages:

- The protocol version number "0001" is the current baseline protocol version number.
- If the MES receives SI that has a baseline protocol version number that is lower than its implemented protocol version number, it shall interpret the SI according to the received protocol version number.
- If the MES receives SI that has a baseline protocol version number that is greater than or equal to its implemented protocol version number, it shall interpret the SI according to the MESs implemented protocol version number.
- The MES shall check the block header and segment type in the segment header. It may stop decoding SI blocks when it has read all the segments that it can recognize, based on the segment type. It shall stop decoding a segment when it has decoded all the fields that it is able to decode, based upon the MESs implemented protocol version number.
- The MES shall determine the contents of a system block only from the block header and the class header. The MES shall make no assumption regarding the order of transmission of SI blocks or class segments. The MES shall make no assumption regarding the synchronization of a frame number vs. any block or segment of any class of SI.
- A class of system information shall only be assembled from segments that have the same version number. If the MES receives a segment that contains a different version number, any unused earlier segments shall be discarded and the MES shall restart assembling the class segments using the new version number.
- Some blocks contain variable length lists, with the length information coded within the list. If an MES detects that the list ends before its expected size, i.e. is shorter than the maximum size, it shall jump directly to the expected location of the next known field in the segment or the next segment if this happens to be the last field in the current segment.

4.2.2.1.4.1 Differentially encoded carrier lists

Same as clause 4.2.2.1.4.1 of GMR-1 04.008 [19].

4.2.2.1.4.2 Concurrent BCCH list

Same as clause 4.2.2.1.4.2 of GMR-1 04.008 [19].

4.2.2.1.4.3 Packet control channel list

The packet control channel list contains multiple sub-lists called Packet Control Channel Definition (see clause 11.5.2.109) , each one corresponding to a different downlink bandwidth. Three different downlink bandwidths are supported in a GMPRS network, 62,5 kHz, 125 kHz and 156,25 kHz. The GMPRS terminal type identifier (see GMPRS-1 05.002 [12]) indicates the capability of an MES to support one or more of the three downlink bandwidth types. A single spot-beam can have carriers of all three or a combination of three downlink bandwidths. Additionally, based on network resource availability the number of carriers and the type of carriers available in a spot-beam may vary over time. Thus if a single spot-beam has carriers of both 125 kHz and 156,25 kHz, and there are packet control channels on both categories of carriers, there will be two sub lists. Similarly, if the spot beam has carriers for both 62,5 kHz and 156,25 kHz then there will two sub lists. If a single spot-beam has only 62,5 kHz (or only 156,25 kHz) carriers then there will be a single sub list. Each sub list has a single field called SA_PCCCH_CHANS which identifies the number of PCCCH carrying sub-bands of the bandwidth defined in the subsequent Downlink BW field. The presence of the Downlink BW field is conditional on SA_PCCCH_CHANS being non-zero. If SA_PCCCH_CHANS is zero, this means that there are no subsequent PCCCHs defined in the system information of any bandwidth category.

While in packet idle mode, using the Packet control channel list and the GMPRS terminal type assigned to it, an MES can determine if suitable packet carriers are available in a spot-beam or not.

4.2.2.1.5 Future extensions

Same as clause 4.2.2.1.5 of GMR-1 04.008 [19].

4.2.2.1.6 Anchored(A) and Temporary(T) BCCH

Refer to GMPRS-1 05.008 [15] for definition of A-BCCH and T-BCCH. The distribution of A-BCCH and T-BCCH in BCCH neighbour lists and concurrent BCCH system information is as follows:

- BCCH neighbour lists in A-BCCHs and T-BCCHs shall only contain A-BCCHs.
- If T-BCCH is present all A-BCCHs shall contain T-BCCHs in the concurrent BCCH information.
- All T-BCCHs shall contain A-BCCHs in the concurrent BCCH information.

4.2.2.1.7 Multiplexing of CCCH and PCCCH

PCCCH and CCCH (both normal CCCH and CCCH/AGCH) may coexist in a spot-beam. The PCCCH description is provided in a variable size list, which shares the class 3 segments with the CCCH normal or the CCCH/AGCH.

In segments 3C, 3D, 3E and 3E bis, the PCCCH and the normal CCCH lists share the same bitspace. In segments 3F, 3G, 3G bis and 3H, the PCCCH and the CCCH/AGCH lists share the same bitspace. Note that each segment contains a part of the CCCH list and then a part of the PCCCH list.

To find the PCCCH list and decode it, the terminal may do the following:

- Read the parameter SA_CCCH_CHANS to determine the number of normal CCCHs and SA_AGCH_CHANS to determine the number of CCCH/AGCH in the appropriate segments.
- In each segment where the normal CCCH is present, it starts decoding the normal CCCH list. For each decoded CCCH an internal variable corresponding to the number of normal decoded CCCHs is incremented. It stops decoding the CCCH list for that segment when the internal variable reaches the value of SA_CCCH_CHANS or the maximum number of bits allocated for CCCH in that segment is reached. The PCCCH list, if present is immediately after this. The presence or absence of the PCCCH list is determined by the parameter SA_PCCCH_CHANS at the head of the Packet Control Channel Definition IE, which indicates how many PCCCHs of the bandwidth specified in the following field are present. Note that if a given SA_PCCCH_CHANS reads zero, it indicates that there are no PCCCH elements behind it.
- The same procedure is used for the segments containing CCCH/AGCH. Note that the PCCCH definitions may run through multiple segments so that the start is in segment 3C and end in 3D, 3E/3Ebis, 3F,3G/3Gbis or 3H. In other words, there is no demarcation of segments as in the case of normal CCCH and CCCH/AGCH.
- The SA_AGCH_CHANS, SA_CCCH_CHANS variables indicate the total number of CCCHs of a given category for the entire system information cycle, not just in a particular segment. Thus the internal variable is not reset across segments.
- The SA_PCCCH_CHANS variable 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.

4.2.2.2 GPS satellite ephemeris data broadcasting

Same as clause 4.2.2.2 of GMR-1 04.008 [19].

4.2.2.3 GPS almanac data transmission

Same as clause 4.2.2.3 of GMR-1 04.008 [19].

4.3 RR connection establishment

4.3.1 RR connection establishment initiated by the Mobile Earth Station (MES): immediate assignment procedure

Same as clause 4.3.1 of GMR-1 04.008 [19].

4.3.1.1 Spot beam selection to access the network

The RR entity at the MES side interacts with the physical layer for a suitable spot beam (see GMPRS-1 05.008 [15], and GMPRS-1 03.022 [4]). Upon camping on a suitable spot beam, the physical layer entity informs the RR layer of the availability of the spot beam. The MES performs LAI selection within the available spot beams and then camps onto the control channels of the suitable cell (i.e., the LAI within the spot beam). The MES requesting packet services acquires a BCCH to determine whether it is offering packet services. If so, it acquires the BCCH and camps on the control channels that are advertised in the BCCH. If no packet services are available, the MES will go through the concurrent list till it finds a BCCH which is offering packet services. If no BCCH is available which is offering packet services MES will execute the dark-beam camping procedure as given in GMPRS-1 03.022 [4].

4.3.1.2 Permission to access the network

Same as clause of 4.3.1.2 of GMR-1 04.008 [19].

4.3.1.3 Initiation of the immediate assignment procedure

The MES shall attempt to obtain the current GPS position before sending a CHANNEL REQUEST message on the RACH. A position shall be current if less than Page GPS Position Age (Mobile Terminated (MT) calls) or GPS Position Age (other accesses) time has elapsed since it was measured. If the last measured position is not current, the MES shall start the RACH Position timer and initiate GPS position calculation. If the position calculation is successful, the timer shall be stopped and the newly calculated position is used. If the timer expires, the last available position (if any) shall be used. If no position information is available, an access attempt shall be made without position information.

The Page Response Current GPS flag indicates the importance of responding to an MT call with a current position in order to ensure that the call can be completed. If the Page Response Current GPS flag is set to 1, the RACH Position timer shall not be used for MT calls. Instead, the page timer (in response to paging) or alert timer (in response to alerting) shall be used in its place in the procedure described in the preceding paragraph.

If T3119 expires while the GPS calculation is being done, T3119 is restarted and no further action needs to be taken in response to this event.

A GMPRS Class-B MES requesting circuit-switched services shall first check if GMPRS service is already suspended. If not already suspended, then GMPRS Class-B MES shall request suspension of GMPRS service as specified in clause 4.8. If the GMPRS service was already suspended (e.g., due to previous attempt), then GMPRS Class-B MES shall proceed as specified in the following paragraphs.

If the MES requesting circuit services sends position information in the CHANNEL REQUEST message, it shall send the timestamp in CIPHER MODE COMPLETE message. When the establishment cause is "position verification", the MES shall send only the CHANNEL REQUEST message with the new GPS position. If new position is not available, no CHANNEL REQUEST message will be sent If the MES is requesting packet services with establishment cause Packet Routing Area Update/Attach request it shall include the timestamp in the CHANNEL REQUEST TYPE 1 message. If the establishment cause is Packet TBF Establishment the MES shall not include the timestamp in the CHANNEL REQUEST TYPE 1 message.

If the MES is accessing the home PLMN, it shall send the Service Provider Identification (SP ID) in the CHANNEL REQUEST message. While accessing any network other than the home PLMN, the MES shall send the Home Public Land Mobile Network Identification (HPLMN-ID).

For MES requesting circuit services the RR entity shall indicate the terminal priority in the CHANNEL REQUEST message. For certain types of terminals, this value is stored in the non-volatile memory. If the terminal is not equipped with this information, the default value (value 0) shall be sent by the MES.

Under certain circumstances the MES requesting circuit services will resend a CHANNEL REQUEST message for Call Establishment as part of the optimal routing procedures described in GMR-1 03.297 [5]. The O and R bits are used in these procedures. The MES may resend a CHANNEL REQUEST message on the original RACH following an attempt at optimal routing that failed due to inability to register on the optimal GS. The MES shall resend a CHANNEL REQUEST message to the new RACH on the new satellite following an IMMEDIATE ASSIGNMENT REJECT message or EXTENDED IMMEDIATE ASSIGNMENT REJECT message with reject cause, "redirect to the new satellite". The MES shall resend a CHANNEL REQUEST message to the old BCCH on the old satellite following an optimal routing failure on the new satellite which occurs before the MES receives an IMMEDIATE ASSIGNMENT message or IMMEDIATE ASSIGNMENT REJECT message from the new satellite.

The MES requesting circuit services shall not resend a CHANNEL REQUEST message more than once in a single-satellite optimal routing case. The MES requesting circuit services shall not send a CHANNEL REQUEST message more than once on the second satellite nor resend it more than once on the first satellite in a two-satellite optimal routing case.

As long as the MES is continuing an immediate assignment procedure for the same service connection, it shall continue to use the same establishment cause until it is terminated.

The RR entity shall read Class 1 system information and the SI block header immediately prior to transmission of a CHANNEL REQUEST message and verify the RACH_CONTROL_PARAMETERS in combination with the Access Control Class elementary file in the Subscriber Identity Module (SIM). The MES shall not utilize the RACH if not allowed by any parameter in the RACH_CONTROL_PARAMETERS.

The RR entity of the MES shall initiate the immediate assignment procedure by scheduling sending on the RACH (of the CHANNEL REQUEST message) with maximum power and leaving the idle mode (in particular, the MES will ignore the PAGING REQUEST messages).

To schedule the transmission of the CHANNEL REQUEST, the RR entity randomly selects a RACH out of the total available contention channels in the LAI as broadcast in the BCCH. The MES then chooses a frame <n> counting from the current frame, to send the CHANNEL REQUEST. The value of <n> is randomly chosen from a sequence {0, 1, …, <m>}, where the value of <m> is defined by the RANDOMIZATION PERIOD in the header of the system information block from which the Class 1 information was read.

After sending the CHANNEL REQUEST message on the RACH, the RR entity at the MES shall start timer T3126. At expiry of this timer, the RR entity shall increment the value of the retransmit counter, which maintains a count of the total number of retransmission attempts since the initiation of the Immediate Assignment procedure. If this value exceeds M (M is the value of the "max retrans" broadcast over BCCH), the Immediate Assignment procedure shall be aborted; if the Immediate Assignment procedure was triggered by a request from the MM sublayer, a random access failure shall be indicated to the MM/GMM sublayer.

For MES requesting circuit services, if the establishment cause is "position verification", and there is a pending establishment request from the MM layer or a request from the RR layer to service a received PAGE REQUEST/ALERT REQUEST message, the RR layer shall not retry the channel establishment for position verification procedure, even if the retry count does not exceed M. Instead, it shall reset the retry counter and attempt to establish a fresh radio-channel connection to service the pending establishment request from the MM or RR sublayer itself.

If the maximum retransmission value is not achieved, the RR entity at the MES shall repeat the transmission of the CHANNEL REQUEST messages over the random access channel with a new random reference (drawn randomly from a uniform probability distribution) each time. The retransmission of the CHANNEL REQUEST is delayed by n frames, following the expiration of the timeout, where n is a random number between 1 and S_k. The value of S_k is obtained from $S_k = 4 \times 2^{k-1}$, where k is the value of the retransmission count.

While timer T3126 is running after sending the CHANNEL REQUEST message, the MES shall continuously monitor the corresponding downlink CCCH (as the AGCH/RACH are paired, the corresponding downlink CCCH refers to the one paired with the RACH on which the request was sent) for AGCH messages.

For MES requesting packet services using CHANNEL REQUEST TYPE 1 will follow the retransmission procedure as described in clause 4.7.2.1.2.

4.3.1.4 Answer from the network

4.3.1.4.1 On receipt of a CHANNEL REQUEST message

Same as clause 4.3.1.4.1 of GMR-1 04.008 [19].

4.3.1.4.2 IMMEDIATE ASSIGNMENT from network for MES requesting circuit service

Same as clause 4.3.1.4.2 of GMR-1 04.008 [19].

4.3.1.4.2.1 IMMEDIATE ASSIGNMENT with dedicated resource allocated and location update needed

Same as clause 4.3.1.4.2.1 of GMR-1 04.008 [19].

4.3.1.4.2.2 IMMEDIATE ASSIGNMENT with dedicated resource allocated and no location update needed

Same as clause 4.3.1.4.2.2 of GMR-1 04.008 [19].

4.3.1.4.2.3 IMMEDIATE ASSIGNMENT with dedicated resource allocated and extended procedure needed

Same as clause 4.3.1.4.2.3 of GMR-1 04.008 [19].

4.3.1.4.2.4 IMMEDIATE ASSIGNMENT with no dedicated resource allocated and pause timer indicated

Same as clause 4.3.1.4.2.3 of GMR-1 04.008 [19].

4.3.1.4.3 Immediate Assignment from network for MES requesting packet service

Upon receipt of an IMMEDIATE ASSIGNMENT TYPE 2 message corresponding to its CHANNEL REQUEST TYPE 1 message the MES shall proceed as described in clause 4.7.2.

4.3.1.4.4 Assignment rejection (IMMEDIATE ASSIGNMENT REJECT from network)

For circuit switched services if no channel is available for assignment, or if a dedicated channel shall not be provided, the network should send the MES an IMMEDIATE ASSIGNMENT REJECT (TYPE 1 or TYPE 2) message in unacknowledged mode in any AGCH slot of any frame of the downlink CCCH corresponding to the RACH on which the CHANNEL REQUEST message was received. This message contains the request reference and a wait indication. The MES matches the request reference and the GPS discriminator (if given for the request reference) with the corresponding locally calculated value to determine if the IMMEDIATE ASSIGNMENT REJECT message is addressed to it. The IMMEDIATE ASSIGNMENT REJECT TYPE 2 message is for all purposes equivalent to an IMMEDIATE ASSIGNMENT REJECT TYPE 1 message except that a country/region display string is given with the TYPE 2 message and TYPE 2 is not used for certain reject causes ("lack of resources", "invalid position for spot-beam", "reported position acceptable", and "redirect to another satellite"). The MES stores the available country/region information (given in the Position Display IE) for displaying it to the user.

The GPS Update Timer value and GPS Update Distance value, if available in the received message, shall replace the corresponding idle mode position reporting parameters.

For packet switched services the network should send the MES an IMMEDIATE ASSIGNMENT REJECT (TYPE 1 or TYPE 2 or TYPE 3) message. If the reject cause is incorrect class-2 RACH info, the UT shall not consider the GPS discriminator.

Upon receipt of an IMMEDIATE ASSIGNMENT REJECT message corresponding to its last CHANNEL REQUEST/CHANNEL REQUEST TYPE 1 message the MES shall stop timer T3126/T3146 or timer T3115 or T3333, whichever is running. Subsequent handling varies for different reject causes as given in clauses 4.3.1.4.4.1 to 4.3.1.4.4.13.

4.3.1.4.4.1 Lack of resources

If the reject cause is "lack of resources" at the network in response to the CHANNEL REQUEST message, the MES shall start timer T3122 with the indicated value (Wait Indication IE) and returns to idle mode (listening to its paging channel). The MES shall not make a new attempt to establish a nonemergency RR connection in the same cell until T3122 expires. Provided that an IMMEDIATE ASSIGNMENT REJECT message has not been received for an emergency RR connection attempt, the MES may attempt to establish an RR connection for an emergency call in the same cell before T3122 has expired. This reject cause in response to a CHANNEL REQUEST TYPE 1 message indicates that resources to support the packet service request are not available in this spotbeam at this time. The MES shall terminate the Packet Access procedure and RR should notify the higher layer of this failure. The MES shall start timer T3142 with the value contained in the Wait Indication IE and shall not make another request for packet service until expiry of timer T3142. The MES shall ignore IMMEDIATE ASSIGNMENT TYPE 3 messages and PAGING REQUEST messages indicating packet paging procedures while T3142 is running.

T3142 shall apply only to the location area from which the rejection was received. The MES is free to request packet service in another location area following spotbeam reselection or change of PLMN/LAI selection.

4.3.1.4.4.2 Invalid position for selected LAI

Same as clause 4.3.1.4.3.2 of GMR-1 04.008 [19].

4.3.1.4.4.3 Invalid position for selected spot beam

Same as clause 4.3.1.4.3.3 of GMR-1 04.008 [19].

4.3.1.4.4.4 Invalid position

Same as clause 4.3.1.4.3.4 of GMR-1 04.008 [19].

4.3.1.4.4.5 Invalid position for service provider

Same as clause 4.3.1.4.3.5 of GMR-1 04.008 [19].

4.3.1.4.4.6 Position too old

Same as clause 4.3.1.4.3.6 of GMR-1 04.008 [19].

4.3.1.4.4.7 Redirect to new satellite

Same as clause 4.3.1.4.3.7 of GMR-1 04.008 [19].

4.3.1.4.4.8 Additional data in REJECT message

Same as clause 4.3.1.4.3.8 of GMR-1 04.008 [19].

4.3.1.4.4.9 Dark beam activation in progress

This reject cause indicates that the network has received the RACH successfully. On receipt of this reject cause the MES shall start timer T3115 (Pause Timer) with the value received in the IMMEDIATE ASSIGNMENT REJECT TYPE 3 message. The MES should not send another RACH, till the expiry of Pause Timer or till it receives an IMMEDIATE ASSIGNMENT REJECT TYPE 3 in which case it will follow the procedure as described in clause 4.3.1.4.4.

4.3.1.4.4.10 Switch to new BCCH

Upon receipt of this reject cause the MES will camp-on to the new BCCH ARFCN and initiate the Immediate Assignment procedure on RACH as described in clause 4.3.1.3.

4.3.1.4.4.11 Incorrect Class-2 RACH Info

On receiving this reject cause, a type A (see GMPRS-1 05.002 [12]) MES shall re-transmit the Channel Request Type 1 message after applying the timing and frequency correction received in the Immediate Assignment Reject Type 3 message and shall follow the procedure as described in clause 4.3.1.3. The MES shall retransmit the RACH at most three times for each packet access procedure invocation. If the MES receives this cause value more than three times within the context of a packet access procedure, the MES shall terminate the current packet access procedure and declare failure to the upper layers.

A type C MES, on receiving this reject cause shall re-transmit the Channel Request Type 1 message after applying time and frequency correction as specified in GMPRS-1 05.010 [16] and shall follow procedure described in clause 4.3.1.3. The MES shall retransmit the RACH at most three times for each packet access procedure invocation. If the MES receives this cause value more than three times within the context of a packet access procedure, the MES shall terminate the current packet access procedure and declare failure to the upper layers.

If this reject cause was received in response to a Channel Request Type 2 message, by an type C MES, the MES shall re-transmit the Channel Request Type 2 message after applying time and frequency correction as described in GMPRS-1 05.010 [16] and shall follow procedure described in clause 4.3.1.3.

4.3.1.4.4.12 Non-availability of satellite resources

This reject cause indicates that the network has insufficient resources to provide packet service in this spotbeam. The MES will terminate the current access procedure and declare failure to the upper layers. It shall start timer T3333 with the value indicated in the Illumination Retry IE in the Immediate Assignment Reject message and return to idle mode. It shall not make another request for packet service until expiry of timer T3333.

T3333 shall apply only to the location area from which the rejection was received. The MES is free to request packet service in another location area following spotbeam reselection or change of PLMN/LAI selection.

4.3.1.4.4.13 Non-Availability of Service

This reject cause indicates that packet service is not available from the current LAI to this location. The MES shall terminate the Packet Access procedure and RR should notify the higher layer of this failure. The MES shall start timer T3144 and shall not make another request for packet service until expiry of timer T3144.

The MES shall stop T3144 upon measuring a new GPS position if Position Reporting Required is set to Required and:

a) no GPS position was included in the Channel Request; or

b) the CPI bit in the Channel Request indicated an old position; or

c) the new position is at least GPS Update Distance from the reported position.

T3144 shall apply only to the location area from which the rejection was received. The MES is free to request packet service in another location area following spotbeam reselection or change of PLMN/LAI selection.

4.3.1.4.4.14 Pause indication

This reject cause indicates that the network has received the RACH successfully. On receipt of this reject cause, the MES shall start timer T3115 (Pause Timer) with the value received in the IMMEDIATE ASSIGNMENT REJECT TYPE 3 message. The MES should not send another RACH until any of the following conditions occur:

- Expiry of Pause Timer;
- MES receives an IMMEDIATE ASSIGNMENT REJECT TYPE 3, in which case it will follow the procedure as described in clause 4.3.1.4.4;
- MES receives an IMMEDIATE ASSIGNMENT TYPE 2, in which case it will follow the procedure as described in clause 4.7.2.1.3.

4.3.1.4.5 Extended immediate assignment procedure

If the network is not able to receive the complete CHANNEL REQUEST message and needs further information from the MES in order to make call setup decisions, it may ask the MES to initiate the extended immediate assignment procedure before sending an initial L3 message. The network should not respond to any incompletely received CHANNEL REQUEST message except when it asks the MES for the extended procedure. The network may also initiate the extended immediate assignment procedure on receipt of CHANNEL REQUEST TYPE-2 message. As explained in clause 4.3.1.4.2.3, the MES establishes the main signalling link and performs contention resolution. It then sends the EXTENDED CHANNEL REQUEST message on the main signalling link and starts timer T3127. If the network receives a CHANNEL REQUEST message with packet access establishment cause, it shall not initiate the Extended Immediate Assignment Procedure.

A MES whose CHANNEL REQUEST message contains packet access establishment cause, shall ignore a immediate assignment message to a channel which is to be used in a dedicated mode.

When sending EXTENDED CHANNEL REQUEST message on the main signalling link immediately following a GMPRS suspend procedure, the MES shall set the establishment cause to correspond to the request from upper layers (i.e., establishment cause will be set as defined in clause 11.5.2.48).

4.3.1.4.5.1 EXTENDED IMMEDIATE ASSIGNMENT from network

Same as clause 4.3.1.4.4.1 of GMR-1 04.008 [19].

4.3.1.4.5.2 EXTENDED IMMEDIATE ASSIGNMENT REJECT from network

Same as clause 4.3.1.4.4.2 of GMR-1 04.008 [19].

4.3.1.4.5.3 Abnormal cases (during extended immediate assignment procedure)

Same as clause 4.3.1.4.4.3 of GMR-1 04.008 [19].

4.3.1.4.6 Position verification procedure

Same as clause 4.3.1.4.5 of GMR-1 04.008 [19].

4.3.1.5 Assignment procedure completion

Same as clause 4.3.1.5 of GMR-1 04.008 [19].

4.3.1.6 Abnormal cases

Same as clause 4.3.1.6 of GMR-1 04.008 [19].

4.3.2 RR connection establishment initiation by the network: paging procedure for circuit switched services

Same as clause 4.3.2 of GMR-1 04.008 [19].

4.4 RR connection transfer phase

Same as clause 4.4.1.1 of GMR-1 04.008 [19].

4.5 RR connection release procedure

Same as clause 4.5 of GMR-1 04.008 [19].

4.6 Receiving an RR STATUS message by an RR entity

Same as clause 4.6 of GMR-1 04.008 [19].

4.7 RR procedures on CCCH related to temporary block flow establishment

The establishment of a Temporary Block Flow (TBF) on a packet data physical channel is supported by procedures on CCCH. The procedures for temporary block flow establishment using CCCH are only applicable to a mobile station supporting GMPRS. These procedures constitute a complement to the corresponding procedures for temporary block flow establishment using PCCCH, defined in GMPRS-1 04.060 [20], and include the procedures using CCCH for packet paging (see clause 4.7.1), packet access (see clause 4.7.2) and packet downlink assignment (see clause 4.7.3).

4.7.1 Packet paging procedure using CCCH

Same as clause 3.5.1 of 3GPP TS 04.08 [21].

4.7.1.1 Packet paging initiation by the network

The packet paging procedure is initiated by the RR entity of the network side. It is triggered by a page request from the MM sublayer, see GMPRS-1 04.007 [11].

The network initiates the paging procedure by sending a paging request message on an appropriate paging subchannel on CCCH. Paging initiation using a paging subchannel on CCCH is used when sending paging information to a mobile station.

There are three types of paging request messages that are applicable:

- PAGING REQUEST TYPE 1
- PAGING REQUEST TYPE 2
- PAGING REQUEST TYPE 3.

In a PAGING REQUEST message used for the packet paging procedure, the mobile station shall be identified by the P-TMSI (GMPRS TMSI) or its IMSI. If the mobile station is identified by its IMSI, the network shall set the Channel Needed field in the Paging Information IE to PDCH to indicate that it is being paged for packet services. On receiving the page message the mobile station shall proceed as specified in clause 4.7.1.2. If the mobile station is identified by the P-TMSI, it shall proceed as specified in clause 4.7.1.2.

A PAGING REQUEST message may include more than one mobile station identification.

The mobile station in packet idle mode is required to receive and analyse the paging messages and immediate assignment messages sent on the paging subchannels on CCCH corresponding to the paging groups determined for it in packet idle mode, as specified in GMPRS-1 05.002 [12]. These messages contain a page mode information element.

The treatment of page mode information, including the procedure when the mobile station selects a new PCH, and the procedure if a message in a paging subchannel is not received correctly are defined in clause 4.3.2.1.

For each paged MES, the PAGING REQUEST message includes SGSN ID and Channel Needed parameters, which shall be echoed back by the MES in the CHANNEL REQUEST TYPE 1 message.

A PAGING REQUEST message may also be used by the network to carry the GPS Almanac Data if some of the slots for inserting P-TMSIs are unused. Information about whether a particular slot is carrying P-TMSI/paging information or whether it is carrying GPS Almanac Data is given in the TMSI Availability Mask IE. The MES should analyze this IE to detect slots that are carrying valid P-TMSIs.

The choice of message type depends on the number of MESs to be paged and on the types of identities used. The maximum number of paged MESs per message is four when using only P-TMSIs for identification of the MESs.

4.7.1.2 On receipt of a packet paging request

On the receipt of a paging request message, the RR sublayer of addressed mobile station indicates the receipt of a paging request to the MM sublayer, see GMPRS-1 04.007 [11].

4.7.2 Packet access procedure using CCCH

The packet access procedure using CCCH may be used to establish a temporary block flow to support the transfer of LLC PDUs in the direction from the mobile station to the network.

4.7.2.1 Entering the packet transfer mode: packet access procedure

The establishment of an uplink temporary block flow may be initiated by the RR entity of the mobile station using the packet access procedure. The procedure is triggered by a request from upper layers to transfer a LLC PDU, see GMPRS-1 04.007 [11]. The request from upper layers specifies radio priority and an RLC mode associated with the packet transfer or it indicates that the packet to be transferred contains signalling.

Upon such a request,

- if access to the network is allowed (see clause 4.7.2.1.1), the RR entity of the mobile station initiates the packet access procedure as defined in clause 4.7.2.1.2;
- otherwise, it rejects the request.

If the request from upper layers indicates signalling, the highest radio priority level shall be used at determination if access to the network is allowed, and the acknowledged RLC mode shall be used.

4.7.2.1.1 Permission to access the network

Access to the network is allowed:

- if the mobile station is a member of at least one authorized access class or special access class as defined in clause 4.3.1.2; and
- if packet access is allowed in the cell for the radio priority level associated with the packet transfer, as indicated by the PRIORITY_ACCESS_THR parameter broadcast in system information.

4.7.2.1.2 Initiation of the packet access procedure: channel request

The mobile station schedules CHANNEL REQUEST TYPE 1 message is sent on a RACH as defined in clause 4.3.1.3 and leaves the packet idle mode. The CHANNEL REQUEST TYPE 1 messages are sent on RACH and contains an establishment cause which indicates packet access. The CHANNEL REQUEST TYPE 1 message also contains a random reference which is drawn randomly from an uniform probability distribution for every new transmission.

After sending the CHANNEL REQUEST TYPE 1 message, the mobile station shall monitor the l downlink CCCH (AGCH) corresponding to the uplink CCCH used for transmitting the CHANNEL REQUEST TYPE 1 message.

A mobile station belonging to GMPRS MES class B shall continue to monitor its paging subchannel on CCCH for PAGING REQUEST messages indicating an establishment of RR connection. A mobile station belonging to GMPRS MES class B may abort the packet access procedure at the receipt of a PAGING REQUEST messages indicating an establishment of RR connection.

Having sent the CHANNEL REQUEST TYPE 1 message, the mobile station starts timer T3146. At expiry of timer T3146, another CHANNEL REQUEST TYPE 1 message is sent if the maximum count has not been reached or else the packet access procedure is aborted and a packet access failure is indicated to upper layers.

If the mobile station receives an IMMEDIATE ASSIGNMENT TYPE 3 or a PAGING REQUEST (indicating a packet paging procedure) message during the packet access procedure, the mobile station shall ignore the message.

4.7.2.1.3 Packet immediate assignment

4.7.2.1.3.1 On receipt of a CHANNEL REQUEST TYPE 1 message

On receipt of a CHANNEL REQUEST TYPE 1 message indicating a packet access, the network may allocate a temporary flow identity and assign a packet uplink resource comprising PDCH(s) for an uplink temporary block flow.

The packet uplink resource is assigned to the mobile station in an IMMEDIATE ASSIGNMENT TYPE 2 message sent in unacknowledged mode on the same CCCH on which the network has received the CHANNEL REQUEST TYPE 1 message. There is no further restriction on what part of the downlink CCCH the IMMEDIATE ASSIGNMENT TYPE 2 message can be sent. Timer T3141 is started on the network side. After transmission of IMMEDIATE ASSIGNMENT TYPE 2 network shall schedule USF after expiry of TUSF timer to account for propagation and processing delay.

Depending on the GMPRS terminal type The IMMEDIATE ASSIGNMENT TYPE 2 message may contain:

- Packet channel description;
- USF/Allocation Bitmap;
- TLLI;
- Timing and Frequency Offset;
- Starting Frame Number;
- TFI;
- USF_Granularity;
- MAC Mode;
- Control MAC-slot;
- Modulation and Coding Scheme;
- MAC-Slot Allocation;
- Packet Power Control Parameters.

On receipt of an IMMEDIATE ASSIGNMENT TYPE 2 message corresponding to its CHANNEL REQUEST TYPE 1 message, the mobile station stops T3146 or T3115 (if either of them is running), stops sending CHANNEL REQUEST TYPE 1 messages, and switches to the assigned PDCH.

An IMMEDIATE ASSIGNMENT TYPE 2 message shall indicate an assignment starting time in the TBF Starting frame number. The MES shall switch to the assigned PDCHs at the TBF starting frame number. If while monitoring the CCCH the mobile station receives more than one IMMEDIATE ASSIGNMENT TYPE 2 message, it shall act upon the most recently received message and shall ignore the previous message. If the mobile station receives the message with TBF starting frame number set to zero, it shall immediately switch to the assigned PDCH.

4.7.2.1.3.2 One phase packet access

This clause is currently not supported in GMR-1.

4.7.2.1.3.3 Single block packet access

This clause is currently not supported in GMR-1.

4.7.2.1.3.4 Packet access rejection

The network may send to the mobile station an IMMEDIATE ASSIGNMENT REJECT (TYPE 1, TYPE 2 or TYPE 3) message in unacknowledged mode on the same CCCH on which the channel request message was received. There is no further restriction on what part of the downlink CCCH an IMMEDIATE ASSIGNMENT REJECT message can be sent. On receipt of these messages the MES will follow the procedures as described in clause 4.3.1.4.4.

4.7.2.1.4 Packet access completion

The packet access procedure is completed when the mobile station has entered the packet transfer mode. Timer T3141 is stopped on the network side.

4.7.2.1.5 Abnormal cases

If a failure occurs on the mobile station side the allocated temporary block flow is released; the mobile station returns to packet idle mode, upper layers are notified (TBF establishment failure), transactions in progress are aborted:

- If an IMMEDIATE ASSIGNMENT TYPE 2 message indicates a PDCH in a non-supported frequency band then a TBF establishment failure has occurred.
- If an IMMEDIATE ASSIGNMENT REJECT message is received with cause "Incorrect Class 2 RACH Info" then the MES shall proceed as described in clause 4.3.1.4.4.11.
- On the network side, if timer T3141 elapses the newly allocated temporary block flow is released as specified in GMPRS-1 04.060 [20] and the packet access is forgotten.

4.7.2.2 Sending an RLC/MAC control message: single block packet access procedure

This clause is currently not supported in GMR-1.

4.7.3 Packet downlink assignment procedure using CCCH

The packet downlink assignment procedure using CCCH may be used to establish a temporary block flow to support the transfer of LLC PDUs in the direction from the network to the mobile station.

4.7.3.1 Entering the packet transfer mode: packet downlink assignment procedure

4.7.3.1.1 General

The establishment of a downlink temporary block flow may be initiated by the RR entity on the network side using the packet downlink assignment procedure. The procedure is triggered by a request from upper layers to transfer a LLC PDU, see GMPRS-1 04.007 [11]. The request from upper layers specifies a QOS profile, an *RLC mod*e, *DRX parameters* and a *MES classmark* associated with the packet transfer.

Upon such a request, the network shall determine whether the mobile station is in packet idle mode or packet transfer mode. The packet downlink assignment procedure using CCCH is applicable when the mobile station is in packet idle mode.

The network may allocate a temporary flow identity and assign a packet downlink resource comprising PDCH(s) for a downlink temporary block flow.

4.7.3.1.2 Initiation of the packet downlink assignment procedure

The network initiates the packet downlink assignment procedure by sending an IMMEDIATE ASSIGNMENT TYPE 3 message in unacknowledged mode on the CCCH corresponding to CCCH group the mobile station belongs to. If the mobile station does not apply DRX, there is no further restriction on what part of the downlink CCCH an IMMEDIATE ASSIGNMENT TYPE 3 message can be sent. If the mobile station applies DRX, the message shall be sent in the CCCH corresponding to a paging group determined for the mobile station in packet idle mode,
see GMPRS-1 05.002 [12].

The IMMEDIATE ASSIGNMENT TYPE 3 message contains:

- Page Mode;
- TLLI;
- Downlink TFI;
- Starting Frame Number;
- RLC Mode;
- MAC-Slot Allocation;
- Packet Power Control Parameters;
- Persistence Level;
- Timing Advance Index;
- Packet Frequency Parameters.

On reception of IMMEDIATE ASSIGNMENT TYPE 3 message, the MES shall respond with a PACKET CHANNEL REQUEST message on a PRACH channel with a cause code "Packet Initial Correction" if timer T3202 has not expired. If timer T3202 has expired, the MES shall ignore IMMEDIATE ASSIGNMENT TYPE 3 and continue listening to the CCCH corresponding to its paging group. On sending the message on a PRACH channel the MES shall start timer T3208 and start monitoring the assigned MAC-slots on the downlink channel. On reception of PRACH, the network shall provide the time and frequency correction on the assigned downlink channel using a PACCH. The MES shall stop timer T3208 on reception of the first timing and frequency synchronization parameters.

If the timer T3208 expires, the MES shall ignore the received downlink assignment and shall return to packet idle mode.

When timer T3208 is active, the MES shall not initiate uplink access procedure on RACH or PRACH to establish an uplink TBF.

The MES shall not transmit any uplink PNB bursts (including timing correction bursts if scheduled) until it has received timing and frequency correction value at least once from the network since the last IMMEDIATE ASSIGNMENT TYPE 3 message was received on the PCH channel. But, the MES shall be capable of receiving downlink data prior to receiving the timing and frequency correction values.

An IMMEDIATE ASSIGNMENT TYPE 3 message shall indicate an assignment starting time in the TBF Starting frame number. The mobile station may monitor CCCH till an access burst with cause code "Packet Initial Correction" is transmitted. The MES shall switch to the assigned PDCHs at the TBF starting frame number. If while monitoring the CCCH the mobile station receives more than one IMMEDIATE ASSIGNMENT TYPE 3 message, it shall act upon the most recently received message and shall ignore the previous message.

The timer T3190 shall be started immediately at the TBF starting frame number. If the mobile station receives the message with TBF starting frame number set to zero, it shall immediately start timer T3190 and switch to the assigned PDCH.

The MES shall wait till it gets the first timing correction from the network. The mobile station shall only use the continuous update timing advance mechanism using PTCCH channel, see GMPRS-1 05.010 [16].

4.7.3.1.3 Packet downlink assignment completion

After having sent the packet downlink assignment, the network starts sending downlink RLC/MAC blocks on the assigned packet downlink resource and the packet downlink assignment procedure is completed at the network side. On the mobile station side, the procedure is completed when the mobile station receives an RLC/MAC block identified by the assigned temporary flow identity. The mobile station stops timer T3190. The mobile station has entered packet transfer mode.

4.7.3.1.4 Abnormal cases

If a failure occurs on the mobile station side before the packet downlink assignment procedure is completed (TBF establishment failure), the temporary block flow is released; the mobile station returns to packet idle mode:

- If the mobile station does not receive a RLC/MAC block on the assigned PDCHs before timer T3190 expires, then a TBF establishment failure has occurred.
- If the information available in the mobile station, after the reception of an IMMEDIATE ASSIGNMENT TYPE 3 message, does not satisfactorily define a PDCH, then a TBF establishment failure has occurred.
- If the mobile station does not receive timing and frequency correction before the elapse of timer T3208, then a TBF establishment failure has occurred.

If an IMMEDIATE ASSIGNMENT TYPE 3 message indicates a PDCH in a non-supported frequency band, then a TBF establishment failure has occurred.

4.7.3.2 Sending an RLC/MAC control message: single block packet downlink assignment procedure

This clause is currently not supported in GMR-1.

4.8 GMPRS suspend procedure on CCCH

A GMPRS MES class B attached for GMPRS service shall initiate procedure for suspending GMPRS services before entering RR dedicated mode. Suspension of GMPRS services is triggered if the GMPRS class B MES decides to respond to a page for circuit-switched services. Suspension of GMPRS service is also triggered due to a request from the upper layer to establish a dedicated connection for mobile-originated call establishment.

4.8.1 Initiation of GMPRS suspend procedure

The mobile earth station initiates a GMPRS suspend procedure by scheduling transmission of a CHANNEL REQUEST TYPE 2 message on a RACH as defined in clause 4.3.1.3. The CHANNEL REQUEST TYPE 2 message contains a request type that indicates the reason for suspending GMPRS services.

If the MES sends position information in the CHANNEL REQUEST TYPE 2 message, it shall send the timestamp in CIPHER MODE COMPLETE message.

After sending the CHANNEL REQUEST TYPE 2 message, the mobile station shall start timer T3126 and shall monitor the downlink CCCH (AGCH) corresponding to the uplink CCCH used for transmitting the CHANNEL REQUEST TYPE 2 message. The mobile station shall follow procedures specified in clause 4.3.1.3 for retransmitting CHANNEL REQUEST TYPE 2.

If the mobile earth station receives an IMMEDIATE ASSIGNMENT TYPE 3 or a PAGING REQUEST (indicating a packet paging procedure) message during the GMPRS suspend procedure, the MES shall ignore the message.

4.8.2 Completion of GMPRS suspend procedure

On receipt of a CHANNEL REQUEST TYPE 2 message indicating a request for suspending GMPRS services, the network shall attempt to suspend GMPRS services. Further actions on the network side are determined by the request type field in CHANNEL REQUEST TYPE 2.

If the request type in CHANNEL REQUEST TYPE 2 indicated that suspension is due to emergency, mobile originating call, MM procedure or call re-establishment, then the network shall initiate extended immediate assignment procedure as specified in clause 4.3.1.4.2.3. After transmitting a CHANNEL REQUEST TYPE 2 message, the RR sublayer shall indicate successful suspension of GMPRS services to the MM sublayer. If the MES received IMMEDIATE ASSIGNMENT indicating extended immediate assignment, it shall proceed as specified in clause 4.3.1.4.5. If the MES received IMMEDIATE ASSIGNMENT REJECT it shall proceed as specified in clause 4.3.1.4.4.

If the request type in CHANNEL REQUEST TYPE 2 indicated that suspension is due to answer to paging, then the actions on the network are the same as those taken on receipt of a CHANNEL REQUEST with establishment cause set to "In Response to Paging". After transmitting a CHANNEL REQUEST TYPE 2 message, the RR sublayer shall indicate successful suspension of GMPRS services to the MM sublayer. If the MES received IMMEDIATE ASSIGNMENT indicating extended immediate assignment, it shall proceed as specified in clause 4.3.1.4.2. If the MES received IMMEDIATE ASSIGNMENT REJECT, it shall proceed as specified in clause 4.3.1.4.4.

4.8.3 Abnormal cases

The MES shall ignore IMMEDIATE ASSIGNMENT without extended immediate assignment indicator when requesting suspension of GMPRS services due to emergency, mobile originating call, MM procedure or call re-establishment.

On expiry of timer T3126 the mobile earth station shall retransmit CHANNEL REQUEST 2. If the MES did not receive an IMMEDIATE ASSIGNMENT or IMMEDIATE ASSIGNMENT REJECT from the network after having made maximal attempts to send CHANNEL REQUEST TYPE 2 message, the MES declares failure and notifies upper layers.

4.9 GMPRS resume procedure on CCCH

GMPRS resume procedure is triggered by a request from MM sub-layer on the mobile earth station side to resume a previously suspended GMPRS service (see clause 4.8). the GMPRS resume procedure shall be initiated on CCCH if timer T3202 has expired on the MES. If timer T3202 is still running, then the MES shall initiate GMPRS resume procedure on PCCCH (see GMPRS-1 04.060 [20]).

4.9.1 Initiation of GMPRS resume procedure

The mobile earth station initiates a GMPRS resume procedure by scheduling transmission of a CHANNEL REQUEST TYPE 2 message on a RACH as defined in clause 4.3.1.3. The CHANNEL REQUEST TYPE 2 message contains a request type that indicates resumption of GMPRS services.

After sending the CHANNEL REQUEST TYPE 2 message, the MES shall start timer T3196 and monitor the downlink CCCH (AGCH) corresponding to the uplink CCCH used for transmitting the CHANNEL REQUEST TYPE 2 message. The mobile station shall follow procedures specified in clause 4.3.1.3 for retransmitting CHANNEL REQUEST TYPE 2.

If the MES receives an IMMEDIATE ASSIGNMENT TYPE 3 or a PAGING REQUEST (indicating a packet paging procedure) message during the GMPRS resume procedure, the MES shall ignore the message. The MES shall respond to PAGING REQUEST for circuit switched services.

4.9.2 Completion of GMPRS resume procedure

On receipt of a CHANNEL REQUEST TYPE 2 message requesting resumption of GMPRS services, the network shall attempt to resume GMPRS services only if a GMPRS suspend procedure (see clause 4.8) was successful for the same mobile station. If the GMPRS suspend procedure was unsuccessful or if sufficient information is not available due to a previous network failure, then the network shall respond with a GMPRS RESUME RESPONSE message on AGCH with a result indicating that GMPRS service resumption was unsuccessful. If the GMPRS suspend procedure for the mobile station was successful, then the network shall attempt to resume the GMPRS services. On successful completion of GMPRS service resumption, the network shall transmit a GMPRS RESUME RESPONSE message on AGCH with a result indicating that GMPRS service was successfully resumed.

The MES shall compare the TLLI previously reported in the CHANNEL REQUEST TYPE 2 message with the TLLI present in GMPRS RESUME RESPONSE message. If the two TLLIs do not match, the MES shall ignore the GMPRS RESUME RESPONSE and continue to wait for a response from the network.

On receipt of a GMPRS RESUME RESPONSE message matching its TLLI, the mobile earth station shall stop timer T3196 and conclude the GMPRS resume procedure. The mobile station shall then notify MM sub-layer of the result (success or failure) of the GMPRS resume procedure.

4.9.3 Abnormal cases

On expiry of timer T3196, the mobile earth station shall reinitiate the GMPRS resume procedure on CCCH unless it has already been reinitiated 3 times, in which case the mobile earth station shall return packet idle mode and indicate a failure to resume GMPRS services to the MM sub-layer.

5 Elementary procedures for mobility management

5.1 General

Same as clause 4.1 of 3GPP TS 04.08 [21].

5.1.1 MM and GMM procedures

5.1.1.1 Types of MM and GMM procedures

Same as those defined in clause 4.1.1.1 of 3GPP TS 04.08 [21].

5.1.1.2 MM-GMM co-ordination for GMPRS MESs

Same as clause 4.1.1.2 of 3GPP TS 04.08 [21] with following additional requirements for GMPRS Class-B MES.

If registration is required during optimal routing, a GMPRS Class-B MES shall not use combined GMM procedures for registration, a GMPRS Class-B MES shall proceed as specified in clause 5.5.1.8. MM-GMM co-ordination shall continue on completion (successful or unsuccessful) of the optimally routed call.

5.1.2 MM sublayer states

Same as clause 5.1.2 of GMR-1 04.008 [19].

5.1.3 GPRS mobility management (GMM) sublayer states

Same as clause 4.1.3 of 3GPP TS 04.08 [21].

5.1.3.1 GMM states in the MES

Same as clause 4.1.3.1 of 3GPP TS 04.08 [21].

5.1.3.1.1 Main states

5.1.3.1.1.1 GMM-NULL

Same as clause 4.1.3.1.1.1 of 3GPP TS 04.08 [21].

5.1.3.1.1.2 GMM-DEREGISTERED

The GPRS capability has been enabled in the MES, but no GMM context has been established. In this state, the MES may establish a GMM context by starting the GPRS attach procedure.

5.1.3.1.1.3 GMM-REGISTERED-INITIATED

A GPRS attach procedure has been started and the MES is awaiting a response from the network. If a dark beam indication is received or MES detects unavailability of packet data channels (see clause 4.2.2.1.4.3) before a peer level response from the network, the MES will transition to GMM-DEREGISTERED.NORMAL-SERVICE-DARK-BEAM. If a status indication is received from the lower layers with a cause indicating "Switch to new BCCH", the MES will transition to GMM-DEREGISTERED .PLMN-SEARCH. The timer T3310 will be stopped, attempt counter will not be incremented and the GU status will not be changed.

5.1.3.1.1.4 GMM-REGISTERED

A GMM context has been established, i.e. the GPRS attach procedure has been successfully performed. In this state, the MES may activate PDP contexts, may send and receive user data and signalling information and may reply to a page request. Furthermore, cell and routing area updating are performed.

5.1.3.1.1.5 GMM-DEREGISTERED-INITIATED

The MES has requested release of the GMM context by starting the GPRS detach procedure. This state is only entered if the MES is not being switched off at detach request. If a dark beam indication is received or if the MES detects unavailability of suitable packet data channels (see clause 4.2.2.1.4.3) before a peer layer response from the network, the MES will transition to GMM-DEREGISTERED.NORMAL-SERVICE-DARK-BEAM. The attempt counter will not be incremented and the GU status will not be changed.

5.1.3.1.1.6 GMM-ROUTING-AREA-UPDATING-INITIATED

A routing area updating procedure has been started and the MES is awaiting a response from the network. If a dark beam indication is received or if the MES detects unavailability of suitable packet data channels (see clause 4.2.2.1.4.3) before a response from the network, the MES will transition to GMM-REGISTERED.ROUTING-AREA-UPDATE-DARK-BEAM. The timer T3330 will be stopped, attempt counter will not be incremented and the GU status will not be changed.

5.1.3.1.2 Substates of state GMM-DEREGISTERED

Same as clause 4.1.3.1.2 of 3GPP TS 04.08 [21].

5.1.3.1.2.1 GMM-DEREGISTERED.NORMAL-SERVICE

Same as clause 4.1.3.1.2.1 of 3GPP TS 04.08 [21].

5.1.3.1.2.2 GMM-DEREGISTERED.LIMITED-SERVICE

Same as clause 4.1.3.1.2.2 of 3GPP TS 04.08 [21].

5.1.3.1.2.3 GMM-DEREGISTERED.ATTACH-NEEDED

Valid subscriber data is available and for some reason a GPRS attach must be performed as soon as possible. This state is usually of no duration, but can last, e.g. if the access class is blocked. If a dark beam indication is received or if the MES detects unavailability of suitable packet data channels (see clause 4.2.2.1.4.3), the MES will transition to substate GMM-DEREGISTERED.NORMAL-SERVICE-DARK-BEAM.

5.1.3.1.2.4 GMM-DEREGISTERED.ATTEMPTING-TO-ATTACH

The GPRS update status is GU2, a cell is selected, a previous GPRS attach was rejected. The execution of further attach procedures depends on the GPRS attach attempt counter. No GMM procedure except GPRS attach shall be initiated by the MES in this substate. If a dark beam indication is received or if the MES detects unavailability of suitable packet data channels (see clause 4.2.2.1.4.3), the MES will transition to substate GMM-DEREGISTERED.NORMAL-SERVICE-DARK-BEAM. If a status indication is received from the lower layers with a cause indicating "Switch to new BCCH", the MES will transition to GMM-DEREGISTERED.PLMN-SEARCH.

5.1.3.1.2.5 GMM-DEREGISTERED.NO-IMSI

Same as clause 4.1.3.1.2.5 of 3GPP TS 04.08 [21].

5.1.3.1.2.6 GMM-DEREGISTERED.NO-CELL-AVAILABLE

Same as clause 4.1.3.1.2.6 of 3GPP TS 04.08 [21].

5.1.3.1.2.7 GMM-DEREGISTERED.PLMN-SEARCH

The mobile station is searching for PLMNs. This substate is left either when a PLMN has been selected (the new substate is NORMAL-SERVICE or LIMITED-SERVICE) or when it has been concluded that no cell is available at the moment (the new substate is NO-CELL-AVAILABLE).

5.1.3.1.2.8 GMM-DEREGISTERED.SUSPENDED

Same as clause 4.1.3.1.2.8 of 3GPP TS 04.08 [21].

5.1.3.1.2.9 GMM-DEREGISTERED.INVALID-POSITION

Same as clause 4.1.3.1.2.9 of 3GPP TS 04.08 [21].

5.1.3.1.2.10 GMM-DEREGISTERED.NORMAL-SERVICE-DARK-BEAM

The MES was attempting an attach or a detach procedure which could not be completed due to unavailability of suitable packet data channels (see clause 4.2.2.1.4.3) or dark beam indication. This substate ends when the MES receives a trigger from upper layers or on detecting availability of suitable packet data channels or on receiving a light beam indication. The MES then transitions to substate GMM-DEREGISTERED.NORMAL-SERVICE.

5.1.3.1.3 Substates of state GMM-REGISTERED

Same as clause 4.1.3.1.3 of 3GPP TS 04.08 [21].

5.1.3.1.3.1 GMM-REGISTERED.NORMAL-SERVICE

User data and signalling information may be sent and received. On receiving a dark beam indication or on detecting the unavailability of suitable packet data channels (see clause 4.2.2.1.4.3) the MES will transition to substate GMM-REGISTERED.NORMAL-SERVICE-DARK-BEAM.

5.1.3.1.3.2 GMM-REGISTERED.SUSPENDED

Same as clause 4.1.3.1.3.2 of 3GPP TS 04.08 [21].

5.1.3.1.3.3 GMM-REGISTERED.UPDATE-NEEDED

The MES has to perform a routing area updating procedure, but its access class is not allowed in the cell. The procedure will be initiated as soon as access is granted (this might be due to a cell-reselection or due to change of the access class of the current cell). No GMM procedure except routing area updating shall be initiated by the MES in this substate. In this substate, no user data and no signalling information shall be sent. On receiving a dark beam indication or on detecting the unavailability of suitable packet data channels (see clause 4.2.2.1.4.3) the MES will transition to GMM-REGISTERED.ROUTING-AREA-UPDATE-DARK-BEAM.

5.1.3.1.3.4 GMM-REGISTERED.ATTEMPTING-TO-UPDATE

A routing area updating procedure failed due to a missing response from the network. The MES retries the procedure controlled by timers and a GMPRS attempt counter. No GMM procedure except routing area updating shall be initiated by the MES in this substate. No data shall be sent or received. On receiving a dark beam indication or on detecting the unavailability of suitable packet data channels (see clause 4.2.2.1.4.3) the MES will transition to GMM-REGISTERED.ROUTING-AREA-UPDATE-DARK-BEAM.

5.1.3.1.3.5 GMM-REGISTERED.NO-CELL-AVAILABLE

Same as clause 4.1.3.1.3.5 of 3GPP TS 04.08 [21].

5.1.3.1.3.6 GMM-REGISTERED.LIMITED-SERVICE

A PLMN is selected, which is known not to be able to provide normal service. The MES will remain in this substate until a PLMN is selected which is able to provide normal service.

5.1.3.1.3.7 GMM-REGISTERED.ATTEMPTING-TO-UPDATE-MM

Same as clause 4.1.3.1.3.7 of 3GPP TS 04.08 [21].

5.1.3.1.3.8 GMM-REGISTERED.NORMAL-SERVICE-DARK-BEAM

The MES shall enter this substate on receiving a dark beam indication or on detecting the unavailability of suitable packet data channels (see clause 4.2.2.1.4.3) in substate GMM-REGISTERED. NORMAL-SERVICE. No user data and signalling shall be sent by the MES in this substate. The MES will remain in this substate until a trigger is received to send user data, timer T3312 expires, the MES detects availability of suitable packet channels or a light beam indication is received. On receiving a light beam indication or on detecting availability of suitable packet data channels the MES will transition to substate GMM-REGISTERED.NORMAL-SERVICE. If a trigger is received to send user data the MES will transition to substate GMM-REGISTERED.NORMAL-SERVICE-ILLUMINATION-INITIATED. On expiry of T3312, the MES will transition to substate GMM-REGISTERED.ROUTING -AREA-UPDATE-DARK-BEAM.

5.1.3.1.3.9 GMM-REGISTERED.NORMAL-SERVICE-ILLUMINATION-INITIATED

The MES shall enter this substate when it receives a trigger to send user data in substate GMM-REGISTERED.NORMAL-SERVICE-DARK-BEAM. User data is buffered in this substate until the MES detects availability of suitable packet data channels (see clause 4.2.2.1.4.3), a light beam or dark beam indication is received or timer T3312 expires. On receiving a light beam indication or a status indication from the lower layers with a cause indicating "Switch to new BCCH" or on detecting availability of suitable packet data channels, the MES will transition to substate GMM-REGISTERED.NORMAL-SERVICE and send the buffered data. If a dark beam indication is received the MES will discard buffered data and return to substate GMM-REGISTERED.NORMAL-SERVICE-DARK-BEAM. On expiry of T3312 the MES will transition to substate GMM-REGISTERED.ROUTING-AREA-UPDATE-ILLUMINATION-INITIATED.

5.1.3.1.3.10 GMM-REGISTERED.ROUTING-AREA-UPDATE-DARK-BEAM

The MES shall enter this substate when it receives a dark beam event or on detecting unavailability of suitable packet data channels (see clause 4.2.2.1.4.3) while attempting to perform a routing area update or T3312 expires in substate GMM-REGISTERED.NORMAL-SERVICE-DARK-BEAM. The MES will remain in this substate until it receives a light beam indication or detects availability of suitable packet data channels or a trigger to send user data. On receiving a light beam indication or on detecting availability of suitable packet data channels the MES will transition to substate GMM-REGISTERED.UPDATE-NEEDED. If a trigger is received to send user data the MES will transition to substate GMM-REGISTERED.ROUTING-AREA-UPDATE-ILLUMINATION-INITIATED.

5.1.3.1.3.11 GMM-REGISTERED.ROUTING-AREA-UPDATE-ILLUMINATION-INITIATED

The MES shall enter this substate when it receives a trigger to send user data in substate GMM-REGISTERED.ROUTING-AREA-UPDATE-DARK-BEAM or T3312 expires while waiting for a beam indication in substate GMM-REGISTERED.NORMAL-SERVICE-ILLUMINATION-INITIATED. User data is buffered in this substate until the MES detects availability of suitable packet data channels (see clause 4.2.2.1.4.3), a light beam or dark beam indication is received. On receiving a light beam indication or on detecting availability of suitable packet data channels the MES will transition to substate GMM-REGISTERED.UPDATE-NEEDED and perform a routing area update. If a dark beam indication is received the MES will return to substate GMM-REGISTERED.ROUTING-AREA-UPDATE-DARK-BEAM.

5.1.3.1.3.12 GMM-REGISTERED.IMSI-DETACH-INITIATED

Same as clause 4.1.3.1.3.8 of 3GPP TS 04.08 [21].

5.1.3.2 GPRS update status

In addition to the GMM sublayer states described so far, a GPRS update status exists. The GPRS update status pertains to a specific subscriber embodied by a SIM. This status is defined even when the subscriber is not activated (SIM removed or connected to a switched off MES). It is stored in a non volatile memory in the SIM. The GPRS update status is changed only after execution of a GPRS attach, network initiated GPRS detach authentication procedure, or routing area updating procedure.

GU1: UPDATED

The last GPRS attach or routing area updating attempt was successful (correct procedure outcome, and the answer was accepted by the network). The SIM contains the RAI of the routing area (RA) to which the subscriber was attached, and possibly a valid P-TMSI, GPRS ciphering key and GPRS ciphering key sequence number.

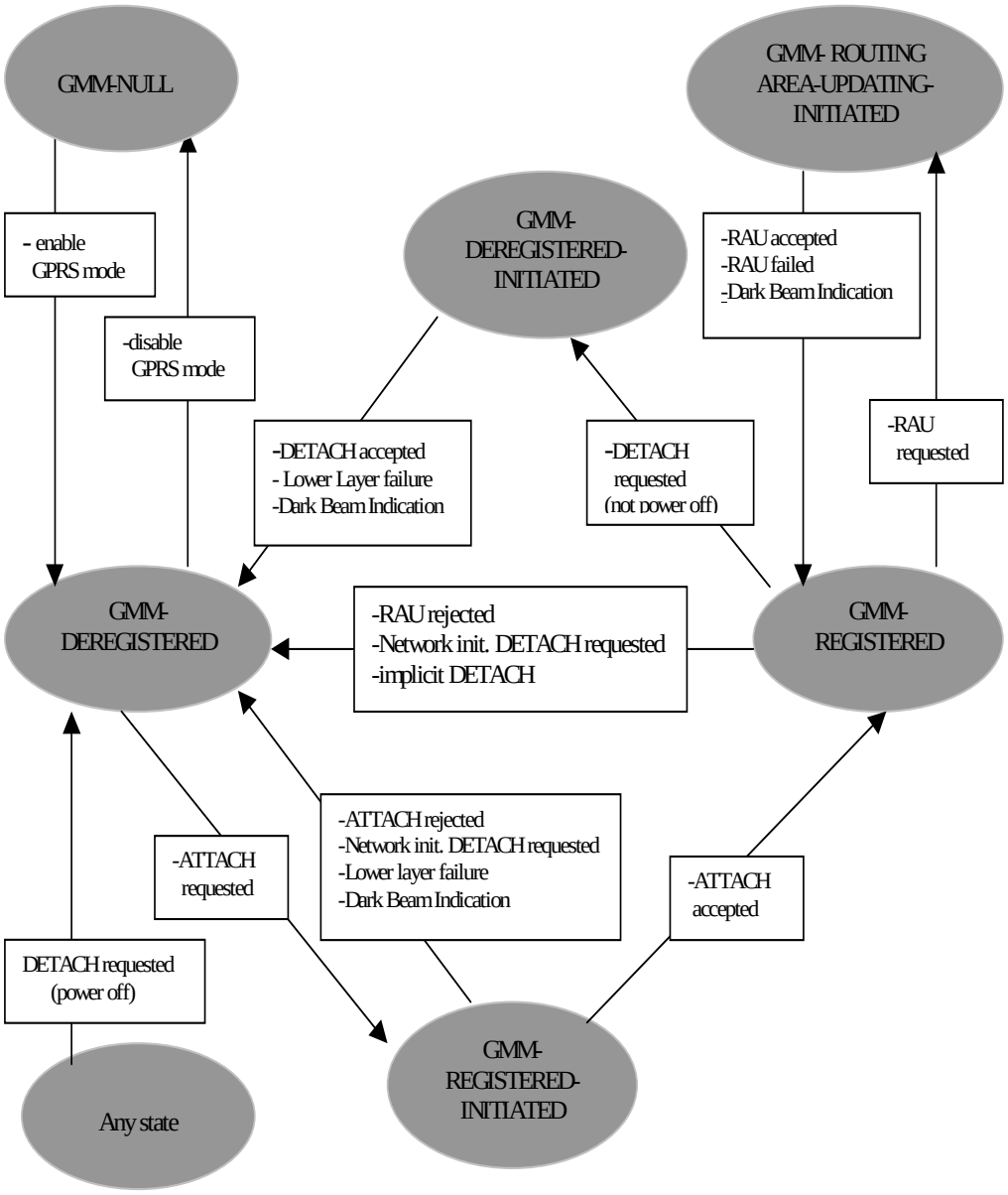

Figure 5.1a: GMM main states on the MES side

GU2: NOT UPDATED

The last GPRS attach or routing area updating attempt failed procedurally, i.e. no response was received from the network. This includes the cases of failures or congestion inside the network. In this case, the SIM may contain the RAI of the routing area (RA) to which the subscriber was attached, and possibly also a valid P-TMSI, GPRS ciphering key and GPRS ciphering key sequence number. For compatibility reasons, all these fields shall be set to the "deleted" value if the RAI is deleted. However, the presence of other values shall not be considered an error by the MES.

GU3: ROAMING NOT ALLOWED

The last GPRS attach or routing area updating attempt was correctly performed, but the answer from the network was negative (because of roaming or subscription restrictions). For this status, the SIM does not contain any valid RAI, P-TMSI, GPRS ciphering key or GPRS ciphering key sequence number. For compatibility reasons, all these fields must be set to the value "deleted" at the moment the status is set to ROAMING NOT ALLOWED. However, the presence of other values shall not be considered an error by the MES.

5.1.3.3 GMM mobility management states on the network side

Same as clause 4.1.3.3. of 3GPP TS 04.08 [21].

5.1.3.3.1 Main States

5.1.3.3.1.1 GMM-DEREGISTERED

The network has no GMM context or the GMM context is marked as detached, the MES is detached. In this state, the network may answer to a GPRS attach procedure initiated by the MES.

5.1.3.3.1.2 GMM-COMMON-PROCEDURE-INITIATED

Same as clause 4.1.3.3.1.2 of 3GPP TS 04.08 [21].

5.1.3.3.1.3 GMM-REGISTERED

Same as clause 4.1.3.3.1.3 of 3GPP TS 04.08 [21].

5.1.3.3.1.4 GMM-DEREGISTERED-INITIATED

Same as clause 4.1.3.3.1.4 of 3GPP TS 04.08 [21].

5.1.3.3.2 Substates of state GMM-REGISTERED

Same as clause 4.1.3.3.2 of 3GPP TS 04.08 [21].

5.1.3.3.2.1 GMM-REGISTERED.NORMAL-SERVICE

Same as clause 5.1.3.3.2.1 of 3GPP TS 04.08 [21].

5.1.3.3.2.2 GMM-REGISTERED.SUSPENDED

Same as clause 4.1.3.3.3.2 of 3GPP TS 04.08 [21].

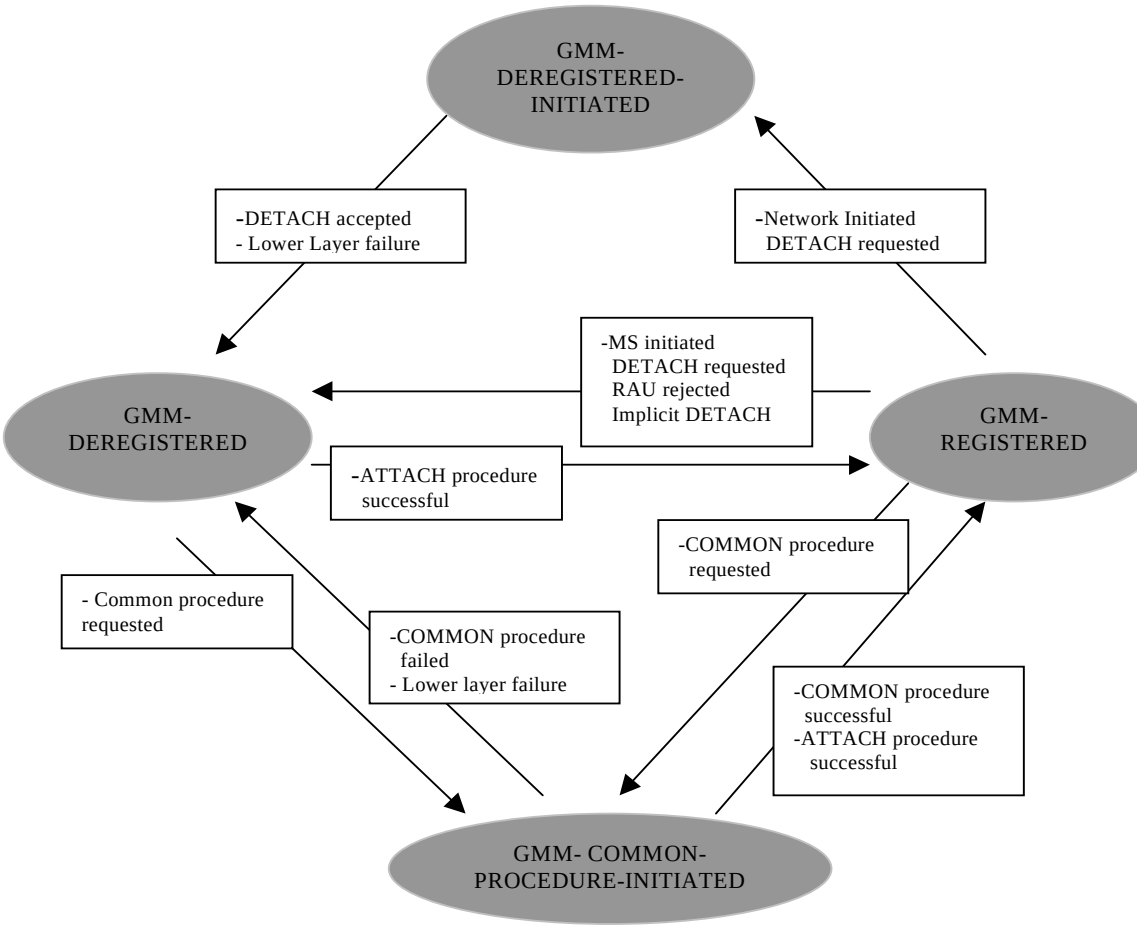

Figure 5.1b: GMM main states on the network side

5.2 Behaviour of the MES in MM idle state, GMM-DEREGISTERED state and GMM-REGISTERED state

Same as clause 4.2 of 3GPP TS 04.08 [21] except that clauses 5.2.5 and 5.2.6 refer to the states GMM-DEREGISTERED and GMM-REGISTERED, respectively.

5.2.1 Primary service state selection

5.2.1.1 Selection of the service state after power-on

Same as clause 5.2.1.1 of GMR-1 04.008 [19].

5.2.1.2 Other cases

Same as clause 5.2.1.2 of GMR-1 04.008 [19].

5.2.2 Detailed description of MES behaviour in MM idle state

Same as clause 5.2.2 of GMR-1 04.008 [19].

5.2.3 Service state when back to state MM idle from another state

Same as clause 5.2.3 of GMR-1 04.008 [19].

5.2.4 Service state after position verification

Same as clause 5.2.4 of GMR-1 04.008 [19].

5.2.5 Behaviour in state GMM-DEREGISTERED

The state GMM-DEREGISTERED is entered when:

- the MES is switched on;
- the GMPRS capability has been enabled in the MES;
- a GMPRS detach procedure has been performed; or
- a GMM procedure has failed (except routing area updating, see clause 5.7.5).

The selection of the appropriate substate of GMM-DEREGISTERED after switching on is described in clause 5.2.5.1. The specific behaviour of the MES in state GMM-DEREGISTERED is described in clause 5.2.5.2. The substate chosen when the GMM-DEREGISTERED state is returned to from another state except state GMM-NULL is described in clause 5.2.5.3.

It should be noted that transitions between the various substates of GMM-DEREGISTERED are caused by (e.g.):

- insertion or removal of the SIM;
- cell selection/reselection (see also GMPRS-1 03.022 [4]);
- PLMN search;
- Dark Beam/Light Beam indication;
- trigger from upper layer;
- loss/regain of coverage;
- change of RA; or
- detection of availability/unavailability of suitable packet data channels.

How various GMM procedures affect the GMM-DEREGISTERED substates and the GPRS update status is described in the detailed description of the GMM procedures in clause 5.7.

5.2.5.1 Primary substate selection

5.2.5.1.1 Selection of the substate after power on or enabling the MESs GMPRS capability

When the MES is switched on, the substate shall be PLMN-SEARCH in case the SIM is inserted and valid.
See GMPRS-1 03.022 [4] and GMPRS-1 05.008 [15] for further details.

When the GPRS capability in an activated MES has been enabled, the selection of the GMM-DEREGISTERED substate depends on the MM state and the GPRS update status.

The substate chosen after PLMN-SEARCH, in case of power on or after enabling of the GPRS capability is:

- if no PLMN is found, the substate shall be NO-CELL-AVAILABLE;
- if no SIM is present the substate shall be NO-IMSI;
- if a PLMN has been found and the PLMN or LA is not in the forbidden list, then the substate shall be NORMAL-SERVICE;
- if the selected PLMN supporting GMPRS is in a forbidden PLMN or a forbidden LA, then the MES shall enter the substate LIMITED-SERVICE;
- if the MES is in manual network selection mode and no PLMN supporting GMPRS of the selected cell has been found, the MES shall enter the substate NO-CELL-AVAILABLE.

5.2.5.1.2 Other cases

The GMM substate PLMN-SEARCH shall also be entered in the following cases:

- when a SIM is inserted in substate NO-IMSI;
- when the user has asked for a PLMN selection in any substate except NO IMSI and NO CELL AVAILABLE;
- when coverage is lost in any substate except NO IMSI and NO CELL AVAILABLE;
- optionally, when the MES is in automatic network selection mode and the maximum allowed number of subsequently unsuccessful attach attempts controlled by the GPRS attach attempt counter (see clause 5.7.3) have been performed;
- optionally, when the MES is in automatic network selection mode and the maximum allowed number of subsequently unsuccessful routing area update attempts controlled by the GPRS routing area update attempt counter (see clause 5.7.5) have been performed.

5.2.5.2 Detailed description of the MES behaviour in state GMM-DEREGISTERED

In state GMM-DEREGISTERED, the MES shall behave according to the substate. In the following clauses, the behaviour is described for the non transient substates.

5.2.5.2.1 Substate, NORMAL-SERVICE

Same as clause 4.2.4.2.1 of 3GPP TS 04.08 [21].

5.2.5.2.2 Substate, ATTEMPTING-TO-ATTACH

Same as clause 4.2.4.2.2 of 3GPP TS 04.08 [21].

5.2.5.2.3 Substate, LIMITED-SERVICE

Same as clause 4.2.4.2.3 of 3GPP TS 04.08 [21].

5.2.5.2.4 Substate, NO-IMSI

Same as clause 4.2.4.2.4 of 3GPP TS 04.08 [21].

5.2.5.2.5 Substate, NO-CELL

The MES shall:

- perform cell selection according to GMPRS-1 03.022 [4] and shall choose an appropriate substate.

5.2.5.2.6 Substate, PLMN-SEARCH

Same as clause 4.2.4.2.6 of 3GPP TS 04.08 [21].

5.2.5.2.7 Substate, ATTACH-NEEDED

Same as clause 4.2.4.2.7 of 3GPP TS 04.08 [21].

5.2.5.2.8 Substate, SUSPENDED

Same as clause 4.2.4.2.8 of 3GPP TS 04.08 [21].

5.2.5.2.9 Substate, INVALID-POSITION

When in state GMM DEREGISTERED and substate INVALID-POSITION, the MES shall:

- if timer T3212 expires, perform a -periodic routing update.

5.2.5.2.10 Substate, NORMAL-SERVICE-DARK-BEAM

The MES shall:

- not send any user data;
- not send any signalling information.

5.2.5.3 Substate when back to state GMM-DEREGISTERED from another GMM state

When returning to state GMM-DEREGISTERED, the MES shall select a cell as specified in GMPRS-1 03.022 [4]. The substate depends on the result of the cell selection procedure, the outcome of the previously performed GMM specific procedures, on the GPRS update status of the MES, on the location area data stored in the MES and on the presence of the SIM:

- if no cell has been found, the substate is NO-CELL-AVAILABLE, until a cell is found;
- if no SIM is present or if the inserted SIM is considered invalid by the MES, the substate shall be NO-IMSI;
- if the selected cell is in a location area where the MES is allowed to roam, the substate shall be NORMAL-SERVICE;
- if a GPRS attach shall be performed (e.g. network requested reattach), the substate shall be ATTEMPTING-TO-ATTACH;
- if a PLMN reselection (according to GMPRS-1 03.022 [4]) is needed , the substate shall be PLMN SEARCH;
- if the selected cell is in a location area where the MES is not allowed to roam, the state shall be LIMITED-SERVICE;
- if an IMMEDIATE ASSIGNMENT REJECT message and the request reason was not "location updating" (location updating cases are treated in clause 5.4.4.9);
- with Reject Cause of "Invalid position", "Invalid position for this service provider", or "Invalid position for this LAI" but no more LAIs are available, the state is INVALID POSITION;

NOTE 1: This event can also occur without leaving the MM IDLE state (see clause 4.2.1.2).

NOTE 2: If the state was PLMN SEARCH or PLMN SEARCH, NORMAL SERVICE and the MES received this Reject Cause before spot beam selection was fully completed (see GMPRS-1 03.022 [4]), then the state is PLMN SEARCH or PLMN SEARCH, NORMAL SERVICE until the PLMN selection is successful or the spot beam selection is completed.

- with Reject Cause of "Invalid position for this LAI" and there are other available LAIs, then upon selecting a new LAI the state is LOCATION UPDATE NEEDED or PLMN SEARCH, depending upon PLMN availability;
- with Reject Cause of "Position too old", the state is unchanged;
- after some abnormal cases occurring during an unsuccessful location updating procedure, as described in clause 5.4.4.9, the status is ATTEMPTING TO UPDATE or INVALID POSITION.

In case of a return from a location updating procedure to which was answered Roaming not allowed in this location area, the service state PLMN SEARCH is entered as specified in clause 5.2.1.2.

- if a dark beam indication is received or if the MES detects unavailability of suitable packet data channels while waiting for a response to an attach request the substate shall be NORMAL-SERVICE-DARK-BEAM;
- if a dark beam indication is received or if the MES detects unavailability of suitable packet data channels while waiting for a response to a detach request the substate shall be NORMAL-SERVICE-DARK-BEAM.

5.2.6 Behaviour in state GMM-REGISTERED

The state GMM-REGISTERED is entered when:

- a GMM context is established, i.e. the MES is IMSI attached for GMPRS services only, or for GMPRS and non-GMPRS services.

The specific behaviour of the MES in state GMM-REGISTERED is described in clause 5.2.6.1. The primary substate when entering the state GMM-REGISTERED is always NORMAL-SERVICE.

It should be noted that transitions between the various substates of GMM-REGISTERED are caused by (e.g.):

- cell selection/reselection (see also GMR-1 03.022 [4]);
- change of RA;
- loss/regain of coverage;
- Dark Beam/Light Beam indication;
- trigger from upper layers to send user data;
- detection of availability/unavailability of suitable packet data channels.

How various GMM procedures affect the GMM-REGISTERED substates is described in the detailed description of the procedures in clause 5.7.

5.2.6.1 Detailed description of the MES behaviour in state GMM-REGISTERED

Same as clause 4.2.5.1 of 3GPP TS 04.08 [21].

5.2.6.1.1 Substate, NORMAL-SERVICE

The MES shall:

- perform cell selection/reselection according to GMR-1 03.022 [4];
- perform normal and periodic routing area updating; and
- receive and transmit user data and signalling information.

5.2.6.1.2 Substate, SUSPENDED

Same as clause 4.2.5.1.2 of 3GPP TS 04.08 [21].

5.2.6.1.3 Substate, UPDATE-NEEDED

The MES shall:

- not send any user data;
- not send any signalling information;
- perform cell selection/reselection according to GMR-1 03.022 [4]; and
- chose the appropriate new substate depending on the GPRS update status as soon as the access class allows network contact in the selected cell.

5.2.6.1.4 Substate, ATTEMPTING-TO-UPDATE

Same as clause 4.2.5.1.4 of 3GPP TS 04.08 [21].

5.2.6.1.5 Substate, NO-CELL-AVAILABLE

The MES shall perform cell selection/reselection according to GMPRS-1 03.022 [4].

5.2.6.1.6 Substate, LIMITED-SERVICE

The MES shall perform cell selection/reselection according to GMPRS-1 03.022 [4].

5.2.6.1.7 Substate, ATTEMPTING-TO-UPDATE-MM

The MES shall:

- perform cell selection/reselection according to GMPRS-1 03.022 [4];
- receive and transmit user data and signalling information;
- perform routing area update indicating "combined RA/LA updating with IMSI attach" on the expiry of timers T3311 or T3302;
- perform routing area update indicating "combined RA/LA updating with IMSI attach" when the routing area of the serving cell has changed and the location area this cell is belonging to is not in the list of forbidden Las; GMPRS MESs in operation modes C shall answer to paging requests.

5.2.6.1.8 Substate, NORMAL-SERVICE-DARK-BEAM

The MES shall:

- not send any user-data;
- not send any signalling information.

5.2.6.1.9 Substate, NORMAL-SERVICE-ILLUMINATION-INITIATED

The MES shall:

- buffer user data received from the upper layer;
- not send any signalling information.

5.2.6.1.10 Substate, ROUTING-AREA-UPDATE-DARK-BEAM

The MES shall:

- not send any user-data;
- not send any signalling information.

5.2.6.1.11 Substate, ROUTING-AREA-UPDATE-ILLUMINATION-INITIATED

The MES shall:

- buffer user data received from the upper layer;
- not send any signalling information.

5.3 MM common procedures

5.3.1 TMSI reallocation procedure

Same as clause 4.3.1 of 3GPP TS 04.08 [17].

5.3.2 Authentication procedure

Same as clause 5.3.2 of GMR-1 04.008 [19].

5.3.3 Identification procedure

Same as clause 5.3.3 of GMR-1 04.008 [19].

5.3.4 IMSI detach procedure

Same as clause 5.3.4 of GMR-1 04.008 [19].

5.3.5 Abort procedure

Same as clause 5.3.5 of GMR-1 04.008 [19].

5.4 MM specific procedures

Same as clause 5.4 of GMR-1 04.008 [19].

5.5 Connection management sublayer service provision

5.5.1 MM connection establishment

Same as clause 5.5.1 of GMR-1 04.008 [19].

5.5.1.1 MM connection establishment initiated by the MES

Same as clause 5.5.1.1 of GMR-1 04.008 [19].

5.5.1.2 Abnormal cases

Same as clause 5.5.1.2 of GMR-1 04.008 [19].

5.5.1.3 MM connection establishment initiated by the network

Same as clause 5.5.1.3 of GMR-1 04.008 [19].

5.5.1.4 Abnormal cases

Same as clause 5.5.1.4 of GMR-1 04.008 [19].

5.5.1.5 MM connection establishment for emergency calls

Same as clause 5.5.1.5 of GMR-1 04.008 [19].

5.5.1.6 Call reestablishment

Same as clause 5.5.1.6 of GMR-1 04.008 [19].

5.5.1.7 Forced release during MO MM connection establishment

Same as clause 5.5.1.7 of GMR-1 04.008 [19].

5.5.1.8 Optimal routing

During establishment of an RR session for a CM service, it may be indicated that a registration is needed to service the call (see clause 4.3.1.4.2.1). If so, MM shall proceed as follows:

- If the MES is in GMPRS Class-B mode of operation, then co-ordination with GMM shall be temporarily suspended. The current GMM state on the MES shall remain unchanged.
- Cancel T3230, if a CM SERVICE REQUEST has been sent according to clause 5.5.1.1 (a) first bullet; or cancel T3210, if a LOCATION UPDATING REQUEST has been sent according to clause 5.5.1.1 (a) second bullet.
- Perform the location updating procedure, as detailed in clause 5.4.4, except that the RR connection is already available. The "follow on request" indication shall be included in the LOCATION UPDATING REQUEST to the network.
- When the LOCATION UPDATING ACCEPT message is received with the "follow on proceed" indication, start T3230 and send (or resend) the CM SERVICE REQUEST.

In the event of failure to establish a call that was optimally routed, the following requirements shall apply:

- In the event that the location update is not accepted by the network, the MES shall proceed as normal (see clause 5.4.4.7). After release of the RR connection, the MES shall camp on the previous idle mode camped-on channels and shall initiate a normal location update (see clause 5.4.4.1).
- In the event that the location update is not accepted by the network, a GMPRS Class-B MES shall resume the co-ordination between MM and GMM and proceed as specified in clause 5.4.4.7. After release of the RR connection, the GMPRS Class-B MES shall camp on the previous idle mode camped-on channels and shall initiate a location update using combined routing area update procedure (see clause 5.7.5.2) if the network is operating in mode I. If the network is not operating in mode I, then the GMPRS Class-B MES shall use MM specific procedure to initiate a location area update.
- In the event of any abnormal failure of either the location update or the CM service request, including the case where the MSC does not grant the FOR, the MES shall delete the TMSI and LAI and shall set the SIM status to NOT UPDATED. If the location update fails, the MES shall not use the counter (with reference to clause 5.4.4.9) and shall not perform any further action with respect to the location update. A GMPRS Class-B MES shall resume the co-ordination between MM and GMM. The MES shall camp on the previous idle mode camped-on channels and shall initiate a normal location update (see clause 5.4.4.1). If the MES is in GMPRS Class-B mode of operation and the network is operating in mode I, then the MES shall initiate a combined routing area update procedure (see clause 5.7.5.2) instead of a normal location update. If the network is not operating in mode I, then GMPRS Class-B MES shall initiate location update using MM specific procedures.
- Upon release of the RR connection, and after a location update if so required, the MES may try to service the pending CM request again. If so, the MES shall indicate to the network that the optimal routing attempt for the request failed the previous time (see clause 4.3.1.3).

This clause applies so long as MM has asked for an establishment cause of "mobile-originated call", irrespective of whether it has sent a CM SERVICE REQUEST or a LOCATION UPDATING REQUEST message. For the latter case, MM shall restart the location updating procedure and give a second LOCATION UPDATING REQUEST message to RR.

5.5.2 MM connection information transfer phase

Same as clause 5.5.2 of GMR-1 04.008 [19].

5.5.3 MM connection release

Same as clause 5.5.3 of GMR-1 04.008 [19].

5.6 Receiving an MM STATUS message by an MM entity

Same as clause 5.6 of GMR-1 04.008 [19].

5.7 Elementary mobility management procedures for GMPRS services

5.7.1 General

Same as clause 4.7.1 of 3GPP TS 04.08 [21].

5.7.1.1 Lower layer failure

Same as clause 4.7.1.1 of 3GPP TS 04.08 [21].

5.7.1.2 Ciphering of messages

Same as clause 4.7.1.2 of 3GPP TS 04.08 [21].

5.7.1.3 P-TMSI signature

Same as clause 4.7.1.3 of 3GPP TS 04.08 [21].

5.7.1.4 Radio resource sublayer address handling

Same as clause 4.7.1.4 of 3GPP TS 04.08 [21] applies with the following additional rules:

When the MES accepts a P-TMSI change in the ATTACH ACCEPT or ROUTING AREA UPDATE ACCEPT messages, it shall immediately release the uplink TBF (as specified in GMPRS-1 04.060 [20]) that was established before the P-TMSI change. If an ATTACH COMPLETE or ROUTING AREA UPDATE ACCEPT message is required, it shall be sent via a new uplink TBF established on CCCH following the release of the uplink TBF that was used to send ATTACH REQUEST or ROUTING AREA UPDATE REQUEST message.

5.7.1.5 P-TMSI handling

Same as clause 4.7.1.5 of 3GPP TS 04.08 [21].

5.7.1.6 Change of network mode of operation

This function is not currently supported in GMR-1.

5.7.2 GPRS Mobility management timers

5.7.2.1 READY timer behaviour

Same as clause 4.7.2.1 of 3GPP TS 04.08 [21].

5.7.2.2 Periodic routing area updating

Periodic routing area updating is used to periodically notify the availability of the MES to the network. This procedure is always initiated on the RACH channel. The procedure is controlled in the MES by the periodic RA update timer, T3312. The value of timer T3312 is sent by the network to the MES in the messages ATTACH ACCEPT and ROUTING AREA UPDATE ACCEPT. The value of the timer T3312 shall be unique within a RA.

The timer T3312 is reset and started with its the initial value, when the READY timer is stopped or expires. The timer T3312 is stopped and shall be set to its initial value for the next start when the READY timer is started. If after a READY timer negotiation the READY timer value is set to zero, timer T3312 is reset and started with its the initial value. If the initial READY timer value is zero, the timer T3312 is reset and started with its the initial value, when the ROUTING AREA UPDATE REQUEST message is transmitted.

When timer T3312 expires, the periodic routing area updating procedure shall be started and the timer shall be set to its initial value for the next start.

If the MES is in any other substate other than GMM-REGISTERED.NORMAL-SERVICE or dark beam substates in GMM-REGISTERED when the timer expires the periodic routing area updating procedure is delayed until the MES returns to GMM-REGISTERED.NORMAL-SERVICE or the beam is illuminated or if the MES detects availability of suitable packet data channels (see clause 4.2.2.1.4.3). If the MES in GMPRS Class-B mode of operation is in the state GMM-REGISTERED.SUSPENDED when the timer expires the periodic routing area the updating procedure is delayed until the state is left.

The network supervises the periodic routing area updating procedure by means of the Mobile Reachable timer. The Mobile Reachable timer shall be longer than the periodic RA update timer. When the Mobile Reachable timer expires, typically the network stops sending paging messages to the mobile and may take other appropriate actions.

The Mobile Reachable timer is reset and started with its the initial value, when the READY timer is stopped or expires.

The Mobile Reachable timer is stopped and shall be set to its initial value for the next start when the READY timer is started.

If after a READY timer negotiation the READY timer value is set to zero the Mobile Reachable timer is reset and started with its the initial value. If the initial READY timer value is zero, the Mobile Reachable is reset and started with its the initial value, when the ROUTING AREA UPDATE REQUEST message is received.

If the MES is both IMSI attached for GMPRS and non-GMPRS services, and if the MES lost coverage of the registered PLMN and timer T3312 expires, then:

a) if the MES returns to coverage in a cell that supports GMPRS and that indicates that the network is in network operation mode I, then the MES shall either perform the combined routing area update procedure indicating "combined RA/LA updating with IMSI attach"; or

b) if the MES returns to coverage in a cell in the same RA that supports GMPRS and that indicates that the network is in network operation mode II or III, then the MES shall perform the periodic routing area updating procedure indicating "Periodic updating" and shall perform the periodic location updating procedure; or

c) if the MES returns to coverage in a cell that does not support GMPRS, then, depending upon the LA of the cell, the MES shall perform either the periodic location updating procedure or a normal location updating procedure. In addition, the MES shall perform a combined routing area update procedure indicating "combined RA/LA updating with IMSI attach" when the MES enters a cell that supports GMPRS and that indicates that the network is in network operation mode I; or

d) if the MES returns to coverage in a new RA the description given in clause 5.7.5 applies.

If the MES is both IMSI attached for GMPRS and non-GMPRS services in a network that operates in network operation mode I, and if the MES has camped on a cell that does not support GMPRS and timer T3312 expires, then the MES shall start an MM location updating procedure. In addition, the MES shall perform a combined routing area update procedure indicating "combined RA/LA updating with IMSI attach" when the MES enters a cell that supports GMPRS and indicates that the network is in operation mode I.

Timer T3312 shall not be stopped when a GMPRS MES enters state GMM-REGISTERED.SUSPENDED.

5.7.3 GPRS attach procedure

The GPRS attach procedure is used for:

- Normal GPRS attach, performed by the MES to IMSI attach for GMPRS services only. The normal GPRS attach procedure shall be used by GMPRS MESs in MES operation mode C, independent of the network operation mode. It shall also be used by GMPRS MESs in MES operation mode B if the network operates in network operation mode II or III.

- Combined GMPRS attach procedure, used by GMPRS MESs in MES operation mode B to attach the IMSI for GMPRS and non-GMPRS services provided that the network operates in network operation mode I.

With a successful GPRS attach procedure a GMM context is established.

Clause 5.7.3.1 describes the GPRS attach procedure to attach the IMSI only for GMPRS services. The GPRS attach procedure is always initiated on the RACH channel.

To limit the number of subsequently rejected attach attempts, a GPRS attach attempt counter is introduced. The GPRS attach attempt counter shall be incremented as specified in clause 5.7.3.1.5. Depending on the value of the GPRS attempt counter, specific actions shall be performed. The GPRS attach attempt counter shall be reset when:

- the MES is powered on;

- a SIM is inserted;

- a GPRS attach procedure is successfully completed; or

- a GPRS attach procedure is completed with cause #8, #9, #11, #12, #13, or #16; and additionally when the MES is in substate ATTEMPTING-TO-ATTACH:

  - expiry of timer T3302;

  - a new routing area is entered; or

  - an attach is triggered by CM sublayer requests.

The mobile equipment shall contain a list of "forbidden location areas for roaming", as well as a list of "forbidden location areas for regional provision of service". The handling of these lists is described in clause 5.4.1; the same lists are used by GMM and MM procedures.

5.7.3.1 GPRS attach procedure for GMPRS services

Same as clause 4.7.3.1 of 3GPP TS 04.08 [21].

5.7.3.1.1 GPRS attach procedure initiation

In state GMM-DEREGISTERED, the MES initiates the GPRS attach procedure by sending an ATTACH REQUEST message to the network, starts timer T3310 and enters state GMM-REGISTERED-INITIATED.

The MES shall include a valid P-TMSI, if any is available, the P-TMSI signature associated with the P-TMSI and the routing area identity associated with the P-TMSI in the ATTACH REQUEST message. If there is no valid P-TMSI available, the IMSI shall be included instead of the P-TMSI and P-TMSI signature.

5.7.3.1.2 GMM common procedure initiation

Same as clause 4.7.3.2 of 3GPP TS 04.08 [21].

5.7.3.1.3 GPRS attach accepted by the network

Same as clause 4.7.3.1.3 of 3GPP TS 04.08 [21].

5.7.3.1.4 GPRS attach not accepted by the network

Same as clause 4.7.3.1.4 of 3GPP TS 04.08 [21].

5.7.3.1.5 Abnormal cases in the MES

The following abnormal cases can be identified:

a) Access barred because of access class control:

The GPRS attach procedure shall not be started. The MES stays in the current serving cell and applies normal cell reselection process. The GPRS attach procedure is started as soon as possible, i.e. when access is granted or because of a cell change.

b) Lower layer failure before the ATTACH ACCEPT or ATTACH REJECT message is received:

The procedure shall be aborted. The MES shall proceed as described below.

c) T3310 time-out:

On the first expiry of the timer, the MES reset and restart timer T3310 and shall retransmit the ATTACH REQUEST message. This retransmission is repeated four times, i.e. on the fifth expiry of timer T3310, the GPRS attach procedure shall be aborted and the MES shall proceed as described below.

d) ATTACH REJECT, other causes than those treated in clause 5.7.3.1.4:

The MES shall proceed as described below.

e) Change of cell into a new routing area:

If a cell change into a new routing area occurs before an ATTACH ACCEPT or ATTACH REJECT message has been received, the GPRS attach procedure shall be aborted and re-initiated immediately. If a routing area border is crossed when the ATTACH ACCEPT message is received but before an ATTACH COMPLETE message is sent, the GPRS attach procedure shall be aborted and the routing area updating procedure shall be initiated. If a P-TMSI was allocated during the GPRS attach procedure, this P-TMSI shall be used in the routing area updating procedure. If a P-TMSI signature was allocated together with the P-TMSI during the GPRS attach procedure, this P-TMSI signature shall be used in the routing area updating procedure.

f) Power off:

If the MES is in state GMM-REGISTERED-INITIATED at power off, the GPRS detach procedure shall be performed.

g) Procedure collision:

If the MES receives a DETACH REQUEST message from the network in state GMM-REGISTERED-INITIATED, the GPRS detach procedure shall be progressed and the GPRS attach procedure shall be aborted. If the cause IE, in the DETACH REQUEST message, indicated a "reattach request", the GPRS attach procedure shall be progressed and the DETACH REQUEST message shall be ignored.

In cases b, c and d the MES shall proceed as follows. Timer T3310 shall be stopped if still running. The GPRS attach attempt counter shall be incremented.

If the GPRS attach attempt counter is less than 5:

- timer T3311 is started and the state is changed to GMM-DEREGISTERED.ATTEMPTING-TO-ATTACH.

If the GPRS attach attempt counter is greater than or equal to 5:

- the MES shall delete any RAI, P-TMSI, P-TMSI signature, and GPRS ciphering key sequence number, shall set the GPRS update status to GU2 NOT UPDATED, shall start timer T3302. The state is changed to GMM-DEREGISTERED, ATTEMPTING-TO-ATTACH or optionally to GMM-DEREGISTERED.PLMN-SEARCH (see clause 5.2.5.1.2).

5.7.3.1.6 Abnormal cases on the network side

Same as clause 4.7.3.1.6 of 3GPP TS 04.08 [21].

5.7.3.2 Combined GPRS attach procedure for GMPRS and non-GMPRS services

Same as clause 4.7.3.2 of 3GPP TS 04.08 [21].

5.7.4 GPRS detach procedure

The GPRS detach procedure is used:

- to detach the IMSI for GMPRS services only;
- in the case of a network failure condition to indicate to the MES that a re-attach with successive activation of previously active PDP contexts shall be performed.

After completion of a GPRS detach procedure the GMM context is released.

The GPRS detach procedure shall be invoked by the MES if the MES is switched off, the SIM card is removed from the MES or if the GPRS or non-GPRS capability of the MES is disabled. The procedure may be invoked by the network to detach the IMSI for GMPRS services. The GPRS detach procedure causes the MES to be marked as inactive in the network for GMPRS services, non-GMPRS services or both services.

If the GPRS detach procedure is performed, the PDP contexts are deactivated locally without peer to peer signalling between the SM and LLC entities in the MES and the network.

5.7.4.1 MES initiated GPRS detach procedure

5.7.4.1.1 MES initiated GPRS detach procedure initiation

Same as clause 4.7.4.1.1 of 3GPP TS 04.08 [21].

5.7.4.1.2 MES initiated GPRS detach procedure completion for GMPRS services only

Same as clause 4.2.4.1.2 of 3GPP TS 04.08 [21].

5.7.4.1.3 MES initiated combined GPRS detach procedure completion

Same as clause 4.7.4.1.3 of 3GPP TS 04.08 [21].

5.7.4.1.4 Abnormal cases in the MES

Same as clause 4.7.4.1.4 of 3GPP TS 04.08 [21].

5.7.4.2 Network initiated GMPRS detach procedure

5.7.4.2.1 Network initiated GMPRS detach procedure initiation

Same as clause 4.7.4.2.1 of 3GPP TS 04.08 [21].

5.7.4.2.2 Network initiated GMPRS detach procedure completion by the MES

Same as clause 4.7.4.2.2 of 3GPP TS 04.08 [21].

5.7.4.2.3 Network initiated GMPRS detach procedure completion by the network

Same as clause 4.7.4.2.3 of 3GPP TS 04.08 [21].

5.7.4.2.4 Abnormal cases on the network side

The following abnormal cases can be identified:

a) T3322 time-out:

On the first expiry of the timer, the network shall retransmit the DETACH REQUEST message and shall start timer T3322. This retransmission is repeated four times, i.e. on the fifth expiry of timer T3322, the GPRS detach procedure shall be aborted and the network changes to state GMM-DEREGISTERED.

b) Low layer failure:

The GPRS detach procedure is aborted and the network changes to state GMM-DEREGISTERED.

c) GPRS detach procedure collision:

If the network receives a DETACH REQUEST message with "switching off" indicated, before the network initiated GPRS detach procedure has been completed, both procedures shall be considered completed.

If the network receives a DETACH REQUEST message without "switching off" indicated, before the network initiated GPRS detach procedure has been completed, the network shall send a DETACH ACCEPT message to the MES.

d) GPRS detach and GPRS attach procedure collision:

If the network receives an ATTACH REQUEST message before the network initiated GPRS detach procedure has been completed, the network shall ignore the ATTACH REQUEST message, except when the detach type IE value, sent in the DETACH REQUEST message, indicated that the MES shall perform a GPRS attach procedure.

In this case, the detach procedure is aborted and the GPRS attach procedure shall be progressed after the PDP contexts have been deleted.

e) GPRS detach and routing area updating procedure collision:

GPRS detach containing detach type "reattach required" or "reattach not required":

If the network receives a ROUTING AREA UPDATE REQUEST message before the network initiated GPRS detach procedure has been completed, the detach procedure shall be progressed, i.e. the ROUTING AREA UPDATE REQUEST message shall be ignored.

GPRS detach containing detach type "IMSI detach":

If the network receives a ROUTING AREA UPDATE REQUEST message before the network initiated GPRS detach procedure has been completed, the network shall abort the detach procedure and shall progress the routing area update procedure.

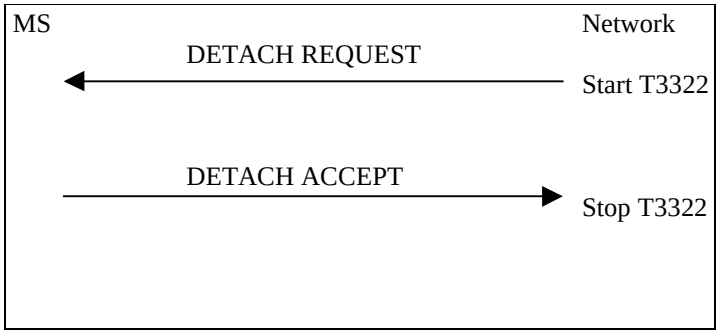

Figure 5.7.4: 2 GMR-1 04.008: Network initiated GPRS detach procedure

5.7.5 Routing area updating procedure

This procedure is used for:

- normal routing area updating to update the registration of the actual routing area of an MES in the network. This procedure is used by GMPRS MESs in MES operation mode C and by GMPRS MESs in MES operation modes A or B that are IMSI attached for GMPRS and non-GMPRS services if the network operates in network operation mode II or III;
- combined routing area updating to update the registration of the actual routing and location area of an MES in the network. This procedure is used by GMPRS MESs in MES operation modes A or B that are IMSI attached for GMPRS and non-GMPRS services provided that the network operates in network operation mode I;
- periodic routing area updating. This procedure is used by GMPRS MESs in MES operation mode C and by GMPRS MESs in MES operation modes A or B that are IMSI attached for GMPRS or for GMPRS and non-GMPRS services independent of the network operation mode;
- resuming GPRS services when the RR sublayer indicated a resumption failure after dedicated mode was left, see clause 4.5.1.1.
- updating the network with the new MES Radio Access Capability IE when the content of the IE has changed. Normal or combined routing area updating procedure is used.

Clause 5.7.5.1 describes the routing area updating procedures for updating the routing area only.

The routing area updating procedure is always initiated by the MES on the RACH channel. It is only invoked in state GMM-REGISTERED. To limit the number of subsequently rejected routing area update attempts, a routing area updating attempt counter is introduced. The routing area updating attempt counter shall be incremented as specified in clause 5.7.5.1.5. Depending on the value of the routing area updating attempt counter, specific actions shall be performed. The routing area updating attempt counter shall be reset when:

- a GPRS attach procedure is successfully completed; or
- a routing area updating procedure is successfully completed;
- a routing area updating procedure is completed with cause #8, #11, #12 and #13; and additionally when the MES is in substate ATTEMPTING-TO-UPDATE;
- a new routing area is entered;
- expiry of timer T3302; or
- at request from registration function.

The mobile equipment shall contain a list of "forbidden location areas for roaming", as well as a list of "forbidden location areas for regional provision of service". The handling of these lists is described in clause 5.4.1. User data transmission in the MES shall be suspended during the routing area updating procedure; user data reception shall be possible. User data transmission in the network shall be suspended during the routing area updating procedure, if a new P-TMSI is assigned.

5.7.5.1 Normal and periodic routing area updating procedure

Same as clause 4.7.5.1 of 3GPP TS 04.08 [21].

5.7.5.1.1 Normal and periodic routing area updating procedure initiation

Same as clause 4.7.5.1.1 of 3GPP TS 04.08 [21].

5.7.5.1.2 GMM Common procedure initiation

Same as clause 4.7.5.1.2 of 3GPP TS 04.08 [21].

5.7.5.1.3 Normal and periodic routing area updating procedure accepted by the network

Same as clause 4.7.5.1.3 of 3GPP TS 04.08 [21].

5.7.5.1.4 Normal and periodic routing area updating procedure not accepted by the network

Same as clause 4.7.5.1.4 of 3GPP TS 04.08 [21].

5.7.5.1.5 Abnormal cases in the MES

The following abnormal cases can be identified:

a) Access barred because of access class control:

The routing area updating procedure shall not be started. The MES stays in the current serving cell and applies the normal cell reselection process. The procedure is started as soon as possible and if still necessary, i.e. when the barred state is removed or because of a cell change.

b) Lower layer failure before the ROUTING AREA UPDATE ACCEPT or ROUTING AREA UPDATE REJECT message is received:

The procedure shall be aborted. The MES shall proceed as described below.

c) T3330 time-out:

The procedure is restarted four times, i.e. on the fifth expiry of timer T3330, the MES shall abort the procedure.

The MES shall proceed as described below.

d) ROUTING AREA UPDATE REJECT, other causes than those treated in clause 5.7.5.1.4:

The MES shall proceed as described below.

e) If a routing area border is crossed, when the MES is in state GMM-ROUTING-AREA-UPDATE-INITIATED, the routing area updating procedure shall be aborted and re-initiated immediately.

f) If a cell change occurs within the same RA, when the MES is in state GMM-ROUTING-AREA-UPDATE-INITIATED, the cell update procedure is performed, before completion of the routing area updating procedure.

g) Routing area updating and detach procedure collision GPRS detach containing detach type "GPRS detach" If the MES receives a DETACH REQUEST message before the routing area updating procedure has been completed, the routing area updating procedure shall be aborted and the GPRS detach procedure shall be progressed.

GPRS detach containing detach type "IMSI detach":

If the MES receives a DETACH REQUEST message before the routing area updating procedure has been completed, the routing area updating procedure shall be progressed, i.e. the DETACH REQUEST message shall be ignored.

h) Routing area updating and P-TMSI reallocation procedure collision

If the MES receives a P-TMSI REALLOCATION REQUEST message before the routing area updating procedure has been completed, the P-TMSI reallocation procedure shall be aborted and the routing area updating procedure shall be progressed.

In cases b, c and d the MES shall proceed as follows:

- Timer T3330 shall be stopped if still running. The routing area updating attempt counter shall be incremented.

If the routing area updating attempt counter is less than 5, and the stored RAI is equal to the RAI of the current serving cell and the GMM update status is equal to GU1 UPDATED:

- the MES shall keep the GMM update status to GU1 UPDATED and changes state to GMM-REGISTERED. NORMAL-SERVICE. The MES shall start timer T3311. When timer T3311 expires the routing area updating procedure is triggered again.

If the routing area updating attempt counter is less than 5, and the stored RAI is different to the RAI of the current serving cell or the GMM update status is different to GU1 UPDATED:

- the MES shall start timer T3311, shall set the GPRS update status to GU2 NOT UPDATED and changes state to GMM-REGISTERED.ATTEMPTING-TO-UPDATE.

If the routing area updating attempt counter is greater than or equal to 5:

- the MES shall start timer T3302, shall set the GPRS update status to GU2 NOT UPDATED and shall change to state GMM-REGISTERED.ATTEMPTING-TO-UPDATE or optionally to GMM-DEREGISTERED.PLMN-SEARCH(see clause 5.2.5.1.2).

5.7.5.1.6 Abnormal cases on the network side

Same as clause 4.7.5.1.6 of 3GPP TS 04.08 [21].

5.7.5.2 Combined routing area updating procedure

Same as clause 4.7.5.1.2 of 3GPP TS 04.08 [21].

5.7.6 P-TMSI reallocation procedure

Same as clause 4.7.6 of 3GPP TS 04.08 [21].

5.7.7 Authentication and ciphering procedure

Same as clause 4.7.7 of 3GPP TS 04.08 [21].

5.7.8 Identification procedure

Same as clause 4.7.8 of 3GPP TS 04.08 [21].

5.7.9 Paging procedure

5.7.9.1 Paging for GMPRS services

Same as clause 4.7.9.1 of 3GPP TS 04.08 [21].

5.7.9.1.1 Paging for packet services using P-TMSI

Same as clause 4.7.9.1.1 of 3GPP TS 04.08 [21].

5.7.9.1.2 Paging for packet services using IMSI

Paging for packet services using IMSI is an abnormal procedure used for error recovery in the network.

The network may initiate paging using IMSI if the P-TMSI is not available due to a network failure. Paging using IMSI requires the network to set the Channel Needed field in the Paging Information IE to PDCH to indicate to the MES that it is being paged for packet services.

To initiate the procedure the GMM entity in the network requests the RR sublayer to start paging (see clause 4; see also GMPRS-1 04.060 [20]).

Upon reception of a paging indication for GMPRS services using IMSI, the MES shall locally deactivate any active PDP contexts and locally detach from GPRS. The local detach includes deleting any RAI, P-TMSI, P-TMSI signature and GPRS ciphering key sequence number stored, setting the GPRS update status to GU2 NOT UPDATED and changing state to GMM-DEREGISTERED.

After performing the local detach, the MES shall then perform a GPRS attach or combined GPRS attach procedure. After performing the attach, a MES should activate PDP context(s) to replace any previously active PDP context(s).

NOTE 1: In some cases, user interaction may be required and then the MES cannot activate the PDP context(s) automatically.

NOTE 2: The MES does not respond to the paging except with the Attach Request. Hence timer T3313 in the network is not used when paging with IMSI.

NOTE 3: Paging without DRX parameters may require a considerable extension of the paging duration.

5.7.9.2 Paging for non-GMPRS services

Same as clause 4.7.9.2 of 3GPP TS 04.08 [21].

5.7.10 Receiving a GMM STATUS message by a GMM entity

Same as clause 4.7.10 of 3GPP TS 04.08 [21].

5.7.11 GMM support for anonymous access

This function is not currently supported in GMR-1.

5.7.12 GMM Information procedure

Same as clause 4.7.12 of 3GPP TS 04.08 [21].

6 Elementary procedures for circuit-switched call control

Same as clause 6 of GMR-1 04.008 [19].

7 Support of packet services

Same as clause 6 of 3GPP TS 04.08 [21].

8 Examples of structured procedures

Same as clause 8 of GMR-1 04.008 [19].

8.1 General

Same as clause 8.1 of GMR-1 04.008 [19].

8.1.1 Paging and alert request

Same as clause 8.1.1 of GMR-1 04.008 [19].

8.1.2 Immediate assignment

Same as clause 8.1.2 of GMR-1 04.008 [19].

8.1.3 Service request and contention resolution

Same as clause 8.1.3 of GMR-1 04.008 [19].

8.1.4 Authentication

Same as clause 8.1.4 of GMR-1 04.008 [19].

8.1.5 Ciphering mode setting

Same as clause 8.1.5 of GMR-1 04.008 [19].

8.1.6 Transaction phase

Same as clause 8.1.6 of GMR-1 04.008 [19].

8.1.7 Channel release

Same as clause 8.1.7 of GMR-1 04.008 [19].

8.2 Abnormal cases

Same as clause 8.2 of GMR-1 04.008 [19].

8.3 Selected examples

Same as clause 8.3 of GMR-1 04.008 [19].

8.3.1 Location updating

Same as clause 8.3.1 of GMR-1 04.008 [19].

8.3.2 Mobile originating call establishment

Same as clause 8.3.2 of GMR-1 04.008 [19].

8.3.3 Mobile terminating call establishment

Same as clause 8.3.3 of GMR-1 04.008 [19].

8.3.4 Call clearing

Same as clause 8.3.4 of GMR-1 04.008 [19].

8.3.5 DTMF protocol control

Same as clause 8.3.5 of GMR-1 04.008 [19].

8.3.6 Handover

Same as clause 8.3.6 of GMR-1 04.008 [19].

8.3.7 In-call modification

Same as clause 8.3.7 of GMR-1 04.008 [19].

8.3.8 Call reestablishment

This function is not currently supported in GMR-1.

8.3.9 Mobile-to-mobile call establishment

Same as clause 8.3.9 of GMR-1 04.008 [19].

8.3.10 Multisatellite optimal routing for call establishment

Same as clause 8.3.10 of GMR-1 04.008 [19].

9 Handling of unknown, unforeseen, and erroneous protocol data

Same as clause 8 of 3GPP TS 04.08 [21].

10 Message functional definitions and contents

This clause defines the structure of the messages of the L3 protocols defined in the present document. These are standard L3 messages as defined in GMPRS-1 04.007 [11], with the exception of those sent on the BACH and the RACH.

Each definition given in this clause includes:

a) A brief description of the message direction and use, including whether the message has:

   1) Local significance (i.e., is relevant only in the originating or terminating access).

   2) Access significance (i.e., is relevant in the originating and terminating access, but not in the network).

   3) Dual significance (i.e., is relevant in either the originating or terminating access and in the network).

   4) Global significance (i.e., is relevant in the originating and terminating access and in the network).

b) A table listing the IEs known in the message and the order of their appearance in the message. In messages for circuit-switched call control, a Shift IE shall be considered as known even if not included in the table. All IEs that may be repeated are explicitly indicated. (V and LV formatted IEs, which compose the imperative part of the message, occur before T, TV, and TLV formatted IEs, which compose the nonimperative part of the message, see GMPRS-1 04.007 [11].) In a (maximal) sequence of consecutive IEs with half octet length, the first IE with half octet length occupies bits 1 to 4 of octet N; the second, bits 5 to 8 of octet N; the third, bits 1 to 4 of octet N+1; etc. Such a sequence always has an even number of elements.

For each IE, the table indicates:

   1) The Information Element Identifier (IEI), in hexadecimal notation, if the IE has format T, TV, or TLV. Usually, there is a default IEI for an IE type; default IEIs of IE types of the same protocol are different. If the IEI has half octet length, it is specified by a notation representing the IEI as a hexadecimal digit followed by the notation "-" (example: B-).

2) The name of the IE (which may give an idea of the semantics of the element). This name (usually written with initial caps) followed by IE, is used in GMR-1 04.008 [19] as reference to the IE within a message.

3) The name of the type of IE (which indicates the coding of the value part of the IE) and generally of GMR-1 04.008 [19], describing the value part of the IE.

4) The presence requirement indication (M, C, or O) for the IE as defined in GMPRS-1 04.007 [11].

5) The format of the IE (T, V, TV, LV, TLV) as defined in GMPRS-1 04.007 [11].

6) The length of the IE (or permissible range of lengths), in octets in the message where "?" means that the maximum length of the IE, is constrained only by link layer protocol; in the case of the Facility IE, by possible further conditions specified in GSM 04.10 [22]. This indication is nonnormative.

c) Clauses specifying, where appropriate, conditions for IEs with presence requirement C or O in the relevant message that, together with other conditions specified in the present document, define when the IEs shall be included; what nonpresence of such IEs means; and, for IEs with presence requirement C, the static conditions for presence and/or nonpresence of the IEs (see GMPRS-1 04.007 [11]).

10.1 Messages for radio resources management

Table 10.1 summarizes the messages for RR management. Table 10.2 gives messages for DTMF transmit receive service.

Table 10.1: Messages for radio resource management

Channel establishment messages:	**Reference**
IMMEDIATE ASSIGNMENT	10.1.18.1
EXTENDED IMMEDIATE ASSIGNMENT	10.1.18.2
IMMEDIATE ASSIGNMENT REJECT TYPE 1	10.1.20.1
IMMEDIATE ASSIGNMENT REJECT TYPE 2	10.1.20.2
EXTENDED IMMEDIATE ASSIGNMENT REJECT	10.1.20.3
POSITION VERIFICATION NOTIFY	10.1.20.4
IMMEDIATE ASSIGNMENT TYPE 2	10.1.18.3
IMMEDIATE ASSIGNMENT REJECT TYPE 3	10.1.20.5
IMMEDIATE ASSIGNMENT TYPE 3	10.1.61
Ciphering messages:	**Reference**
CIPHERING MODE COMMAND	10.1.9
CIPHERING MODE COMPLETE	10.1.10
Channel assignment and handover messages:	**Reference**
ASSIGNMENT COMMAND 1	10.1.2.1
ASSIGNMENT COMMAND 2	10.1.2.2
ASSIGNMENT COMPLETE	10.1.3
ASSIGNMENT FAILURE	10.1.4
HANDOVER COMMAND	10.1.15
HANDOVER COMPLETE	10.1.16
Channel release messages:	**Reference**
CHANNEL RELEASE	10.1.7
TtT SIGNALING LINK FAILURE	10.1.50
Paging and alerting messages:	**Reference**
PAGING REQUEST TYPE 1	10.1.22
PAGING REQUEST TYPE 2	10.1.23
PAGING REQUEST TYPE 3	10.1.24
PAGING RESPONSE	10.1.25
ALERT REQUEST	10.1.43
System information messages:	**Reference**
SYSTEM INFORMATION TYPE 1	10.1.31
SYSTEM INFORMATION TYPE 2	10.1.32
GBCH INFORMATION	10.1.46

Miscellaneous messages:	Reference
CHANNEL MODE MODIFY	10.1.5
CHANNEL MODE MODIFY ACKNOWLEDGE	10.1.6
CHANNEL REQUEST	10.1.8
EXTENDED CHANNEL REQUEST	10.1.8.1
CHANNEL REQUEST TYPE 1	10.1.8.2
CHANNEL REQUEST TYPE 2	10.1.8.3
CLASSMARK CHANGE	10.1.11
CLASSMARK ENQUIRY	10.1.12
POSITION UPDATE REQUEST	10.1.44
POSITION UPDATE ACCEPT	10.1.45
RR STATUS	10.1.29
LINK CORRECTION	10.1.48
GUARD TIME VIOLATION	10.1.47
POWER CONTROL PARAMETERS UPDATE	10.1.49
GMPRS RESUME RESPONSE	10.1.61
Status and diagnostic messages:	**Reference**
INFORMATION REQUEST	10.1.51
INFORMATION RESPONSE POSITION	10.1.56
INFORMATION RESPONSE VERSION	10.1.52
INFORMATION RESPONSE SPOT BEAM SELECTION	10.1.53
INFORMATION RESPONSE POWER CONTROL	10.1.55
INFORMATION RESPONSE VENDOR SPECIFIC	10.1.57
INFORMATION RESPONSE CURRENT BEAM	10.1.54
INFORMATION RESPONSE ERROR	10.1.58

Table 10.2: Messages for DTMF transmit receive service

DTRS-related messages:	Reference
DTMF TONE GENERATE REQUEST	10.1.59
DTMF TONE GENERATE ACKNOWLEDGE	10.1.60

10.1.1 Additional assignment

Same as clause 10.1.1 of GMR-1 04.008 [19].

10.1.2 Assignment command 1 and assignment command 2

10.1.2.1 Assignment command 1

Same as clause 10.1.2.1 of GMR-1 04.008 [19].

10.1.2.2 Assignment command 2

Same as clause 10.1.2.2 of GMR-1 04.008 [19].

10.1.3 Assignment complete

Same as clause 10.1.3 of GMR-1 04.008 [19].

10.1.4 Assignment failure

Same as clause 10.1.4 of GMR-1 04.008 [19].

10.1.5 Channel mode modify

Same as clause 10.1.5 of GMR-1 04.008 [19].

10.1.6 Channel mode modify acknowledge

Same as clause 10.1.6 of GMR-1 04.008 [19].

10.1.7 Channel release

Same as clause 10.1.7 of GMR-1 04.008 [19].

10.1.8 Channel request

Same as clause 10.1.8 of GMR-1 04.008 [19].

10.1.8.1 Extended channel request

Same as clause 10.1.8.1 of GMR-1 04.008 [19].

10.1.8.2 Channel request Type 1

This message is sent in random mode on the RACH. It does not follow the basic format and is 139 bits in length. The first 16 bits of the message are of Class 1 type, which uses more robust coding, and the other 123 bits are of Class 2 type (see GMPRS-1 05.003 [13]). The message content of the Channel request Type 1 message depends on the GMPRS terminal type (See GMPRS-1 05.002 [12] for GMPRS Terminal Types).

The Channel Request Type 1 message content used by MES belonging to GMPRS terminal types A or C is shown in Table 10.7.1a. The Channel Request Type 1 message content used by MES belonging to GMPRS terminal type D is shown in Table 10.7.1b.

NOTE: The Class 1 type bits are more likely to reach the network without corruption, even in a disadvantaged condition.

Message type: CHANNEL REQUEST TYPE 1

Significance: dual

Direction: MES to network

Table 10.7.1a: CHANNEL REQUEST TYPE 1 message content) (GMPRS terminal type A or C)

8	7	6	5	4	3	2	1	
Retry Counter		Est. Cause/Numbering Plan					P	octet 1
Precorrection Indication		Random Reference						octet 2
GMPRS Terminal Type Identifier bits 7 to 4 (4 bits)			HPLMN ID (4 bits) /SP ID					octet 3
HPLMN ID(8 bits)/SP ID								octet 4
HPLMN ID(8 bits)/SP ID								octet 5
Prot Disc (2 bits)	Spare (1)	Radio Priority (2 bits)		GMPRS Terminal Type Identifier Bits 3 to 1 (3 bits)				octet 6
TLLI (8 bits)								octet 7
TLLI (8 bits)								octet 8
TLLI (8 bits)								octet 9
TLLI (8 bits)								octet 10
Timestamp / Number of RLC Blocks (8 bits) (MSB)								octet 11
Timestamp/ Spare	Timestamp/ Spare	Timestamp/Peak Throughput (4 bits)				Timestamp/ Number of RLC Blocks (2)(LSB)		octet 12
GPS Position (8 bits)								octet 13
GPS Position (8 bits)								octet 14
GPS Position (8 bits)								octet 15
GPS Position (8 bits)								octet 16
GPS Position (8 bits)								octet 17
					Spare	LLC Mode (1 bit)	RLC Mode (1 bit)	octet 18

Priority (P) (octet 1)
Indicates the priority of the terminal. This value should be taken out of the non-volatile memory field "terminal priority." In case the value is not defined, the value 0 shall be used.
Bit
1
0 Normal Call
1 Priority Call

Establishment Cause (octet 1)
Bits
6 5 4 3 2
1 x x x x Reserved
0 0 0 x x In Response to Paging (bits 3 to 2 represent Channel Needed echoed from Paging Request)
0 0 1 0 0 Reserved
0 0 1 1 1 Reserved for Channel Request Type 2

0 1 0 0 0 Reserved
0 1 0 0 1 Reserved
0 1 0 1 0 Reserved
0 1 0 1 1 Reserved
0 1 1 1 1 Reserved
0 1 1 0 0 Position Verification
0 1 1 0 1 Attach/RA Update
0 1 1 1 0 Packet Data Transfer

All other values are reserved.

Retry Counter (octet 1, bits 8,7). Range 0 to 3 Retransmission count for current access attempt
Precorrection Indication (octet 2) This is the timing correction applied to RACH while sending this message (see GMPRS-1 05.010 [16] for details). This is coded as Bits 8 7 6 0 0 0 No precorrection 0 0 1 -47 symbols correction 0 1 0 -94 symbols correction 0 1 1 -141 symbols correction 1 0 0 +141 symbols correction 1 0 1 +94 symbols correction 1 1 0 +47 symbols correction 1 1 1 Reserved
Random Reference (octet 2, bits 5 to 1) A random number of 5 bits.
GMPRS Terminal Type Identifier Bits 7 to 4 (octet 3, bits 8 to 5) This field encodes bits b7 to b4 of GMPRS terminal type identifier. GMPRS terminal type identifier is defined in GMPRS-1 05.002 [12]
HPLMN ID/SP ID (octets 3,4,5) Octet 3, bits 1 to 4 represent the highest bits, octet 4 represents the middle bits, and octet 5 represents the lowest bits of the PLMN ID/SP ID field. The HPLMN ID shall be sent in this field when it is different from PLMN ID of the network being accessed. The SP ID shall be sent when the MES is accessing its HPLMN. To accommodate SIMs with 3-digit MNCs, the value transmitted as the HPLMN ID shall consist of digits 1 to 6 of the IMSI. This value shall be represented as a 20-bit binary number. The SP ID shall consist of digits 6 to 9 of the IMSI. This value shall be represented as a 15-bit binary number. The five high-order bits of the 20-bit field shall be set to 11111.
Radio Priority(Octet 6, bits 4 to 5) As described in GMPRS-1 04.060 [20]
PD (Protocol Discriminator) (octet 6, bits 8 to 7) Set to "00" for the current version of the protocol.
GMPRS Terminal Type Identifier Bits 3 to 1 (octet 6, bits 3 to 1) This field encodes bits b3 to b1 of GMPRS terminal type identifier. GMPRS terminal type identifier is defined in GMPRS-1 05.002 [12]
TLLI(octets 7 to 10) As described in GMPRS-1 04.060 [20]
Timestamp/ Number of RLC Blocks (Octet 11, Octet 12) Timestamp is as described in 11.5.2.57 Number of RLC Blocks is as described in GMPRS-1 04.060 [20] The network shall assume the "RLC Blocks" field to be 1 when the Channel Request is sent with the cause "Attach/RA Update". (This field is not present when the establishment cause is "Attach/RA Update").
Peak Throughput/Timestamp (Octet 12 , bits 3 to 6) Timestamp is as described in 11.5.2.57 Peak-throughput is as described in GMPRS-1 04.060 [20]
RLC Mode/Spare (Octet 18, bit 1) 0 - Acknowledged 1 - Unacknowledged
LLC Mode/Spare (Octet 18, bit 2) 0 - SACK/ACK packets 1 - Data packets
GPS Position (octets 13 to 17) GPS Position octet 13 (highest bits) to octet 17 (lowest bits) maps to value part of GPS position IE as described in 11.5.2.53 (i.e., IEI part is not included) (Format V)
Spare bits shall be coded with "0". Timestamp shall be sent for all causes other than Packet Data Transfer

Table 10.7.1b: CHANNEL REQUEST TYPE 1 message content (GMPRS terminal type D)

8	7	6	5	4	3	2	1	
Retry Counter		Est. Cause/Numbering Plan					P	octet 1
Precorrection Indication		Random Reference						octet 2
GMPRS Terminal Type Identifier Bits 7 to 4 (4 bits)			DL Peak Throughput (4 bits)					octet 3
Reserved (8 bits)								octet 4
Reserved (8 bits)								octet 5
Prot Disc (2 bits)	Spare (1)	Radio Priority (2 bits)		GMPRS Terminal Type Identifier Bits 3 to 1 (3 bits)				octet 6
TLLI (8 bits)								octet 7
TLLI (8 bits)								octet 8
TLLI (8 bits)								octet 9
TLLI (8 bits)								octet 10
Timestamp / Number of RLC Blocks (8 bits) (MSB)								octet 11
Timestamp/ Spare	Timestamp/ Spare	Timestamp/ UL Peak Throughput (4 bits)				Timestamp/ Number of RLC Blocks (2)(LSB)		octet 12
GPS Position (8 bits)								octet 13
GPS Position (8 bits)								octet 14
GPS Position (8 bits)								octet 15
GPS Position (8 bits)								octet 16
GPS Position (8 bits)								octet 17
Spare (6 bits)						LLC Mode (1 bit)	RLC Mode (1 bit)	octet 18

Priority (P) (octet 1) This field is coded as described in the Priority field of the table 10.7.1a
Establishment Cause (octet 1) This field is coded as described in the Establishment Cause field of the table 10.7.1a

Retry Counter (octet 1, bits 8,7). Range 0 to 3 This field is coded as described in the Retry Counter field of the table 10.7.1a
Precorrection Indication (octet 2) This field is coded as described in the Precorrection Indication field of the table 10.7.1a
Random Reference (octet 2, bits 5 to 1) This field is coded as described in the Random Reference field of the table 10.7.1a
GMPRS Terminal Type Identifier Bits 7 to 4 (octet 3, bits 8 to 5) This field is coded as described in the GMPRS Terminal Type Identifier field of the table 10.7.1a
Downlink Peak Throughput (Octet 3, bits 1 to 4) This field indicates the Downlink Peak Throughput Class requested by upper layers. The field is coded as the binary representation of the Peak Throughput Class specified in 3GPP TS 03.60 [24] Range: 0 to 7 Octet 4, bits 4 to 8 Reserved. Octet 5, bits 1 to 8 Reserved. The network should assume the "Downlink Peak Throughput" to be 0 (Best Effort) when the Channel Request is sent with the cause "Attach/RA Update".
Radio Priority(Octet 6, bits 4 to 5) This field is coded as described in the Radio Priority field of the table 10.7.1a
PD (Protocol Discriminator) (octet 6, bits 8 to 7) This field is coded as described in the PD (Protocol Discriminator) field of the table 10.7.1a
GMPRS Terminal Type Identifier Bits 3 to 1 (octet 6, bits 3 to 1) This field is coded as described in the GMPRS Terminal Type Identifier field of the table 10.7.1a
TLLI(octets 7 to 10) This field is coded as described in the TLLI field of the table 10.7.1a
Timestamp/ Number of RLC Blocks (Octet 11, Octet 12) This field is coded as described in the Timestamp/ Number of RLC Blocks field of the table 10.7.1a
Timestamp/ UL Peak Throughput (Octet 12 , bits 3 to 6) Timestamp is as described in 11.5.2.57 Uplink Peak Throughput (Octet 12, bits 3 to 6) This field indicates the Uplink Peak Throughput Class requested by upper layers. The field is coded as the binary representation of the Peak Throughput Class specified in 3GPP TS 03.60 [24]. Range: 0 to 7 The network shall assume the "Uplink Peak Throughput" to be 0 (Best Effort) when the Channel Request is sent with the cause "Attach/RA Update".
RLC Mode/Spare (Octet 18, bit 1) This field is coded as described in the RLC Mode/Spare field of the table 10.7.1a
LLC Mode/Spare (Octet 18, bit 2) This field is coded as described in the LLC Mode/Spare field of the table 10.7.1a
GPS Position (octets 13 to 17) This field is coded as described in the GPS Position field of the table 10.7.1a
Spare bits shall be coded with "0". Timestamp shall be sent for all causes other than Packet Data Transfer

10.1.8.3 Channel request Type 2

This message is sent in random mode on the RACH. It does not follow the basic format and is 139 bits in length. The first 16 bits of the message are of Class 1 type, and the remaining 123 bits are of Class 2 type. Class 1 type bits use a more robust coding than Class 2 type bits (see GMPRS-1 05.003 [13]). See table 10.7.2.

NOTE: The Class 1 type bits are more likely to reach the network without corruption, even in a disadvantaged condition.

Message type: CHANNEL REQUEST TYPE 2

Significance: dual

Direction: MES to network

Table 10.7.2: CHANNEL REQUEST TYPE 2 message content

8	7	6	5	4	3	2	1	
Retry Counter		0	0	1	1	1	P	octet 1
Precorrection Indication			Random Reference					octet 2
GMPRS Terminal Type Identifier Bits 7 to 4 (4 bits)			HPLMN ID (4 bits) /SP ID					octet 3
HPLMN ID (8 bits)/SP ID								octet 4
HPLMN ID (8 bits)/SP ID								octet 5
Prot Disc (2bits)		MSC ID (6 bits)						octet 6
TLLI (8 bits)								octet 7
TLLI (8 bits)								octet 8
TLLI (8 bits)								octet 9
TLLI (8 bits)								octet 10
GMPRS Terminal Type Identifier Bits 3 to 1 (3 bits)			Request Type (5 bits)					octet 11
Software Version Number (7 bits)							Spare (1 bit)	octet 12
GPS Position (8 bits)								octet 13
GPS Position (8 bits)								octet 14
GPS Position (8 bits)								octet 15
GPS Position (8 bits)								octet 16
GPS Position (8 bits)								octet 17
					O	R	GCI	octet 18

Priority (P) (octet 1)
Indicates the priority of the terminal. This value should be taken out of the □on-volatile memory field "terminal priority." In case the value is not defined, the value 0 shall be used.
Bit
1
0 Normal Call
1 Priority Call

Establishment Cause (octet 1)
Bits
6 5 4 3 2
0 0 1 1 1 Channel Request Type 2
All other values are reserved.

Retry Counter (octet 1, bits 8,7). Range 0 to 3
Retransmission count for current access attempt

Precorrection Indication (octet 2)
This is the timing correction applied to RACH while sending this message (see GMPRS-1 05.010 [16] for details). This is coded as:
Bits
8 7 6
0 0 0 No precorrection
0 0 1 -47 symbols correction
0 1 0 -94 symbols correction
0 1 1 -141 symbols correction
1 0 0 +141 symbols correction
1 0 1 +94 symbols correction
1 1 0 +47 symbols correction
1 1 1 Reserved

Random Reference (octet 2, bits 5 to 1) A random number of 5 bits.
GMPRS Terminal Type Identifier Bits 7 to 4 (octet 3, bits 8 to 5) This field encodes bits b7 to b4 of GMPRS terminal type identifier. GMPRS terminal type identifier is defined in GMPRS-1 05.002 [12].
HPLMN ID/SP ID (octets 3,4,5) octet 3, bits 1 to 4 represent the highest bits, octet 4 represents the middle bits, and octet 5 represents the lowest bits of the PLMN ID/SP ID field. The HPLMN ID shall be sent in this field when it is different from PLMN ID of the network being accessed. The SP ID shall be sent when the MES is accessing its HPLMN. To accommodate SIMs with 3-digit MNCs, the value transmitted as the HPLMN ID shall consist of digits 1 to 6 of the IMSI. This value shall be represented as a 20-bit binary number. The SP ID shall consist of digits 6 to 9 of the IMSI. This value shall be represented as a 15-bit binary number. The five high-order bits of the 20-bit field shall be set to 11111.
PD (Protocol Discriminator) (octet 6, bits 8 to 7) Set to "00" for the current version of the protocol.
MSC ID (octet 6, bits 6 to 1) Range: 0 to 63. This shall be present in the case of non-MO calls. If the Request Type is "Answer to Paging", this value shall be the MSC ID received in the PAGING REQUEST message. Otherwise this value shall be coded as "111111". --
TLLI(octets 7 to 10) As described in GMPRS-1 04.060 [20].
GMPRS Terminal Type Identifier Bits 3 to 1 (octet 11, bits 8 to 6) This field encodes bits b3 to b1 of GMPRS terminal type identifier. GMPRS terminal type identifier is defined in GMPRS-1 05.002 [12].
Request Type (octet 11, bits 5 to 1) Bits 5 4 3 2 1 0 0 0 x x Suspend - Answer to Paging (bits 2 to 1 represent Channel Needed echoed from Paging Request) 0 0 1 0 0 Suspend - In Response to Alerting for circuit switched services 0 0 1 1 0 Suspend - MO Call 0 0 1 1 1 Resume 0 1 0 0 0 Suspend - Location Update 0 1 0 0 1 Suspend - IMSI Detach 0 1 0 1 0 Suspend - Supplementary Services 0 1 0 1 1 Suspend - Short Message Services 0 1 1 1 1 Suspend - Emergency Call
Software Version Number (octet 12, bits 8 to 2) See GMR-1 03.003 [3]. Represented as a 7-bit binary number with range 0 to 99.
GPS Position (octets 13 to 17) GPS Position octet 13 (highest bits) to octet 17 (lowest bits) maps to value part of GPS position IE as described in 11.5.2.53 (i.e., IEI part is not included) (Format V).
R bit: This bit shall ordinarily be set to 1. It shall be set to 0 if the MES has been redirected to a new satellite and is now retrying the same service request on the new satellite. It shall also be set to 0 when retrying the same service request on the old satellite following a failure to access the new satellite. Note that this bit shall not be set to 0 in the event that the MES establishes a dedicated mode connection on the new satellite but shall retry on the old satellite due to an unsuccessful attempt to perform a location update.
O bit: This bit shall ordinarily be set to 0. It shall be set to 1 when retrying the same service request following a failed optimal routing attempt, including a failed intersatellite optimal routing attempt.
GPS Capability Indicator (GCI) Bit 7 0 MES is not GPS capable 1 MES is GPS capable

10.1.9 Ciphering mode command

Same as clause 10.1.9 of GMR-1 04.008 [19].

10.1.10 Ciphering mode complete

Same as clause 10.1.10 of GMR-1 04.008 [19].

10.1.11 Classmark change

Same as clause 10.1.11 of GMR-1 04.008 [19].

10.1.12 Classmark enquiry

Same as clause 10.1.12 of GMR-1 04.008 [19].

10.1.13 Frequency redefinition

This function is not currently supported in GMR-1.

10.1.14 Handover access

This function is not currently supported in GMR-1.

10.1.15 Handover command

Same as clause 10.1.15 of GMR-1 04.008 [19].

10.1.16 Handover complete

Same as clause 10.1.16 of GMR-1 04.008 [19].

10.1.17 Handover failure

This function is not currently supported in GMR-1.

10.1.18 Immediate assignment

10.1.18.1 Immediate assignment

Same as clause 10.1.18.1 of GMR-1 04.008 [19].

10.1.18.2 Extended immediate assignment

Same as clause 10.1.18.2 of GMR-1 04.008 [19].

10.1.18.3 Immediate assignment Type 2

This message is sent on the CCCH by the network to the MES to change the channel configuration to a dedicated configuration while staying in the same cell. See table 10.14.1.

The L2 Pseudo Length of this message is the sum of the lengths of all IEs present in the message except the IA Rest Octets and L2 Pseudo Length IEs.

Message type: IMMEDIATE ASSIGNMENT Type 2

Significance: dual

Direction: network to MES

Table 10.14.1: IMMEDIATE ASSIGNMENT TYPE 2 message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	L2 Pseudo Length	L2 Pseudo Length clause 11.5.2.19	M	V	1
	RR Management Protocol Discriminator	Protocol Discriminator clause 11.2	M	V	1/2
	Skip Indicator	Skip Indicator clause 11.3.1	M	V	1/2
	Immediate Assignment Type 2 Message Type	Message Type clause 11.4	M	V	1
	USF	USF clause 11.5.2.110	M	V	3
	Timing Advance Index	Timing Advance Index	M	V	1
	TLLI	TLLI	M	V	4
	Timing Offset	Timing Offset clause 11.5.2.40	M	V	2
	Frequency Offset	Frequency Offset clause 11.5.2.49	M	V	2
	Packet Immediate Assignment Type 2 Parameters	Packet Immediate Assignment Type 2 Parameters clause 11.5.2.107	M	V	5
	Packet Frequency Parameters	Packet Frequency Parameters clause 11.5.2.106	M	V	3
	Packet Power Control Parameters	Packet Power Control Parameters	M	V	1

10.1.18.3.1 USF

The Uplink State Flag (USF) is described in GMPRS-1 04.060 [20].

10.1.18.3.2 TLLI

The Temporary Logical Link Identity is described in GMPRS-1 04.060 [20].

10.1.18.3.3 Packet Power Control Parameters

As described in GMPRS-1 04.060 [20] . Packet Power Control Parameters is a 6 bit field and will be implemented such that the most significant bits of the octet shall be spare.

10.1.18.3.4 Timing Advance Index (TAI)

As described in GMPRS-1 04.060 [20]. The Timing Advance Index (TAI) is a 7 bit field and will be implemented such that the most significant bit of the octet shall be spare.

10.1.18.4 Immediate Assignment Type 3

This message is sent on the PCH by the network to assign downlink resources to the MES. The MES is identified by its TLLI. See table 10.39.

The L2 Pseudo Length of this message is the sum of the lengths of all IEs present in the message, except for the P1 rest octets and L2 Pseudo Length IE.

Message type: IMMEDIATE ASSIGNMENT TYPE 3

Significance: dual

Direction: network to MES

Table 10.14.2: IMMEDIATE ASSIGNMENT TYPE 3 message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	L2 Pseudo Length	L2 Pseudo Length clause 11.5.2.19	M	V	1
	RR Management Protocol Discriminator	Protocol Discriminator clause 11.2	M	V	1/2
	Skip Indicator	Skip Indicator clause 11.3.1	M	V	1/2
	Immediate Assignment Type 3 Message Type	Message Type clause 11.4	M	V	1
	Page Mode	Page Mode clause 11.5.2.26	M	V	1/2
	Spare Half Octet	Spare Half Octet clause 11.5.1.8	M	V	1/2
	Persistence Level	Persistence Level	M	V	2
	Timing Advance Index	Timing Advance Index	M	V	1
	TLLI	TLLI	M	V	4
	Packet Immediate Assignment Type 3 Parameters	Packet Immediate Assignment Type 3 Parameters clause 11.5.2.105	M	V	3
	Packet Frequency Parameters	Packet Frequency Parameters clause 11.5.2.106	M	V	3
	Packet Power Control Parameters	Packet Power Control Parameters	M	V	1
	P1 Rest Octets	P1 Rest Octets clause 11.5.2.23	M	V	6

10.1.18.4.1 Page Mode

As described in GMPRS-1 04.060 [20].

10.1.18.4.2 Persistence Level

As described in GMPRS-1 04.060 [20]. Persistence Level consists of 4 radio priorities of 4 bits each and will be implemented such that Radio Priority 1 shall occupy the most significant bits of the lower numbered octet and Radio Priority 4 shall occupy the least significant bits of the higher numbered octet.

10.1.18.4.3 TLLI

As described in GMPRS-1 04.060 [20].

10.1.18.4.4 Packet Power Control Parameters

Refer to clause 10.1.18.3.3.

10.1.18.4.5 Timing Advance Index

Refer to clause 10.1.18.3.4.

10.1.19 Immediate assignment extended

Same as clause 10.1.19 of GMR-1 04.008 [19].

10.1.20 Immediate assignment reject

10.1.20.1 Immediate assignment reject type 1

Same as clause 10.1.20.1 of GMR-1 04.008 [19].

10.1.20.2 Immediate assignment reject type 2

Same as clause 10.1.20.2 of GMR-1 04.008 [19].

10.1.20.3 Extended immediate assignment reject

Same as clause 10.1.20.3 of GMR-1 04.008 [19].

10.1.20.4 Position verification notify

Same as clause 10.1.20.4 of GMR-1 04.008 [19].

10.1.20.5 Immediate Assignment Reject Type 3

This message may be sent to the MES (requesting packet services) by the network on the CCCH to indicate that no channel is available for assignment or that the MES cannot be allowed access. This message may also indicate dark beam activation in progress or pause indication or indicate to the MES to switch to a new BCCH or transmit a new RACH Additionally the message also provides timing and frequency correction. See table 10.18.1. The L2 Pseudo Length of this message shall be the sum of all IEs present in the message, except the IAR Rest Octets and L2 Pseudo Length IEs.

Message type: IMMEDIATE ASSIGNMENT REJECT TYPE 3 MESSAGE TYPE

Significance: dual

Direction: network to MES

Table 10.18.1: IMMEDIATE ASSIGNMENT REJECT TYPE 3 message content

IEI	Information Element (IE)	Type/Reference	Presence	Format	Length
	L2 Pseudo Length	L2 Pseudo Length clause 11.5.2.19	M	V	1
	RR Management Protocol Discriminator	Protocol Discriminator clause 11.2	M	V	1/2
	Skip Indicator	Skip Indicator clause 11.3.1	M	V	1/2
	Immediate Assignment Reject Type 3 Message Type	Message Type clause 11.4	M	V	1
	Request Reference	Request Reference clause11.5.2.30	M	V	2
	GPS Discriminator	GPS Discriminator clause 11.5.2.101	M	V	2
	Reject Cause	Reject Cause clause 11.5.2.56	M	V	1
	Pause Timer	Pause Timer clause 11.5.2.103	C	V	1
	Illumination Retry Timer	Illumination Retry Timer clause 11.5.2.108	C	V	1
	Packet BCCH Carrier	Packet BCCH Carrier clause 11.5.2.104	C	V	2
	Timing Offset	Timing Offset clause 11.5.2.40	M	V	2
	Frequency Offset	Frequency Offset clause 11.5.2.49	M	V	2
	IAR Rest Octets	IAR Rest Octets clause 11.5.2.17	M	V	9 to 11

10.1.20.5.1 Packet BCCH Carrier

The Packet BCCH Carrier IE shall be present if B bit is set in the Reject Cause.

10.1.20.5.2 Illumination Retry Timer

The Illumination Retry Timer IE shall be present if T bit is set in the Reject Cause.

10.1.20.5.3 Pause Timer

The Pause timer IE shall be present if T bit is reset in the Reject Cause.

10.1.21 Measurement report

Same as clause 10.1.21 of GMR-1 04.008 [19].

10.1.22 Paging request type 1

Same as clause 10.1.22 of GMR-1 04.008 [19].

10.1.23 Paging request type 2

Same as clause 10.1.23 of GMR-1 04.008 [19].

10.1.24 Paging request type 3

Same as clause 10.1.23 of GMR-1 04.008 [19].

10.1.25 Paging response

Same as clause 10.1.25 of GMR-1 04.008 [19].

10.1.26 Partial release

Same as clause 10.1.26 of GMR-1 04.008 [19].

10.1.27 Partial release complete

Same as clause 10.1.27 of GMR-1 04.008 [19].

10.1.28 Physical information

Same as clause 10.1.28 of GMR-1 04.008 [19].

10.1.29 RR status

Same as clause 10.1.29 of GMR-1 04.008 [19].

10.1.30 Synchronization channel information

Same as clause 10.1.30 of GMR-1 04.008 [19].

10.1.31 System information type 1

Same as clause 10.1.31 of GMR-1 04.008 [19].

10.1.32 System information type 2

Same as clause 10.1.32 of GMR-1 04.008 [19].

10.1.33 System information type 2bis

This function is not currently supported in GMR-1.

10.1.34 System information type 2ter

This function is not currently supported in GMR-1.

10.1.35 System information type 3

This function is not currently supported in GMR-1.

10.1.36 System information type 4

This function is not currently supported in GMR-1.

10.1.37 System information type 5

This function is not currently supported in GMR-1.

10.1.38 System information type 5bis

This function is not currently supported in GMR-1.

10.1.39 System information type 5ter

This function is not currently supported in GMR-1.

10.1.40 System information type 6

This function is not currently supported in GMR-1.

10.1.41 System information type 7

This function is not currently supported in GMR-1.

10.1.42 System information type 8

This function is not currently supported in GMR-1.

10.1.43 Alert request

Same as clause 10.1.43 of GMR-1 04.008 [19].

10.1.44 Position update request

Same as clause 10.1.44 of GMR-1 04.008 [19].

10.1.45 Position update accept

Same as clause 10.1.45 of GMR-1 04.008 [19].

10.1.46 GBCH information

Same as clause 10.1.46 of GMR-1 04.008 [19].

10.1.47 Guard time violation

Same as clause 10.1.47 of GMR-1 04.008 [19].

10.1.48 Link correction

Same as clause 10.1.48 of GMR-1 04.008 [19].

10.1.49 Power control parameters update

Same as clause 10.1.49 of GMR-1 04.008 [19].

10.1.50 TtT signalling link failure

Same as clause 10.1.50 of GMR-1 04.008 [19].

10.1.51 Information request

Same as clause 10.1.51 of GMR-1 04.008 [19].

10.1.52 Information response version

Same as clause 10.1.52 of GMR-1 04.008 [19].

10.1.53 Information response spot beam selection

Same as clause 10.1.53 of GMR-1 04.008 [19].

10.1.54 Information response current beam

Same as clause 10.1.54 of GMR-1 04.008 [19].

10.1.55 Information response power control

Same as clause 10.1.55 of GMR-1 04.008 [19].

10.1.56 Information response position

Same as clause 10.1.56 of GMR-1 04.008 [19].

10.1.57 Information response vendor specific

Same as clause 10.1.57 of GMR-1 04.008 [19].

10.1.58 Information response error

Same as clause 10.1.58 of GMR-1 04.008 [19].

10.1.59 DTMF tone generate request

Same as clause 10.1.59 of GMR-1 04.008 [19].

10.1.60 DTMF tone generate acknowledge

Same as clause 10.1.60 of GMR-1 04.008 [19].

10.1.61 GMPRS Resume Response

This message is sent on the CCCH by the network to inform the MES on the result of GMPRS service resumption. See table 10.39.

The L2 Pseudo Length of this message is the sum of the lengths of all IEs present in the message except the GMPRS Resume Rest Octets and L2 Pseudo Length IEs.

Message type: GMPRS RESUME RESPONSE

Significance: dual

Direction: network to MES

Table 10.39: GMPRS RESUME RESPONSE message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	L2 Pseudo Length	L2 Pseudo Length clause 11.5.2.19	M	V	1
	RR Management Protocol Discriminator	Protocol Discriminator clause 11.2	M	V	1/2
	Skip Indicator	Skip Indicator clause 11.3.1	M	V	1/2
	GMPRS Resume Response Message Type	Message Type clause 11.4	M	V	1
	TLLI	TLLI	M	V	4
	Result	GMPRS Resume Result clause 11.5.2.121	M	V	1
	GMPRS Resume Response Rest Octets	GMPRS Resume Response Rest Octets clause 11.5.2.122	M	V	16

10.1.61.1 TLLI

As described in GMPRS-1 04.060 [20].

10.2 Messages for mobility management

Same as clause 10.2 of GMR-1 04.008 [19].

10.3 Messages for circuit-switched call control

Same as clause 10.3 of GMR-1 04.008 [19].

10.4 GPRS Mobility Management messages

Same as clause 9.4 of 3GPP TS 04.08 [21].

10.5 GPRS Session Management messages

Same as clause 9.5 of 3GPP TS 04.08 [21] with the additional clause 10.5.1.

10.5.1 Streaming service

A guaranteed bit rate service requested by MES shall specify the following parameters at the imitation of an Activate PDP Context Request message

- Peak Throughput Class: This field shall be set to the highest peak throughput value of either uplink or downlink direction. The Peak Throughput value is specified in 3GPP TS 03.60 [24].
- Delay class: This field shall be set to one of the predictive delay class value as specified in 3GPP TS 03.60 [24]. Delay class 1 to 3 are predictive delay classes.

If the Delay class is not predictive, the network shall treat the service request as best effort. The best effort indicates that throughput shall be made available to the MES on a per need and availability basis.

MES shall not initiate guaranteed bit rate service with foreign or random TLLI.

11 General message format and information elements coding

This clause describes the IEs that are used to define the L3 protocol messages in the GMR-1 system.

11.1 Overview

Same as clause 11.1 of GMR-1 04.008 [19].

11.2 Protocol discriminator

Same as clause 11.2 of GMR-1 04.008 [19].

11.3 Skip indicator and transaction identifier

11.3.1 Skip indicator

Same as clause 11.3.1 of GMR-1 04.008 [19].

11.3.2 Transaction identifier

Same as clause 11.3.2 of GMR-1 04.008 [19].

11.4 Message type

The Message Type IE and its use are defined in GMPRS-1 04.007 [11], which also defines the value part of the Message Type IE used in the RR management protocol.

11.4.1 Radio resource management message types

Table 11.1: Message types for radio resource management

8 7 6 5 4 3 2 1
0 0 1 1 1 - - - - Channel establishment messages:
1 1 1 IMMEDIATE ASSIGNMENT
0 1 0 IMMEDIATE ASSIGNMENT REJECT TYPE 1
0 1 1 IMMEDIATE ASSIGNMENT REJECT TYPE 2
1 1 0 EXTENDED IMMEDIATE ASSIGNMENT
0 1 1 EXTENDED IMM. ASSIGNMENT REJECT
0 0 1 POSITION VERIFICATION NOTIFY
1 0 0 IMMEDIATE ASSIGNMENT REJECT TYPE 3
1 1 0 IMMEDIATE ASSIGNMENT TYPE 2
1 0 1 IMMEDIATE ASSIGNMENT TYPE 3
0 0 1 1 0 - - - - Ciphering messages:
1 0 1 CIPHERING MODE COMMAND
0 1 0 CIPHERING MODE COMPLETE
0 0 1 0 1 - - - - Channel assignment/handover messages:
1 1 0 ASSIGNMENT COMMAND 1
0 1 0 ASSIGNMENT COMMAND 2
0 0 1 ASSIGNMENT COMPLETE
1 1 1 ASSIGNMENT FAILURE
0 1 1 HANDOVER COMMAND
1 0 0 HANDOVER COMPLETE
0 0 0 0 1 - - - - Channel release messages:
1 0 1 CHANNEL RELEASE
1 1 0 TtT SIGNALING LINK FAILURE
0 0 1 0 0 - - - - Paging messages:
0 0 1 PAGING REQUEST TYPE 1
0 1 0 PAGING REQUEST TYPE 2
1 0 0 PAGING REQUEST TYPE 3
1 1 1 PAGING RESPONSE
0 0 0 1 0 - - - - Miscellaneous messages
0 0 0 CHANNEL MODE MODIFY
0 1 0 RR STATUS
1 1 1 CHANNEL MODE MODIFY ACKNOWLEDGE
1 1 0 CLASSMARK CHANGE
0 1 1 CLASSMARK ENQUIRY
1 0 0 POSITION UPDATE REQUEST
1 0 1 POSITION UPDATE ACCEPT
0 0 1 LINK CORRECTION MESSAGE
0 0 0 0 0 - - - -
0 0 1 POWER CONTROL PARAMETERS UPDATE
0 1 0 GUARD TIME VIOLATION
1 0 0 EXTENDED CHANNEL REQUEST
1 0 1 GMPRS RESUME RESPONSE
0 1 0 0 - - - - - Status and Diagnostic Messages
0 0 0 0 INFORMATION REQUEST
0 0 0 1 INFORMATION RESPONSE POSITION
0 0 1 0 INFORMATION RESPONSE VERSION
0 0 1 1 INFORMATION RESPONSE SPOT BEAM SELECTION
0 1 0 0 INFORMATION RESPONSE POWER CONTROL
0 1 0 1 INFORMATION RESPONSE VENDOR SPECIFIC
0 1 1 0 INFORMATION RESPONSE CURRENT BEAM
1 1 1 1 INFORMATION RESPONSE ERROR

11.4.2 DTRS message types

Same as clause 11.4.2 of GMR-1 04.008 [19].

11.5 Other information elements

Same as clause 10.5 of 3GPP TS 04.08 [17].

11.5.1 Common information elements

11.5.1.1 Cell identity

Same as clause 11.5.1.1 of GMR-1 04.008 [19].

11.5.1.2 Ciphering key sequence number

Same as clause 11.5.1.2 of GMR-1 04.008 [19].

11.5.1.3 Location area identification

The purpose of the Location Area Identification IE is to provide an unambiguous identification of location areas within the area covered by the GMR-1 system. This IE is coded as shown in figure 11.2 and table 11.4. LAI is a Type 3 IE, 6 octets in length.

8	7	6	5	4	3	2	1	
Location Area Identification IEI								octet 1
MCC digit 2				MCC digit 1				octet 2
1 1 1 1				MCC digit 3				octet 3
MNC digit 2				MNC digit 1				octet 4
LAC								octet 5
LAC (continued)								octet 6

Figure 11.2: Location area identification IE

Table 11.4: Local area identification IE

MCC (octets 2 and 3) The MCC field is coded as in annex A of ITU-T Recommendation E212 [25].
If the LAI is deleted, the MCC and MNC shall take the value from the deleted LAI.
In abnormal cases, the MCC stored in the mobile earth station can contain elements not in the set {0, 1 … 9}. In such cases the mobile earth station should transmit the stored values using full hexadecimal encoding. When receiving such an MCC, the network shall treat the LAI as deleted.
MNC (octet 4) The coding of this field is the responsibility of each administration but BCD coding shall be used. If an administration decides to include only 1 digit in the MNC, then bits 5 to 8 of octet 4 are coded as "1111" (see note).
In abnormal cases, the MNC stored in the mobile earth station can have digit 1 not in the set {0, 1 … 9} and/or digit 2 not in the set {0, 1 ... 9, F} hex. In such cases the mobile earth station should transmit the stored values, using full hexadecimal encoding. When receiving such an MNC, the network shall treat the LAI as deleted.
LAC (octets 5 and 6) LAC is defined in GMPRS-1 03.003 [3]. The MSC and SGSN ID shall be bits 8 to 3 in octet 5. The Spot Beam ID shall be bits 2 to 1 in octet 5 and all of octet 6.
NOTE: GMPRS-1 03.003 [3] states that a 2-digit MNC shall be used; however, the possibility of using a 1-digit MNC in LAI is provided on the radio interface.

11.5.1.4 Mobile identity

For circuit switched services same as clause 10.5.1.4 of 3GPP TS 04.08 (Phase 2) [17].

For packet switched services same as clause 10.5.1.4 of 3GPP TS 04.08 (Release 1998) [21].

11.5.1.5 Mobile Earth Station (MES) classmark 1

The purpose of the Mobile Earth Station Classmark 1 IE is to provide the network with information concerning aspects of the high priority of the MES. This affects the manner in which the network handles the operation of the MES. The MES classmark information indicates general mobile earth station characteristics.

The Mobile Earth Station Classmark 1 IE is coded as shown in figure 11.3, GMR-1 04.008 [19] and table 11.5, GMR-1 04.008 [19].

The Mobile Earth Station Classmark 1 is a Type 3 IE, 2 octets in length.

8	7	6	5	4	3	2	1	
	Mobile Earth Station Classmark 1 IEI							octet 1
0 spare	Revision Level		ES IND	A5/1	MES Terminal type			octet 2

Figure 11.3: Mobile Earth Station classmark 1 IE

Table 11.5: Mobile Earth Station classmark 1 IE

Revision level (octet 3) Bits 7 6 0 0 Should be used by all Phase 1 MESs 0 1 Reserved for Phase 2 MESs
All other values are reserved for future use
ES IND (octet 2, bit 5) "Controlled Early Classmark Sending" option implementation
0 "Controlled Early Classmark Sending" option is not implemented 1 "Controlled Early Classmark Sending" option is implemented
A5/1 algorithm supported (octet 3, bit 4) 0 Encryption algorithm A5/1 available 1 Encryption algorithm A5/1 not available
MES Terminal Type (octet 2): Bits 3 2 1 0 0 0 Class 1 reserved 0 0 1 Class 2 used by all GMR-1 fixed terminals 0 1 0 Class 3 used by all GMR-1 VTs 0 1 1 Class 4 used by all GMR-1 handheld terminals
All other values are reserved

11.5.1.6 Mobile Earth Station (MES) classmark 2

Same as clause 11.5.1.6 of GMR-1 04.008 [19].

11.5.1.7 Mobile Earth Station (MES) classmark 3

Same as clause 11.5.1.7 of GMR-1 04.008 [19].

11.5.1.8 Spare half octet

Same as clause 11.5.1.8 of GMR-1 04.008 [19].

11.5.2 Radio resource management IEs

11.5.2.1 BA range

This function is not currently supported in GMR-1.

11.5.2.2 Cell description

This function is not currently supported in GMR-1.

11.5.2.3 Cell options (BCCH)

This function is not currently supported in GMR-1.

11.5.2.4 Cell selection parameters

This function is not currently supported in GMR-1.

11.5.2.5 Channel description

Same as clause 11.5.2.5 of GMR-1 04.008 [19].

11.5.2.6 Channel mode

Same as clause 11.5.2.6 of GMR-1 04.008 [19].

11.5.2.7 Channel mode 2

This function is not currently supported in GMR-1.

11.5.2.8 Channel needed

This function is not currently supported in GMR-1.

11.5.2.9 Cipher mode setting

Same as clause 11.5.2.9 of GMR-1 04.008 [19].

11.5.2.10 Cipher response

Same as clause 11.5.2.10 of GMR-1 04.008 [19].

11.5.2.11 Control channel description

This function is not currently supported in GMR-1.

11.5.2.12 Frequency channel sequence

This function is not currently supported in GMR-1.

11.5.2.13 Frequency list

This function is not currently supported in GMR-1.

11.5.2.14 Frequency short list

This function is not currently supported in GMR-1.

11.5.2.15 Handover reference

This function is not currently supported in GMR-1.

11.5.2.16 IA rest octets

The IA Rest Octets IE is coded as shown in figure 11.8 and contains only spare bits. The IA Rest Octets IE is a Type 5 IE, 1 to 5 octets in length.

8	7	6	5	4	3	2	1	
	IA Rest Octets IEI							octet 1
0 Spare	0 Spare	1 Spare	0 Spare	1 Spare	0 Spare	1 Spare	1 Spare	octet 2
0 Spare	0 Spare	1 Spare	0 Spare	1 Spare	0 Spare	1 Spare	1 Spare	• •
0 Spare	0 Spare	1 Spare	0 Spare	1 Spare	0 Spare	1 Spare	1 Spare	octet 5

Figure 11.8: IA Rest Octets IE

11.5.2.17 IAR rest octets

The IAR Rest Octets IE is coded as shown in figure 11.9 and contains only spare bits. The IAR Rest Octets IE is a Type 5 IE, 1 to 5 octets in length.

8	7	6	5	4	3	2	1	
	IAR Rest Octets IEI							octet 1
0 Spare	0 Spare	1 Spare	0 Spare	1 Spare	0 Spare	1 Spare	1 Spare	octet 2
0 Spare	0 Spare	1 Spare	0 Spare	1 Spare	0 Spare	1 Spare	1 Spare	• •
0 Spare	0 Spare	1 Spare	0 Spare	1 Spare	0 Spare	1 Spare	1 Spare	octet 5
0 Spare	0 Spare	1 Spare	0 Spare	1 Spare	0 Spare	1 Spare	1 Spare	octet 6
0 Spare	0 Spare	1 Spare	0 Spare	1 Spare	0 Spare	1 Spare	1 Spare	octet 7
0 Spare	0 Spare	1 Spare	0 Spare	1 Spare	0 Spare	1 Spare	1 Spare	octet 8
0 Spare	0 Spare	1 Spare	0 Spare	1 Spare	0 Spare	1 Spare	1 Spare	octet 9

Figure 11.9: IAR rest octets IE

11.5.2.18 IAX rest octets

This function is not currently supported in GMR-1.

11.5.2.19 L2 pseudo length

Same as clause 11.5.2.19 of GMR-1 04.008 [19].

11.5.2.20 Measurement results

This function is not currently supported in GMR-1.

11.5.2.21 Mobile allocation

This function is not currently supported in GMR-1.

11.5.2.22 Neighbour cells description

This function is not currently supported in GMR-1.

11.5.2.23 P1 rest octets

Same as clause 11.5.2.23 of GMR-1 04.008 [19].

11.5.2.24 P2 rest octets

Same as clause 11.5.2.24 of GMR-1 04.008 [19].

11.5.2.25 P3 rest octets

Same as clause 11.5.2.25 of GMR-1 04.008 [19].

11.5.2.26 Page mode

Same as clause 11.5.2.26 of GMR-1 04.008 [19].

11.5.2.27 NCC permitted

This function is not currently supported in GMR-1.

11.5.2.28 Power command

This function is not currently supported in GMR-1.

11.5.2.29 RACH control parameters

Same as clause 11.5.2.29 of GMR-1 04.008 [19].

11.5.2.30 Request Reference

The Request Reference IE shall be used by the MES to accept or discard the message received in response to the CHANNEL REQUEST message. The network builds the Request Reference IE by using the random number specified in the CHANNEL REQUEST message, the frame number in which the CHANNEL REQUEST message was received by it and the establishment cause. The network transfers the Request Reference IE to MES with IMMEDIATE ASSIGNMENT message over the AGCH. This IE is coded as shown in figure 11.15 and table 11.13. Request Reference is a Type 3 IE, 3 octets in length.

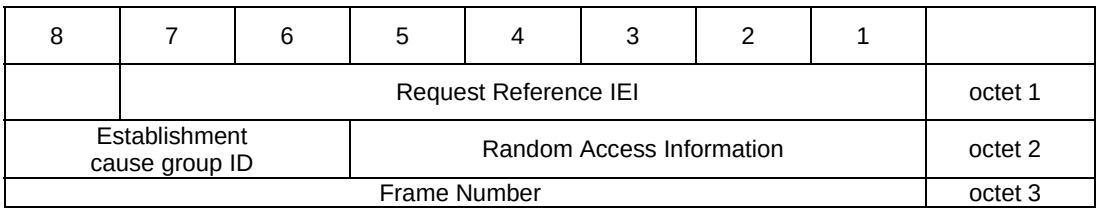

Figure 11.15: Request reference IE

Table 11.13: request reference IE

Random Access Information (octet 2, bits 5 to 1) Random Reference in CHANNEL REQUEST message
Establishment Cause group identifier(octet 2, bits 8 to 6) The establishment causes are grouped as follows group-ID Establishment Cause 000 MO call 001 In response to paging/alerting 010 Location update/IMSI detach 011 Emergency call 100 Supplementary/short message service 101 Position verification 110 Any other valid cause 111 Packet Switched Services
Frame Number (octet 3) Lower 8 bits of the frame number

11.5.2.31 RR cause

Same as clause 11.5.2.31 of GMR-1 04.008 [19].

11.5.2.32 SI 1 rest octets

This function is not currently supported in GMR-1.

11.5.2.33 SI 2*bis* rest octets

This function is not currently supported in GMR-1.

11.5.2.34 SI 3 rest octets

This function is not currently supported in GMR-1.

11.5.2.35 SI 4 rest octets

This function is not currently supported in GMR-1.

11.5.2.36 SI 7 rest octets

This function is not currently supported in GMR-1.

11.5.2.37 SI 8 rest octets

This function is not currently supported in GMR-1.

11.5.2.38 Starting time

This function is not currently supported in GMR-1.

11.5.2.39 Synchronization indication

This function is not currently supported in GMR-1.

11.5.2.40 Timing offset

Same as clause 11.5.2.40 of GMR-1 04.008 [19].

11.5.2.41 Time difference

This function is not currently supported in GMR-1.

11.5.2.42 TMSI

Same as clause 11.5.2.42 of GMR-1 04.008 [19].

11.5.2.43 Wait indication

Same as clause 11.5.2.43 of GMR-1 04.008 [19].

11.5.2.44 MES information flag

Same as clause 11.5.2.44 of GMR-1 04.008 [19].

11.5.2.45 TTCH channel description

Same as clause 11.5.2.45 of GMR-1 04.008 [19].

11.5.2.46 MES configuration

Same as clause 11.5.2.46 of GMR-1 04.008 [19].

11.5.2.47 TtT common cipher key

Same as clause 11.5.2.47 of GMR-1 04.008 [19].

11.5.2.48 Access information

Same as clause 11.5.2.48 of GMR-1 04.008 [19].

11.5.2.49 Frequency offset

Same as clause 11.5.2.49 of GMR-1 04.008 [19].

11.5.2.50 Extended power class

This IE is used to describe the RF power class of the MES. Its coding is shown in figure 11.24. The various components of the element are described in table 11.22.

8	7	6	5	4	3	2	1	
Ext Power Class IEI				Extended Power Class				octet 1

Figure 11.24: Extended power class IE

Table 11.22: Extended power class IE

Extended Power Class Bits 4 3 2 1
0 0 0 0 Power Class 1
0 0 0 1 Power Class 2
0 0 1 0 Power Class 3
0 0 1 1 Power Class 4
0 1 0 0 Power Class 5
0 1 0 1 Power Class 6
0 1 1 0 Power Class 7
0 1 1 1 Power Class 8
1 0 0 0 Power Class 9
1 0 0 1 Power Class 10
1 0 1 0 Power Class 11
1 0 1 1 Power Class 12
1 1 0 0 Power Class 13
1 1 0 1 Power Class 14
1 1 1 0 Power Class 15
1 1 1 1 Power Class 16
See GMPRS-1 05.005 [14] for details of the Power Class.

11.5.2.51 Paging Information

The Paging Information IE is used to indicate MSC ID/SGSN ID associated with a Mobile ID in the paging message. This IE is coded as shown in figure 11.25 and table 11.23. The Paging Information IE is a Type 3 IE, 2 octets in length.

8	7	6	5	4	3	2	1	
0	Paging Information IEI							octet 1
MSC ID/SGSN ID						Channel Needed		octet 2

Figure 11.25: Paging information IE

Table 11.23: Paging information IE

Channel needed for Paging Mobile (octet 2) Bits 2 1 0 0 any 0 1 SDCCH 1 0 TCH3 1 1 PDCH
Bits 3 to 8 of octet 2 contain the MSC ID/SGSN ID to be used by the mobile at immediate assignment procedure.

11.5.2.52 Position display

Same as clause 11.5.2.52 of GMR-1 04.008 [19].

11.5.2.53 GPS position

Same as clause 11.5.2.53 of GMR-1 04.008 [19].

11.5.2.54 Idle or dedicated mode position update information

Same as clause 11.5.2.54 of GMR-1 04.008 [19].

11.5.2.55 BCCH carrier

Same as clause 11.5.2.55 of GMR-1 04.008 [19].

11.5.2.56 Reject Cause

The Reject Cause IE is used to specify cause for rejecting the access request and the presence of additional information to the MES. This IE is coded as shown in figure 11.30 and table 11.28. Reject Cause IE is a Type 3 IE, 2 octets in length.

8	7	6	5	4	3	2	1	
0	Reject Cause IEI							octet 1
Cause						T	B	octet 2

Figure 11.30: Reject cause IE

Table 11.28: Reject cause IE

BCCH carrier (B) (octet 2) Bit 1 0 BCCH carrier information absent 1 BCCH carrier information present
Timer (T) (octet 2) Bit 2 0 Pause Timer T3115 is present 1 Illumination Retry Timer T3333 is present
Cause (octet 2) Bits 8 7 6 5 4 3 0 0 0 0 0 0 Lack of resources (default) 0 1 0 0 0 1 Invalid position for selected LAI 0 1 0 0 1 0 Invalid position for selected spot beam 0 1 0 0 1 1 Invalid position 0 1 0 1 0 1 Position too old 0 1 0 1 1 0 Invalid position for service provider 0 1 0 1 1 1 Redirect to new satellite 0 1 1 0 0 0 Pause Indication 0 1 1 0 0 1 Dark beam activation in progress 0 1 1 0 1 0 Switch to new BCCH 0 1 1 0 1 1 Incorrect Class-2 RACH Info 0 1 1 1 0 0 Non-availability of Satellite Resources for PD 0 1 1 1 0 1 Non-Availability of service 1 1 1 1 1 1 Reported position acceptable. 0 1 1 1 1 0 Requested QoS not satisfied 0 1 1 1 1 1 Invalid QoS parameters
All other values reserved.

11.5.2.57 GPS timestamp

Same as clause 11.5.2.57 of GMR-1 04.008 [19].

11.5.2.58 Timing correction

Same as clause 11.5.2.58 of GMR-1 04.008 [19].

11.5.2.59 MES information 2 flag

Same as clause 11.5.2.59 of GMR-1 04.008 [19].

11.5.2.60 Power control parameters

Same as clause 11.5.2.60 of GMR-1 04.008 [19].

11.5.2.61 DTMF digits

Same as clause 11.5.2.61 of GMR-1 04.008 [19].

11.5.2.62 TMSI availability mask

Same as clause 11.5.2.62 of GMR-1 04.008 [19].

11.5.2.63 GPS almanac data

Same as clause 11.5.2.63 of GMR-1 04.008 [19].

11.5.2.64 Frequency correction

Same as clause 11.5.2.64 of GMR-1 04.008 [19].

11.5.2.65 Alerting information

Same as clause 11.5.2.65 of GMR-1 04.008 [19].

11.5.2.66 Segment 1A

Segment 1A contains all Class 1 information. It has a fixed size of 64 bits. The description of the messages is done according to the compact notation described in annex B of GMPRS-1 04.007 [11].

<Class 2 version: bitstring (3) >	3 bits. Contains the version number for current Class 2 information.
<Class 3 version: bitstring (4) >	4 bits. Contains the version number for current Class 3 information.
<Synch. Info Class 1>	19 bits.
<RACH Control Parameters>	RACH Control parameters. 19 bits.
<Misc. Info. Class 1: bitstring (6) >	Contains miscellaneous information.
<GBCH Present: bitstring (1) >	Flag to indicate presence of the GPS broadcast channel. 0 the GBCH is absent. 1 the GBCH is present.
<Test GS: bitstring (1) >	The interpretation of this field is described in subclause 5.2.5 of GMPRS-1 03.022 [4].
<Spare : bitstring (4) >	4 bits
<CELL_BAR_ACCESS_EXTENSION2: bitstring(1)	The interpretation of this field is described in subclause 5.2.5 of GMPRS-1 03.022 [4].
<Spare: bitstring (5)	5 bits
<CELL_BAR_ACCESS_EXTENSION: bitstring (1) >	The interpretation of this field is described in subclause 5.2.5 of GMPRS-1 03.022 [4].
<Synchronization Info Class 1>::=	
<SB_FRAME_TS_OFFSET: bitstring (5) >	Valid values 5 to 29; refer to GMPRS-1 05.010 [16].
<SB_SYMBOL_OFFSET: bitstring (6) >	Values in 2's complement. Ranges from -32 to +31.
<SA_FREQ_OFFSET: bitstring (8) >	Values in 2's complement in units of 5 Hz.
	Ranges from -640 Hz to +635 Hz.
<RACH Control Parameters>::=	
<Max Retrans: bitstring (2) >	Maximum number of retransmissions. Range:0 to 3.
<Access Classes: bitstring (16) >	AC and EC bits as described in clause 10.5.2.29 of 3GPP TS 04.08 [17].
<CELL_BAR_ACCESS: bitstring (1) >	The interpretation of this field is described in subclause 5.2.5 of GMPRS-1 03.022 [4].
<Access Classes:>::=	
<AC15: bit><AC14: bit><AC13: bit> <AC12: bit><AC11: bit> <EC10: bit> <AC9: bit> <AC8: bit><AC7: bit> <AC6: bit><AC5: bit><AC4: bit> <AC3: bit><AC2: bit> <AC1: bit> <AC0: bit>	ACN corresponds to Access Control Class N (N = 0 to 9 and 11 to 15) EC10 corresponds to Emergency Calls.
<Misc. Info Class 1>::=	
<SB_RESELECTION_HYSTERESIS: bitstring(4)>	Unit of 0,5 dB. Range: 0 to 6,0 dB.
<spare: bitstring (1) >	
<Priority Access Ind: bitstring (1) >	Reserved for future use.

When all bits of SB_Reselection_Hysteresis parameter are set to 1s, the MES shall consider this as an indication to remain in the same spot beam.

11.5.2.67 Segment 2A

Segment 2A contains all class 2 information, regarding synchronization, selection criteria, and LA information. It also contains the first part of the BCCH neighbour list. It has a fixed size of 184 bits. The description of the messages is done according to the compact notation described in annex B of GMPRS-1 04.007 [11].

<Header: bitstring (6) >	6 bits.
<Class 4 Version: bitstring (3) >	3 bits; contains version number for class 4 information in current system information cycle.
<Synch. Info Class 2>	25 bits.
<Selection Criteria Class 2>	5 bits.
<Misc. Information Class 2>	4 bits.
<LA Information Class 2>	20 bits.
<BCCH NEIGHBOUR LIST1>	57 bits (three BCCH neighbours = 3 × 19).
<PS_AVAILABLE : bitstring (1) >	Indication of availability of packet system information for switched services 0 : indicates non availability of packet service related system information. 1 : indicates availability of packet service related system information
<PRACH Control Parameters>	11 bits. As described in GMPRS-1 04.060 [20]. This field is interpreted only if the PS_AVAILABLE bit is set.
<Offered GMPRS Packet services>	3 bits. Indicates the types of GMPRS services that are offered in this spot beam. Use of this information in idle mode is specified in GMPRS-1 03.022 [4].
<Spare: bitstring (49)	
<Header Segment 2A>::=	
<Class Type 2: 10><Segment type: 0000>	
<Synch. Info Class 2>::=	
<SA_SIRFN_DELAY: bitstring (4) >	Delay of system information relative to superframe timing. Refer GMPRS-1 05.002 [12] for details.
<SA_BCCH_STN: bitstring (5) >	Binary representation of starting timeslot number. Range (0 to 23); refer GMPRS-1 05.002 [12] for details.
<Superframe number: bitstring (13) >	Superframe number.
<Multiframe number: bitstring (2) >	Multiframe number in a superframe.
<MFFN: bit>	High bit of the TDMA FN in a multiframe (see note 1).
NOTE: The frame number FN refers to the frame in which Segment 2A is transmitted. Using the MFFN high bit the MES knows the position of the BCCH burst within a group of 8 frames (see GMPRS-1 05.002 [12]). The MES can derive the correct frame number knowing that the BCCH burst always occurs in (2+SA_SIRFN_DELAY)mod 8.	

<Selection Criterion Class 2>::=	Refer to GMPRS-1 05.008 [15] for details.
<RXLEV_SELECT_MIN: bitstring (5) >	Adjustment to threshold to camp-on system in units of 0,5 dB ranging from 0 to 15,5 dB.
<Misc. Information Class 2>::=	
<SB_SELECTION_POWER: bitstring (4) >	In units of 0,5 dB. Valid range: 0 to 6,0 dB.
<LA Information Class 2>::=	Contains information for the LAI. Refer to GMPRS-1 05.008 [15].
<SA_PCH_CONFIG: bitstring (2) >	Paging group configuration information.
<SA_BACH_CONFIG: bitstring (8) >	Alerting group configuration information.
<RACH_TS_OFFSET: bitstring (5) >	Start of RACH window with respect to BCCH (see GMPRS-1 05.002 [12]). Value in the range 0 to 23.
<N_Page_Occurrences: bitstring (2) >	Number of times a page shall be retransmitted after the initial transmission. Value of 0 indicates that the page shall be transmitted once and not subsequently.
<IMSI attach-detach ind: bitstring (1) >	ATT flag. Value 0: Means MESs shall not apply IMSI attach and detach procedure for this LA. Value 1: Means MESs shall apply IMSI attach and detach procedures for this LA.
<ECSC indication: bitstring (1) >	Early Classmark Sending Control. This bit controls early sending of the classmark by the MES implementing "Controlled Early Classmark Sending" option: 1: Indicates Early Sending is explicitly accepted. 0: Indicates Early Sending is explicitly prohibited.
<SI_update_ind: bitstring (1) >	Flag for BACH reorganization. Value changes after each reorganization.
<BCCH NEIGHBOUR LIST1>::=	Six neighbour BCCHs shall be specified. The neighbours shall be ordered in a clockwise fashion around the centre beam, starting with the northernmost neighbour. The first three neighbours shall be stored in BCCH NEIGHBOR LIST1 and the last three neighbours shall be stored in BCCH NEIGHBOR LIST2. Missing beams, neighbouring areas outside of system coverage, shall have all the bits of ARFCN, SA_BCCH_ STN, and RELATIVE_FRAME_ OFFSET set to 1s.
<ARFCN: bitstring (11) >	
<SA_BCCH_STN: bitstring (5) >	
<RELATIVE_FRAME_OFFSET: bitstring (3) >	Frame number relative to the BCCH frame number of the centre beam.
<Offered GMPRS Packet services> ::=	
<60 kbps service: bitstring (1) >	0: 60 kbps services not available 1: 60 kbps services available
<144 kbps service: bitstring (1) >	0: 144 kbps services not available 1: 144 kbps services available
<Reserved: bitstring (1) >	Reserved for future use.
	See GMPRS-1 03.064 [23] for definition of 60 and 144 kbps services.

11.5.2.68 Segment 2A*bis*

Segment 2A*bis* contains all class 2 information, regarding synchronization, selection criteria, and LA information. It also contains the first part of the BCCH neighbour list. It has a fixed size of 120 bits. The description of the messages is done according to the compact notation described in annex B, GMPRS-1 04.007 [11].

<Header: (6)>	6 bits.
<Class 4 Version: (3)>	3 bits.
<Synch. Info Class 2>	25 bits.
<Selection Criterion Class 2>	5 bits.
<Misc. Information Class 2>	4 bits.
<LA Information Class 2>	20 bits.
<BCCH_NEIGHBOUR_LIST1b>	19 bits.
<PS_AVAILABLE: bitstring (1) >	Indication of availability of system information for packet switched services 0 : indicates non availability of packet service related system information 1 : indicates availability of packet service related system information
<PRACH Control Parameters>	11 bits. As described in GMPRS-1 04.060 [20]. This field is only to be interpreted if the PS_AVAILABLE bit is set.
<Offered GMPRS Packet services>	3 bits. Indicates the types of GMPRS services that are offered in this spot beam. Use of this information in idle mode is specified in GMPRS-1 03.022 [4].
<Spare: bitstring (23) >	
<Header Segment 2A*bis*>::=	
<Class Type 2: 10><Segment type: 0000>	
<Synch. Info Class 2>::=	
<SA_SIRFN_DELAY: bitstring (4) >	Delay of system information relative to superframe timing. Refer GMPRS-1 05.002 [12] for details.
<SA_BCCH_STN: bitstring (5) >	Binary representation of starting timeslot number.
	Range (0 to 23); refer to GMPRS-1 05.002 [12] for details.
<Superframe number: bitstring (13) >	Superframe number.
<Multiframe number: bitstring (2) >	Multiframe number in a superframe.
<MFFN high bit:bit>	High bit of the TDMA FN in a multiframe.
NOTE: The frame number FN refers to the frame in which Segment 2Abis is transmitted. Using the MFFN high bit the MES knows the position of the BCCH burst within a group of 8 frames (see GMPRS-1 05.002 [12]). The MES can derive the correct frame number knowing that the BCCH burst always occurs in (2+SA_SIRFN_DELAY)mod 8.	
<Selection Criterion Class 2>::=	Refer to GMPRS-1 05.008 [15] for details.
<RXLEV_SELECT_MIN: bitstring (5) >	Adjustment to threshold to camp on system in units of 0,5 dB. Valid range: 0 to 15,5 dB.
<Misc. Information Class 2>::=	
<SB_SELECTION_POWER: bitstring (4) >	In units of 0,5 dB. Valid range: 0 to 6,0 dB.
<LA Information Class 2>::=	Contains information for the LAI; refer to GMPRS-1 05.008 [15].
<SA_PCH_CONFIG: bitstring (2) >	Paging group configuration information.
<SA_BACH_CONFIG: bitstring (8) >	Alerting group configuration information.
<RACH_TS_OFFSET: bitstring (5) >	Start of RACH window with respect to BCCH (see GMPRS-1 05.002 [12]). Value in the range 0 to 23.
<N_Page_Occurrences: bitstring (2) >	Number of times a page shall be retransmitted after the initial transmission. Value of 0 indicates that the page shall be transmitted once and not subsequently.
<IMSI attach-detach ind: bitstring (1) >	ATT flag. Value 0 means MESs shall not apply IMSI attach and detach procedure for this LA. Value 1 means MESs shall apply IMSI attach and detach procedure for this LA.
<ECSC indication: bitstring (1) >	Early classmark Sending Control. This bit controls early sending of the classmark by the MES implementing "Controlled Early Classmark Sending" option: 1: Indicates Early sending is explicitly accepted. 0: Indicates Early sending is explicitly prohibited.
<SI_update_ind: bitstring (1) >	Flag for BACH reorganization. Value changes after each reorganization.

<BCCH_NEIGHBOUR_LIST1b>::=	One BCCH shall be specified. The neighbours shall be ordered in a clockwise fashion around the centre beam, starting with the first neighbour positioned at the northernmost location. The first neighbour shall be stored in BCCH_NEIGHBOR_LIST1b and the last five neighbours shall be stored in BCCH_ NEIGHBOR_LIST2b. Missing beams shall have all the bits of ARFCN, SA_BCCH_STN, and RELATIVE_ FRAME_OFFSET set to 1s.
<ARFCN: bitstring (11) >	
<SA_BCCH_STN: bitstring (5) >	
<RELATIVE_FRAME_OFFSET: bitstring (3) >	Frame number relative to the BCCH frame number of the centre beam.
<Offered GMPRS Packet services> ::=	
<60 kbps service: bitstring (1) >	0: 60 kbps services not available 1: 60 kbps services available
<144 kbps service: bitstring (1) >	0: 144 kbps services not available 1: 144 kbps services available
<Reserved: bitstring (1) >	Reserved for future use.
	See GMPRS-1 03.064 [23] for definition of 60 and 144 kbps services.

11.5.2.69 Segment 2B

Same as clause 11.5.2.69 of GMR-1 04.008 [19].

11.5.2.70 Segment 2B*bis*

Same as clause 11.5.2.70 of GMR-1 04.008 [19].

11.5.2.71 Segment 3A

Same as clause 11.5.2.71 of GMR-1 04.008 [19].

11.5.2.72 Segment 3B

Same as clause 11.5.2.72 of GMR-1 04.008 [19].

11.5.2.73 Segment 3B*bis*

Same as clause 11.5.2.73 of GMR-1 04.008 [19].

11.5.2.74 Segment 3C

Segment 3C contains the first partition of the differentially encoded normal CCCH carrier list. The description of the messages is done according to the compact notation described in annex B of GMPRS-1 04.007 [11].

Size: 120 bits

<Header: bitstring(5)>	
<SA_CCCH_CHANS: bitstring (5) >	Range 1 to 31. See GMPRS-1 05.002 [12].
<SA_CCCH_LIST_PART1: bitstring (A) >	First partition of the differentially encoded CCCH list. See clause 4.2.2.1.4. A is less than or equal to 82 bits.
<Packet_Control_Channel_Definition_Part1 : bitstring (B) >	First partition of list of packet control channels. See clause 4.2.2.1.4.3. B is less than or equal to 110 - A.
<Spare: bitstring (C) >	C is less than or equal to 110-A-B.
<Header Segment 3C>::=	
<Class Type 3: 0><Segment type: 0010>	
Rules for defining CCCH and PCCCH lists : 1)<SA_CCCH_LIST_PART1> containing CCCH ARFCNs will be defined within A bits where A is ≤82 bits. 2) <Packet_Control_Channel_Definition_Part1> definition shall be contained within B bits where B <= 110 - A. 3) Number of spare bits will be equal to C bits where C = 110 - A - B.	

11.5.2.75 Segment 3D

Segment 3D contains the second partition of the differentially encoded normal CCCH carrier list (see clause 4.2.2.1.5). The description of the messages is done according to the compact notation described in annex B of GMPRS-1 04.007 [11].

Size: 120 bits

<Header: bitstring (5) >	5 bits.
<SA_CCCH_LIST_PART2: bitstring (A) >	Second partition of the differentially encoded CCCH list. (See clause 4.2.2.1.4).
<Packet_Control_Channel_Definition_Part2 : bitstring (B)>	Second partition of list of packet control channels. See clause 4.2.2.1.4.3
<Spare: bitstring (C) >	
<Header Segment 3D>::=	
<Class Type 3: 0><Segment type: 0011>	
Rules for defining CCCH and PCCCH lists : 1) <SA_CCCH_LIST_PART2> containing CCCH ARFCNs will be defined within A bits where A <= 82 bits. 2) <Packet_Control_Channel_Definition_Part2> definition shall be contained within B bits where B <= 115 - A. 3) Number of spare bits will be equal to C bits where C = 115 - (A + B).	

11.5.2.76 Segment 3E

Segment E contains the third and last partition of the differentially coded normal CCCH carrier list. It also contains the second and the last partition of the concurrent BCCH information list (the first partition is specified in segment 3B). The description of the messages is done according to the compact notation described in annex B, GMPRS-1 04.007 [11].

Size: 184 bits

<Header: bitstring(5)>	
<Concurrent BCCH Information_part2: bitstring (61)>	second partition of the concurrent BCCH information list.
<SA_CCCH_LIST_PART3: bitstring(A)>	Third and last partition of the differentially encoded CCCH list. See clause 4.2.2.1.4.
<Packet_Control_Channel_Definition_Part3 : bitstring (B)>	Third partition of list of packet control channels. See clause 4.2.2.1.4.3
<Spare: bitstring(C)>	
<Header Segment 3E>::=	
<Class Type 3: 0><Segment type: 0100>	
<Concurrent BCCH Information_part2>::=	Compressed encoding (see clause 4.2.2.1.4)
SA_CCCH_LIST_PART3>::=	Differentially encoded (see clause 4.2.2.1.4)
Rules for defining CCCH and PCCCH lists : 1) <SA_CCCH_LIST_PART3> containing CCCH ARFCNs will be defined within A bits where A is less than or equal to 70 bits. 2) <Packet_Control_Channel_Definition_Part3> definition shall be contained within B bits where B <= (118-A). 3) Number of spare bits will be equal to C bits where C = 118 - A - B.	

11.5.2.77 Segment 3E*bis*

Segment 3E*bis* contains the second and last partition of the Concurrent BCCH information list. The description of the messages is done according to the compact notation described in annex B, GMPRS-1 04.007 [11].

Size: 120 bits

<Header: bitstring(5)>	
<Concurrent BCCH_information_part2: bitstring (A) >	Second partition of the concurrent BCCH information list.
<Packet_Control_Channel_Definition_Part3 : bitstring (B) >	Third partition of list of packet control channels. See clause 4.2.2.1.4.3.
<Spare: bitstring (C) >	
<Header Segment 3E*bis*>::=	
<Class Type 3: 0><Segment type: 0100>	
<Concurrent BCCH Information_part2>::=	Compressed encoding (see clause 4.2.2.1.4).
Rules for defining CCCH and PCCCH lists : 1) <Concurrent BCCH_information_part2> containing BCCH ARFCNs will be defined within A bits where A is less than or equal to 50 bits. 2) <Packet_Control_Channel_Definitions_Part3> definition shall be contained within B bits where B <= 115 - A. 3) Number of spare bits will be equal to C bits where C = 115 - (A + B).	

11.5.2.78 Segment 3F

Segment 3F contains the first partition of the differentially encoded AGCH/CCCH list. The description of the messages is done according to the compact notation described in annex B of GMPRS-1 04.007 [11].

Size: 120 bits

<Header: bitstring (5) >	5 bits.
<SA_AGCH_CHANS: bitstring (5) >	Range 0 to 31. Indicates number of AGCHs/ CCCHs in the LAI.
<SA_AGCH_LIST_PART1: bitstring (A) >	First partition of differentially encoded AGCH/CCCH list. See clause 4.2.2.1.4.1.
<Packet_Control_Channel_Definition_Part4: bitstring (B)>	Fourth partition of list of packet control channels. See clause 4.2.2.1.4.3.
<Spare: bitstring (C) >	
<Header Segment 3F>::=	
<Class Type 3: 0><Segment type: 0101>	
Rules for defining CCCH and PCCCH lists : 1) <SA_AGCH_LIST_PART1> containing CCCH ARFCNs will be defined within A bits where A < = 82 bits. 2) <Packet_Control_Channels_Definition_Part4> definition shall be contained within B bits where B < = 115 - A. 3) Number of spare bits will be equal to C bits where C = 115 - (A + B).	

11.5.2.79 Segment 3G

Segment 3G contains the second partition of the AGCH/CCCH list and GMPRS Parameters. The description of the messages is done according to the compact notation described in annex B of GMPRS-1 04.007 [11].

Size: 184 bits

<Header: bitstring (5) >	
<SA_AGCH_LIST_PART2: bitstring (A) >	Second partition of the differentially encoded AGCH/CCCH list. See clause 4.2.2.1.4.1.
<Packet_Control_Channel_Definition_Part5 : bitstring (B)>	Fifth partition of list of packet control channel parameters. See clause 4.2.2.1.4.3.
<Packet_Spotbeam_Specific_Parameters : bitstring (60)>	This field shall be interpreted only if the PS_AVAILABLE information element in Segment 2A is set to 1.
Spare: bitstring (D)	
Rules for defining CCCH and PCCCH lists : 1) <SA_AGCH_LIST_PART2> containing CCCH ARFCNs will be defined within A bits where A <= 70 . 2) <Packet_Control_Channel_Definition_Part5> definition shall be contained within B bits where B <= 119 - A. 4) Number of spare bits will be equal to D bits where D = 119 - A - B	
Packet Spotbeam Specific Parameters ::=	
<RAC : bitstring (8) >	As described in GMPRS-1 04.060 [20]
<PRIORITY_ACCESS_THRESHOLD>	Bit 3 2 1 0 0 0 packet access is not allowed in the cell; 0 0 1 spare, shall be interpreted as "000" (packet access not allowed); 0 1 0 spare, shall be interpreted as "000" (packet access not allowed); 0 1 1 packet access is allowed for priority level 1; 1 0 0 packet access is allowed for priority level 1 to 2; 1 0 1 packet access is allowed for priority level 1 to 3; 1 1 0 packet access is allowed for priority level 1 to 4; 1 1 1 spare, shall be interpreted as "110" (packet access allowed).
<GMPRS BCCH Options>	See clause 11.5.2.111.
<CS_AVAILABLE : bitstring (1) >	Reserved for future use.
<BCCH_Type_Flag : bitstring (1) >	Indication of type of BCCH 0 : A-BCCH 1 : T-BCCH
Packet Link Quality Report : bitstring (1)	Link Quality Reporting 0: Enabled 1: Disabled
Link Failure Measurement Interval : bitstring (3)	Bit 3 2 1 0 0 0 Reserved 0 0 1 05 seconds 0 1 0 10 seconds 0 1 1 15 seconds 1 0 0 20 seconds 1 0 1 25 seconds 1 1 0 30 seconds 1 1 1 Reserved
<MAC_FORWARD_TS_OFFSET : bitstring (2)>	MAC Slot 0 Offset from absolute start of frame in downlink 0 to 2
<MAC_RETURN_TS_OFFSET : bitstring (5)>	MAC Slot 0 Offset from absolute start of frame in uplink 0 to 23
<Header Segment 3G>::=	
<Class Type 3: 0><Segment type: 0110>	

11.5.2.80 Segment 3G*bis*

Segment 3G*bis* contains the second part of the AGCH/CCCH list. The description of the messages is done according to the compact notation described in annex B of GMPRS-1 04.007 [11].

Size: 120 bits

<Header: bitstring(5)>	
<SA_AGCH_LIST_PART2: bitstring (A) >	Second partition of differentially encoded list. See clause 4.2.2.1.4.1.
<Packet_Control_Channel_Definition_Part 5 : bitstring (B)>	Fifth partition of list of packet control channels parameters. See clause 4.2.2.1.4.3.
<Packet_Spotbeam_Specific_Parameters : bitstring (60)>	This field shall be interpreted only if the PS_AVAILABLE information element in Segment 2Abis is set to 1.
<Spare: bitstring (D) >	
<Header Segment 3G*bis*>::=	
<Class Type 3: 0><Segment type: 0110>	
Rules for defining CCCH and PCCCH lists : 1) <SA_AGCH_LIST_PART2> containing CCCH ARFCNs will be defined within A bits where A <= 32 2) <Packet_Control_Channel_Definition_Part5> shall be contained within B bits where B <= 55 - A 3) Number of spare bits will be equal to D bits where D = 55 - A - B.	
Packet Spotbeam Specific Parameters ::=	
<RAC : bitstring (8) >	As described in GMPRS-1 04.060 [20]
<PRIORITY_ACCESS_THRESHOLD>	Bit 3 2 1 0 0 0 packet access is not allowed in the cell; 0 0 1 spare, shall be interpreted as "000" (packet access not allowed); 0 1 0 spare, shall be interpreted as "000" (packet access not allowed); 0 1 1 packet access is allowed for priority level 1; 1 0 0 packet access is allowed for priority level 1 to 2; 1 0 1 packet access is allowed for priority level 1 to 3; 1 1 0 packet access is allowed for priority level 1 to 4; 1 1 1 spare, shall be interpreted as "110" (packet access allowed).
<GMPRS BCCH Options>	See clause 11.5.2.111.
<CS_AVAILABLE : bitstring (1) >	Reserved for future use
<BCCH_Type_Flag : bitstring (1) >	Indication of type of BCCH 0 : A-BCCH 1 : T-BCCH
Packet Link Quality Report : bitstring (1)	Link Quality Reporting 0: Enabled 1: Disabled
Link Failure Measurement Interval : bitstring (3)	Bit 3 2 1 0 0 0 Reserved 0 0 1 05 seconds 0 1 0 10 seconds 0 1 1 15 seconds 1 0 0 20 seconds 1 0 1 25 seconds 1 1 0 30 seconds 1 1 1 Reserved
<MAC_FORWARD_TS_OFFSET : bitstring (2) >	MAC Slot 0 Offset from absolute start of frame in uplink 0 to 2
<MAC_RETURN_TS_OFFSET : bitstring (5) >	MAC Slot 0 Offset from absolute start of frame in uplink 0 to 23

11.5.2.81 Segment 3H

Segment 3H contains the third and last partition of the differentially encoded AGCH/CCCH list. The description of the messages is done according to the compact notation described in annex B of GMPRS-1 04.007 [11].

Size: 120 bits

<Header: bitstring (5) >	
<SA_AGCH_LIST_PART3: bitstring (A)>	Third and last partition of the differentially encoded AGCH/CCCH list.
<Packet_Control_Channel_Definition_Part6 : bitstring (B)>	Sixth partition of list of packet control channels. See clause 4.2.2.1.4.3.
Spare: bitstring (C)	
<Class Type 3: 0><Segment type: 0111>	
Rules for defining CCCH and PCCCH lists : 1) <SA_AGCH_LIST_PART3> containing CCCH ARFCNs will be defined within A bits where A is less than or equal to 82 bits. 2) <Packet_Control_Channel_Definition_Part6> definition shall be contained within B bits where B <= 115 - A 3) Number of spare bits will be equal to C bits where C = 115 - A - B	

11.5.2.82 Segment 3I

Same as clause 11.5.2.82 of GMR-1 04.008 [19].

11.5.2.83 Segment 3J

Same as clause 11.5.2.83 of GMR-1 04.008 [19].

11.5.2.84 Segment 3J*bis*

Same as clause 11.5.2.84 of GMR-1 04.008 [19].

11.5.2.85 Segment 4A

Same as clause 11.5.2.85 of GMR-1 04.008 [19].

11.5.2.86 Segment 4B

Same as clause 11.5.2.86 of GMR-1 04.008 [19].

11.5.2.87 Segment 4C

Same as clause 11.5.2.87 of GMR-1 04.008 [19].

11.5.2.88 Segment 4D

Same as clause 11.5.2.88 of GMR-1 04.008 [19].

11.5.2.89 Segment 4E

Same as clause 11.5.2.89 of GMR-1 04.008 [19].

11.5.2.90 Segment 4F

Same as clause 11.5.2.90 of GMR-1 04.008 [19].

11.5.2.91 Disconnection indication

Same as clause 11.5.2.91 of GMR-1 04.008 [19].

11.5.2.92 Handover parameter

Same as clause 11.5.2.92 of GMR-1 04.008 [19].

11.5.2.93 Information request code

Same as clause 11.5.2.93 of GMR-1 04.008 [19].

11.5.2.94 Last spot beams information

Same as clause 11.5.2.94 of GMR-1 04.008 [19].

11.5.2.95 Current spot beam information

Same as clause 11.5.2.95 of GMR-1 04.008 [19].

11.5.2.96 Power control information

Same as clause 11.5.2.96 of GMR-1 04.008 [19].

11.5.2.97 Version information

Same as clause 11.5.2.97 of GMR-1 04.008 [19].

11.5.2.98 Information response error code

Same as clause 11.5.2.98 of GMR-1 04.008 [19].

11.5.2.99 Vendor specific subcommand

Same as clause 11.5.2.99 of GMR-1 04.008 [19].

11.5.2.100 MSC ID

Same as clause 11.5.2.100 of GMR-1 04.008 [19].

11.5.2.101 GPS discriminator

Same as clause 11.5.2.101 of GMR-1 04.008 [19] except that the Discriminator Value shall be set to zero if this IE is included in a response to a Channel Request Type 1 message whose Class 2 bits were not correctly received.

11.5.2.102 Current timing offset

Same as clause 11.5.2.102 of GMR-1 04.008 [19].

11.5.2.103 Pause Timer

The Pause Timer IE gives the time period the MES should wait before re-transmitting the CHANNEL REQUEST message for requesting packet services. This IE is coded as shown in figure 11.51.1 and table 11.49.1. The Pause Timer IE is a Type 3 IE, 2 octets in length.

8	7	6	5	4	3	2	1	
0	Pause Timer IEI							octet 1
Pause Timer								octet 2

Figure 11.51.1: Pause timer information element

Table 11.49.1: Pause Timer information element

The Pause Timer shall be a 8-bit unsigned value representing the time period of T3115 in 100 ms units. The value conveyed through this information element shall override the value conveyed through BCCH.

11.5.2.104 Packet BCCH carrier

The Packet BCCH Carrier IE is used when the network wants the MES to access another BCCH carrier. This IE is coded as shown in figure 11.51.2 and table 11.49.2. Packet BCCH Carrier IE is a Type 3 IE, 3 octets in length.

8	7	6	5	4	3	2	1	
0	BCCH Carrier IEI							octet 1
ARFCN (msb)								octet 2
Spare		SI	RI	Freq Plan ID	ARFCN (lsb)			octet 3

Figure 11.51.2: Packet BCCH carrier IE

Table 11.49.2: Packet BCCH carrier IE

ARFCN (octet 2 and octet 3, bits 1 to 3). Range: 1 to 1 087 Binary representation of absolute RF channel number of the BCCH. Octet 2 is the most significant bits.
SI: Satellite Indication bit (bit6, octet 3) 0 BCCH carrier is on the same satellite 1 BCCH carrier is on a different satellite
RI: Reselection Indication bit (bit 5, octet 3) 0 spot beam reselection not needed; use the spot beam with given BCCH 1 spot beam reselection needed; use the BCCH for spot beam reselection
Frequency Plan Identifier (bit 4, octet 3) As described in GMPRS-1 05.005 [14]

11.5.2.105 Packet Immediate Assignment Type 3 Parameters

The purpose of the Packet Immediate Assignment Type 3 Parameters is to provide information related to quality of service, temporary block flow and MAC-slot allocation. Its coding is shown in figure 11.51.3. The various components of the element are described in table 11.49.3.

8	7	6	5	4	3	2	1	
0	Packet Assignment IEI							octet 1
Downlink TFI (MSB)			Spare				RLC Mode	octet 2
Starting Frame Number				Downlink TFI (LSB)				octet 3
MAC-slot Allocation								octet 4

Figure 11.51.3: Packet Immediate Assignment Type 3 Parameters IE

Table 11.49.3: Packet Immediate Assignment Type 3 Parameters IE

RLC Mode As described in GMPRS-1 04.060 [20]
Downlink TFI As described in GMPRS-1 04.060 [20]
Starting Frame Number As described in GMPRS-1 04.060 [20]
MAC-slot Allocation As described in GMPRS-1 04.060 [20]

11.5.2.106 Packet Frequency Parameters

The Packet Frequency Parameters information element defines frequency parameters which may be allocated to a mobile earth station to define its channel configuration. All MAC-slots in the channel configuration of the mobile earth station shall use the same frequency parameters.

The frequency parameters shall consist of an ARFCN , bandwidth information for the downlink, an uplink frequency difference between actual uplink frequency and frequency derived from ARFCN and bandwidth information for the uplink. Its coding is as shown in figure 11.51.4 and description is as shown in table 11.49.4.

8	7	6	5	4	3	2	1	
0	Packet Frequency Parameters IEI							octet 1
ARFCN (msb)								octet 2
Uplink Freq Distance (MSB)	Downlink Bandwidth			Downlink Freq Plan ID	ARFCN (lsb)			octet 3
Spare	Uplink Bandwidth			Uplink Freq Distance				octet 4

Figure 11.51.4: Packet Frequency Parameters IE

Table 11.49.4: Packet Frequency Parameters IE

ARFCN As described in GMPRS-1 05.005 [14].
Downlink Frequency Plan Identifier As described in GMPRS-1 05.005 [14].
Downlink Bandwidth This field represents the bandwidth to be used for the PDCH in multiples of 31,25 kHz, see GMPRS-1 05.005 [14].
Uplink Frequency Distance As defined in GMPRS-1 04.060 [20].
Uplink Bandwidth This field represents the bandwidth to be used for the PDCH in multiples of 31,25 kHz, see GMPRS-1 05.002 [12]. Range: 1 to 7.

11.5.2.107 Packet Immediate Assignment Type 2 Parameters

The purpose of the Packet Immediate Assignment Type 2 Parameters is to provide information related to quality of service, temporary block parameters and modulation and coding scheme.

The message content of the Packet Immediate Assignment Type 2 Parameters depends on the GMPRS terminal type (See GMPRS-1 05.002 [12] for GMPRS Terminal Types).

The coding used by MES of GMPRS terminal type A or C is shown in figure 11.51.5a. The various components of the element are described in table 11.49.5a.

8	7	6	5	4	3	2	1	
0	Packet Assignment IEI							octet 1
MAC Mode		Downlink Control MAC-slot			USF Granularity	Final Allocation	Spare	octet 2
RLC Data Blocks Granted (MSB)				Starting Frame Number				octet 3
MCS					RLC_Data_Blocks Granted(LSB)			octet 4
Spare	TFI							octet 5
MAC-Slot Allocation								octet 6

Figure 11.51.5a: Packet Immediate Assignment Type 2 Parameters IE (GMPRS terminal type A or C)

Table 11.49.5a: Packet Immediate Assignment Type 2 Parameters IE (GMPRS terminal type A or C)

MAC Mode Bits 0 0 Dynamic allocation All other values are reserved
Downlink Control MAC-Slot This field is reserved.
Starting Frame Number This field is reserved.
USF_Granularity As described in GMPRS-1 04.060 [20]
TFI As described in GMPRS-1 04.060 [20]
MCS As described in GMPRS-1 05.002 [12]
Final_Allocation This field is reserved
MAC-slot Allocation As described in GMPRS-1 04.060 [20]

The coding used by MES of GMPRS terminal type D is shown in figure 11.51.5b. The various components of the element are described in table 11.49.5b.

8	7	6	5	4	3	2	1	
0	Packet Assignment IEI							octet 1
Channel_MCS_Command_PNB_5_12				Channel_MCS_Command				octet 2
Spare								octet 3
Spare	RLC_Data_Blocks Granted							octet 4
USF Granularity	TFI							octet 5
MAC-Slot Allocation								octet 6

Figure 11.51.5b: Packet Immediate Assignment Type 2 Parameters IE (GMPRS terminal type D)

Table 11.49.5b: Packet Immediate Assignment Type 2 Parameters IE (GMPRS terminal type D)

Channel_MCS_Command (Octet 2 - bits 1 to 4) As described in GMPRS-1 04.060 [20]
Channel_MCS_Command_PNB_5_12 (Octet 2 - bits 5 to 8) As described in GMPRS-1 04.060 [20]
Spare (Octet 3)
RLC Data Blocks Granted (Octet 4 - bits 1to7) As described in GMPRS-1 04.060 [20]
Spare (Octet 4 - bit 8)
TFI (Octet 5 - bits 1 to 7) As described in GMPRS-1 04.060 [20]
USF_Granularity (Octet 5 - bit 8) As described in GMPRS-1 04.060 [20]
MAC-slot Allocation (Octet 6 - bits 1 to 8) As described in GMPRS-1 04.060 [20]

11.5.2.108 Illumination Retry Timer

The Illumination Retry Timer IE gives the time period the MES should wait before re-transmitting the CHANNEL REQUEST TYPE 1 message for requesting packet services . This IE is coded as shown in figure 11.51.6 and table 11.49.6. The Illumination Retry timer is a Type 3 IE, 2 octets in length.

8	7	6	5	4	3	2	1	
0	Illumination Retry Timer IEI							octet 1
Scaling Factor		Illumination Retry Timer						octet 2

Figure 11.51.6: Illumination Retry Timer information element

Table 11.49.6: Illumination Retry Timer information element

Scaling Factor Bits 8 7 0 0 <Absolute value of Illumination Retry Timer> x 8 s 0 1 <Absolute value of Illumination Retry Timer> x 16 s 1 0 <Absolute value of Illumination Retry Timer> x 32 s 1 1 <Absolute value of Illumination Retry Timer> x 64 s The Illumination Retry Timer shall be a 6-bit unsigned value representing the time period of T3333 in 1 second units.

11.5.2.109 Packet Control Channel Definition

The Packet Control Channel Definition IE describes the encoding scheme for packet control channel parameters.

Table 11.49.7: Packet Control Channel Definition information element

Packet Control Channel Definition ::=
 	
<Packet Control Channel List> {
<SA_PCCCH_CHANS: bitstring (5) >
<Downlink Bw: bitstring(3)>
{<Packet Control Channel Parameters >} × val(SA_PCCCH_CHANS)
}
<Packet Control Channel Parameters> ::=
{
<DownlinkARFCN:bitstring (11) >
<FrequencyPlanID: bitstring (1) >
{
{ 111 -- Fixed PRACH slot configuration as opposed to USF=Free mechanism
<Uplink PRACH Frequency Distance : bit(2)>
<Uplink PRACH MAC Slots Indicator: bitstring (2) >
<PRACH Frame Periodicity : bit (2) }
} |
{ -- USF=Free based PRACH Overlay mechanism
<PRACH Overlay: bitstring(3) == (000 | 001 | 010 | 011 | 100 | 101 | 110) >
<Uplink PRACH Channels: bitstring (6) >
}
}
}

References: DOWNLINK_BW as defined in GMPRS-1 05.005 [14]. SA_PCCCH_CHANS : 0 to 31, indicates number of PCCCH carrying PDCH-carriers of bandwidth DownlinkBW in the spotbeam . Downlink ARFCN : ARFCN of the downlink PDCH See GMPRS-1 05.005 [14]. Frequency Plan ID as defined in GMRPS-1 05.005 [14].
PRACH Overlay see clause 11.5.2.118 Indicates the number of parallel overlaid PRACH channels available in a single slot. As defined in GMPRS-1 04.060 [20].
Uplink PRACH Channels see clause 11.5.2.112.
UplinkPRACH Frequency Distance see clause 11.5.2.123.
Uplink PRACH MAC Slots Indicator see clause 11.5.2.120.
PRACH Frame Periodicity see clause 11.5.2.124.

11.5.2.110 USF

The purpose of the USF field is to provide USF allocation in dynamic/extended dynamic mode on the uplink.

8	7	6	5	4	3	2	1	
0	USF IEI							octet 1
Spare								octet 2
Spare								octet 3
Spare				USF Allocated				octet 4

Figure 11.51.7: USF IE

Table 11.49.8: USF IE

USF As described in GMPRS-1 04.060 [20]

11.5.2.111 GMPRS BCCH options

The GMPRS BCCH Options information element is used to control a set of cell options related to GMPRS.

This information element may include a nested Extension Bit information element to allow future extension of cell option parameters.

Table 11.49.9: GMPRS BCCH options information element

```
< GPRS BCCH Options IE > ::=
  < NMO : bit (2) >
  < T3168 : bit (3) >
  < T3192 : bit (3) >
  < T3202: bit (6) >
  < BS_CV_MAX : bit (9) >
  < USF_DELAY : bit (2) >
  < PKT_TIMING_CORR_CYCLE : bit (8) >
  < PARALLEL_TBF: bit (1) >
  < SEND_PDU_NOTBF : bit (1) >
  <BITMAP_COMPRESS: bit (1) >

   --Optional extension:
   { 0 | 1 < Extension Bits IE > -- See GMPRS-1 04.060 [20]
            <GMPRS_SUPPORT : bit (1) > { 0 | 1 < Extension Length : bit (6) >
                                                < bit (val(Extension Length) + 1)
                                               & { <GMPRS Extension Information >
                                                   ! { bit ** = <no string> } } > } ;
```

```
< GMPRS Extension Information > ::=
    < USF_DELAY Adjustment: bit (2) >       -- Additional adjustments for USF_DELAY
    < spare bit > ** ;
```

Table 11.49.10: GPRS BCCH options information element details

NMO (2 bit field)
This field is the binary representation of the Network Mode of Operation, see GMPRS-1 04.060 [20]:

bit
2 1
0 0 Network Mode of Operation I
0 1 Network Mode of Operation II
1 0 Network Mode of Operation III
1 1 Reserved.

T3168 (3 bit field)
Reserved for future use. Set to zero by the network.

T3192 (3 bit field)
This field is the binary representation of the timeout value of timer T3192. Range: 0 to 7. The timeout value is given as the binary value plus one in units of 500 millisecond.

T3202 (6 bit field)
This field is the binary representation of the timeout value of timer T3202. Range: 0 to 63. If the value is zero, the timeout is infinite. If the value is nonzero, the value represents the timeout in minutes.

BS_CV_MAX (9 bit field)
This field is the binary representation of the parameter BS_CV_MAX. Range: 0 to 512.

USF_DELAY (2 bit field)
This field indicates the delay between the Mac-slot in which an USF is received by the MES and the Mac-slot in which it must be applied, both as measured by the MES. If USF_DELAY Adjustment parameter is not included as part of GMPRS Extension IE, then the MES shall use the contents of USF_DELAY field without any modifications.

Bit
2 1
0 0 7 frames
0 1 8 frames
1 0 9 frames
1 1 10 frames

If USF_DELAY Adjustment parameter is included as part of Extension IE, then the MES shall derive the actual USF_DELAY by subtracting value contained in USF_DELAY Adjustment parameter from USF_DELAY parameter.

PKT_TIMING_CORR_CYCLE (8 bit field)
This field indicates the repetition period of the pkt continuous timing and frequency correction cycle. It is coded as the value of the field plus fifty in units of multiframes i.e.,

bit
8 7 6 5 4 3 2 1
0 0 0 0 0 0 0 0 50 multiframes
0 0 0 0 0 0 0 1 51 multiframes
0 0 0 0 0 0 1 0 52 multiframes

……..
1 0 0 1 0 1 1 0 200 multiframes

All values greater than 0x96 hex are reserved.

PARALLEL_TBF: bit(1)
Reserved for future use. Set to zero by the network.

SEND_PDU_NOTBF: bit(1)
Reserve for future use. Set to zero by the network.

COMPRESS_BITMAP: bit(1)
Reserved for future use. Set to zero by the network.

GMPRS_SUPPORT: bit(1)
This field indicates if GMPRS specific extension information is present in the Extension Bits IE.

bit
0 Extension Bits IE field does not contain GMPRS extension information
1 Extension Bits IE field contains GMPRS extension information

USF_DELAY Adjustment (2 bit field)
This field indicates additional adjustment to USF_DELAY parameter. Actual USF_DELAY is obtained by subtracting number of frames indicated below from USF_DELAY parameter.

Bit
2 1
0 0 No Adjustments
0 1 1 frame
All other values are reserved.

EXAMPLE: If USF_DELAY is set to "00" (7 frames) and USF_DELAY Adjustment is set to "01" then the actual USF_DELAY to use is 7 - 1 = 6 frames.

11.5.2.112 Uplink PRACH channels

A bitmap indicating the location of the available PRACH channels within a subband. The most significant bit refers to the presence or absence of a PRACH channel at the lowest numbered 31,25 kHz subcarrier within the uplink frequency band. The value "1" indicates the presence of a PRACH channel; "0" indicates the absence of a PRACH channel. The number of bits set to "1" within Uplink PRACH Channels is always equal to the number of active PRACH channels specified in the PRACH_OVERLAY IE (see clause 11.5.2.118).

11.5.2.113 Void

11.5.2.114 Void

11.5.2.115 Void

11.5.2.116 Void

11.5.2.117 Void

11.5.2.118 PRACH overlay

This 3-bit field indicates whether PRACH overlay is supported, and if so, how many overlaid channels are supported. The number of channels supported is 1 plus the value of this field.

EXAMPLE: Bit
3 2 1
0 0 0 PRACH overlay not supported, only one channel
0 0 1 PRACH overlay supported, two channels
0 1 0 PRACH overlay supported, three channels
0 1 1 PRACH overlay supported, four channels
1 0 0 PRACH overlay supported, five channels
1 0 1 Reserved
1 1 0 Reserved

The particular 31,25 kHz subchannels within a subband that support PRACH arfFe indicated opinionative by the Uplink PRACH Channels IE defined in clause 11.5.2.112.

11.5.2.119 Uplink PRACH ARFCN

This 11-bit field is the ARFCN on which PRACH is transmitted by the mobile earth station.

11.5.2.120 Uplink PRACH MAC Slots Indicator

This 2-bit field indicates the pair of consecutive MAC slots on which the mobile earth station can transmit PRACH in a frame. The mobile earth station randomly chooses one MAC slot out of the two to transmit PRACH. The following table shows the value that the field can take and the corresponding MAC slots on which PRACH can be transmitted.

Table 11.49.10a: Uplink PRACH MAC Slots Indicator

Value	List of MAC slots on which PRACH can be transmitted
0	0 and 1
1	2 and 3
2	4 and 5
3	6 and 7

11.5.2.121 GMPRS Resume Result

The GMPRS Resume Result IE gives the outcome of the GMPRS resume procedure. This IE is coded as shown in figure 11.51.8 and table 11.49.11. The GMPRS Resume Result is a Type 3 IE, 2 octets in length.

8	7	6	5	4	3	2	1	
0	GMPRS Resume Result IEI							octet 1
Spare							Result	octet 2

Figure 11.51.8: GMPRS Resume Result information element

Table 11.49.11: GMPRS Resume Result information element

Result is a 1 bit field 0 : GMPRS services not successfully resumed 1 : GMPRS services successfully resumed

11.5.2.122 GMPRS Resume Response Rest Octets

The GMPRS Resume Response Rest Octets IE contains only spare bits. This IE is coded as shown in figure 11.51.9. The GMPRS Resume Response Rest Octets IE is a Type 5 IE, 16 octets in length.

8	7	6	5	4	3	2	1	
	GMPRS Resume Response Rest Octets IEI							octet 1
0 Spare	0 Spare	1 Spare	0 Spare	1 Spare	0 Spare	1 Spare	1 Spare	octet 2*
0 Spare	0 Spare	1 Spare	0 Spare	1 Spare	0 Spare	1 Spare	1 Spare	octet 3*
0 Spare	0 Spare	1 Spare	0 Spare	1 Spare	0 Spare	1 Spare	1 Spare	octet n*

Figure 11.51.9: GMPRS Resume Response rest octets IE

11.5.2.123 Uplink PRACH Frequency Distance

This 2-bit field represents the difference between the uplink PDCH carrier frequency and the actual PRACH frequency in units of 31,25 kHz. The PRACH carrier location interpretation is as follows:

Table 11.49.12: Uplink PRACH Frequency Distance

Bits 1 0	PRACH carrier location
0 0	PRACH frequency = uplink PDCH carrier frequency
0 1	PRACH frequency = uplink PDCH carrier frequency + 31,25 kHz
1 1	PRACH frequency = uplink PDCH carrier frequency - 31,25 kHz
1 0	Reserved

Note that the computation of uplink PDCH carrier frequency at the MES utilizes the downlink ARFCN, frequency plan Id from the PCCCH list (see table 11.49.7) and the value of "uplink frequency distance" parameter from the last received PACKET UPLINK ASSIGNMENT or IMMEDIATE ASSIGNMENT message.

11.5.2.124 PRACH Frame Periodicity

This 2-bit field indicates the PRACH MAC slots periodicity in terms of frames. The mobile earth station is allowed to transmit on PRACH MAC slots only in those frames as given in table 11.49.13.

Table 11.49.13: PRACH Frame Periodicity

Value	PRACH Frame Periodicity
0	Every Frame
1	Once every two frames on frames satisfying (FN mod 2) = 0
2	Once every two frames on frames satisfying (FN mod 2) = 1
3	Reserved

where:

- "FN" represents Frame Number at the satellite.
- "mod" represents modulo.

11.5.3 Mobility management IEs

Same as clause 11.5.3 of GMR-1 04.008 [19].

11.5.4 Call control IEs

Same as clause 11.5.4 of GMR-1 04.008 [19].

11.5.5 GMM IEs

11.5.5.1 Attach request

Same as clause 10.5.5.1 of 3GPP TS 04.08 [21].

11.5.5.2 Attach type

Same as clause 10.5.5.2 of 3GPP TS 04.08 [21].

11.5.5.3 Ciphering algorithm

Same as clause 10.5.5.3 of 3GPP TS 04.08 [21].

11.5.5.4 Void

11.5.5.5 Detach type

Same as clause 10.5.5.5 of 3GPP TS 04.08 [21].

11.5.5.6 DRX parameter

Same as clause 10.5.5.6 of 3GPP TS 04.08 [21].

11.5.5.7 Force to standby

Same as clause 10.5.5.7 of 3GPP TS 04.08 [21].

11.5.5.8 PTMSI signature

Same as clause 10.5.5.8 of 3GPP TS 04.08 [21].

11.5.5.9 Identity type 2

Same as clause 10.5.5.9 of 3GPP TS 04.08 [21].

11.5.5.10 IMEISV request

Same as clause 10.5.5.10 of 3GPP TS 04.08 [21].

11.5.5.11 Receive N-PDU Numbers list

Same as clause 10.5.5.11 of 3GPP TS 04.08 [21].

11.5.5.12 MS network capability

Same as clause 10.5.5.12 of 3GPP TS 04.08 [21].

11.5.5.12a MS Radio Access capability

The purpose of the MS RA capability information element is to provide the radio part of the network with information concerning radio aspects of the mobile station. The contents might affect the manner in which the network handles the operation of the mobile station.

The MS RA capability is a type 4 information element, with a maximum length of 14 octets.

The value part of a MS RA capability information element is coded a shown in table 10.5.146 of 3GPP TS 24.008 [18].

- SEMANTIC RULE : Only the GMPRS access type technology is supported.
- Error handling: If a received Access Technology Type is unknown to the receiver, it shall ignore all the corresponding fields.
- If within a known Access Technology Type a receiver recognizes an unknown field it shall ignore it.
- See more details about error handling of MS radio access capability in 3GPP TS 48.018 [i.1].

Table 11.49.14: Mobile Station Radio Access Capability IE

< MS Radio Access capability IE > : :=
<MS Radio Access capability IEI : 00100100 >
<**Length of MS RA capability** : <octet>> -- length in octets of MS RA capability value part and spare bits
<**MS RA capability value part** : < MS RA capability value part struct >>
<spare bits>** ; -- may be used for future enhancements

<MS RA capability value part struct > : := --recursive structure allows any number of Access technologies
< Access Technology Type : bit (4) >
< **Access capabilities** : <Access capabilities struct> >
{ 0 | 1 <MS RA capability value part struct> } ;

< Access capabilities struct > : :=
< **Length** : bit (7) > -- length in bits of Content and spare bits
<Access capabilities : <Content>>
<spare bits>** ; -- expands to the indicated length
may be used for future enhancements

< Content > : :=
< **« 000 »** >-- may be used for future enhancements
{ 0 | 1 <**A5 bits** : <A5 bits> > } - zero means that the same values apply for parameters as in the immediately preceding Access capabilities field within this IE
-- The presence of the A5 bits is mandatory in the 1st Access capabilities struct within this IE.
< **ES IND** : bit >
< »000 »> -- may be used for future enhancements.
{ 0 | 1 < **Multislot capability** : Multislot capability struct > } ; -- zero means that the same values for multislot parameters as given in an earlier Access capabilities field within this IE apply also here
{ 0 }.
-- error : struct too short, assume features do not exist
-- error : struct too long, ignore data and jump to next Access technology

< Multislot capability struct > : :=
{ 0 }
0 { « 111 » < GMPRS Multislot class > 0 }
{ 0 } ;
{ 0 }
{ 0 } ;

<A5 bits> ::= < A5/1 : bit> <A5/2 : bit> <A5/3 : bit> <A5/4 : bit> <A5/5 : bit> <A5/6 : bit> <A5/7 : bit>; -- bits for circuit mode ciphering algorithms

Access Technology Type

This field indicates the access technology type to be associated with the following access capabilities.

Bits
4 3 2 1

0 0 0 0 GMPRS
All other values are treated as unknown by the receiver.

RF Power Capability
This field is coded as the MES power class (see GMPRS-1 5.005).

A5/1
0 encryption algorithm A5/1 not available
1 encryption algorithm A5/1 available
A5/2
0 encryption algorithm A5/2 not available
1 encryption algorithm A5/2 available
A5/3
0 encryption algorithm A5/3 not available
1 encryption algorithm A5/3 available
A5/4
0 encryption algorithm A5/4 not available
1 encryption algorithm A5/4 available
A5/5
0 encryption algorithm A5/5 not available
1 encryption algorithm A5/5 available
A5/6
0 encryption algorithm A5/6 not available
1 encryption algorithm A5/6 available
A5/7
0 encryption algorithm A5/7 not available
1 encryption algorithm A5/7 available

ES IND - (Controlled early Classmark Sending)
0 "controlled early Classmark Sending" option is not implemented
1 "controlled early Classmark Sending" option is implemented

GMPRS Multi Slot Class
The GMPRS Multi Slot Class field is coded as the binary representation of the multislot class defined in GMPRS-1 05.002.

11.5.5.13 Void

11.5.5.14 GMM cause

Same as clause 10.5.5.14 of 3GPP TS 04.08 [21].

11.5.5.15 Routing Area Identification (RAI)

Same as clause 10.5.5.15 of 3GPP TS 04.08 [21].

11.5.5.16 Void

11.5.5.17 Update result

Same as clause 10.5.5.17 of 3GPP TS 04.08 [21].

11.5.5.18 Update type

Same as clause 10.5.5.18 of 3GPP TS 04.08 [21].

11.5.5.19 A&C reference number

Same as clause 10.5.5.19 of 3GPP TS 04.08 [21].

11.5.6 SM IEs

Same as clause 10.5.6 of 3GPP TS 04.08 [21].

The following element is not currently supported in GMR-1:

- AA Deactivation Cause.

11.5.7 GPRS Common Information Elements

Same as clause 10.5.7 of 3GPP TS 04.08 [21].

12 List of system parameters

The description of timers in this clause should be considered a brief summary. The details are provided in clauses 3 to 6, which should be considered the definitive descriptions.

12.1 Timers and counters for radio resource management

12.1.1 Timers on the MES side

T3122: This timer is used during random access, after the receipt of an IMMEDIATE ASSIGNMENT REJECT message.

The Wait timer is used by the MES to extend the access time period. Its value is indicated by the network in the IMMEDIATE ASSIGNMENT REJECT message.

Its value is given by the network in the IMMEDIATE ASSIGNMENT REJECT message.

T3126: This timer is started after sending a CHANNEL REQUEST message during an immediate assignment procedure.

This timer is also started after sending a CHANNEL REQUEST TYPE 2 message during an GMPRS suspend procedure.

Its purpose is to detect the lack of an answer from the network.

It is stopped upon receipt of an IMMEDIATE ASSIGNMENT message or an IMMEDIATE ASSIGNMENT REJECT message.

At its expiry, another CHANNEL REQUEST (or CHANNEL REQUEST TYPE 2 if the access was for GMPRS suspend procedure) message is sent if the maximum count has not been achieved or else the immediate assignment procedure is aborted.

T3110: This timer is used to delay channel deactivation after receipt of a CHANNEL RELEASE. Its purpose is to allow time for disconnection of the main signalling link.

Its value is set such that the DISC frame is sent twice in case of no answer from the network. It should be chosen to obtain a good probability of normal termination (i.e., no time out of T3109) of the channel release procedure.

T3112: This timer is used when the MES receives an alert message. It is the maximum amount of time available to the MES to read the BCCH and send in a CHANNEL REQUEST message answering the alert. This value is broadcast by the network over the BCCH. This is referred to as Alert timer.

The value of this timer is also an upper limit on the MES to obtain the current GPS position, if the current position is needed in the CHANNEL REQUEST in response to alerting.

T3114: The value of this timer is an upper limit on the MES to obtain the current GPS position if the current position is needed in the CHANNEL REQUEST message in response to paging. This is referred to as Page timer.

T3115: The Pause timer is used by the MES to extend the access time period. Its value is broadcast by the network with the BCCH information.

T3118: The RACH Position timer is used by the MES to calculate the current GPS position, if not already available, before sending a message on the RACH channel, in a spot beam where position is required for access. Its value is broadcast over the BCCH.

T3119: The GPS Update timer is used by the MES to update its GPS position in idle mode and in-call. It is broadcast over the BCCH and may be overridden for a particular MES by a value provided in IMMEDIATE ASSIGNMENT or IMMEDIATE ASSIGNMENT REJECT message.

T3117: This timer is used by the MES to wait for a response to its updated position report to the network, which is transmitted in unacknowledged mode. This timer should be large enough to account for the round-trip delay and processing delay at the network. Because this timer triggers retransmission, a small value could lead to excessive load on the signalling channel.

T3127: This timer is started after sending an EXTENDED CHANNEL REQUEST message during an immediate assignment procedure.

Its purpose is to detect the lack of an answer from the network.

It is stopped upon receipt of an EXTENDED IMMEDIATE ASSIGNMENT message or an EXTENDED IMMEDIATE ASSIGNMENT REJECT message.

At its expiry, the immediate assignment procedure is aborted.

T3142: This timer is used during packet access on CCCH, after the receipt of an IMMEDIATE ASSIGNMENT REJECT TYPE 1 message with reject cause "lack of resources".

The value of this timer shall be given by the network in IMMEDIATE ASSIGNMENT REJECT TYPE 1 message.

T3144: This timer is used during packet access on CCCH, after the receipt of an IMMEDIATE ASSIGNMENT REJECT TYPE 3 message with reject cause "non-availability of service".

The value of this timer shall be 20 minutes.

T3146: This timer is started after sending CHANNEL REQUEST TYPE 1 message during a packet access procedure.

It is stopped at receipt of an IMMEDIATE ASSIGNMENT (TYPE 2 or TYPE 3) message.

At its expiry, another CHANNEL REQUEST TYPE 1 message is sent if the maximum count has not been reached or else the immediate assignment procedure is aborted.

T3190: This timer is used during packet downlink assignment on CCCH. It is started at the receipt of an IMMEDIATE ASSIGNMENT TYPE 3 message.

It is stopped at the receipt of a RLC/MAC lock on the assigned temporary block flow, see GMPRS-1 04.060 [20].

At expiry, the mobile station returns to the packet idle mode.

The value of the timer is 5 seconds.

T3333: This timer is started on receipt of an IMMEDIATE ASSIGNMENT REJECT message with reject cause non-availability of satellite resources. While this timer is running, the mobile shall remain in idle mode and is not permitted to initiate an access procedure in this spot-beam.

T3202: As defined in GMPRS-1 04.060 [20].

T3208: As defined in GMPRS-1 04.060 [20].

T3196: As defined in GMPRS-1 04.060 [20].

12.1.2 Timers on the network side

T3101: This timer is started when a channel is allocated with an IMMEDIATE ASSIGNMENT message. It is stopped when the MES has correctly seized the channels.

Its value is network-dependent.

NOTE 1: It could be higher than the maximum time for an L2 establishment attempt.

T3103: This timer is started by the sending of a HANDOVER message and is stopped when the MES has correctly seized the new channel. Its purpose is to limit the time required to perform the handover.

Its value is network-dependent.

NOTE 2: It could be higher than the transmission time of the HANDOVER COMMAND message in unacknowledged mode with the required success probability plus the maximum duration of an attempt to establish a data link multiframe mode.

T3107: This timer is started by sending an ASSIGNMENT COMMAND 1 message in an MES-to-GS call and is normally stopped when the MES has correctly seized the new channels.

Its purpose is to keep the old channel long enough for the MES to be able to return to the old channels and to release the channels if the MES is lost.

Its value is network-dependent.

NOTE 3: It could be higher than the maximum transmission time of the ASSIGNMENT COMMAND 1 message plus twice the maximum duration of an attempt to establish a data link multiframe mode.

T3108: This timer is started by sending an ASSIGNMENT COMMAND 2 message in an MES-to-MES call and is normally stopped when the MES has correctly seized the new channels.

Its purpose is to keep the old channel long enough for the MES to be able to return to the old channels, and to release the channels if the MES is lost.

Its value is network-dependent.

NOTE 4: It could be higher than the maximum transmission time of the ASSIGNMENT COMMAND 2 message plus twice the maximum duration of an attempt to establish a TACCH multiframe mode.

T3109: This timer is started when a lower layer failure is detected by the network when it is not engaged in an RF procedure. It is also used in the channel release procedure.

Its purpose is to release the channels in case of loss of communication.

Its value is network-dependent.

NOTE 5: Its value should be large enough to ensure that the mobile earth station detects a radio link failure.

T3111: This timer is used to delay the channel deactivation after disconnection of the main signalling link. Its purpose is to allow time for possible repetition of the disconnection.

Its value is equal to the value of T3110.

T3113: This timer is started when the network has sent a PAGING REQUEST message and is stopped when the network has received the PAGING RESPONSE message.

Its value is network-dependent.

NOTE 6: The value could allow for repetition of the CHANNEL REQUEST message and the requirements associated with T3101.

THPA: Timer in alert mode on the network side. This is started when an ALERT REQUEST message is sent by the network to an MES.

Its value is network-dependent.

At the expiry of this timer, the alerting procedure is aborted at the network.

This timer is stopped when a PAGING RESPONSE message corresponding with the ALERT REQUEST message sent is received.

T3141: This timer is started when a temporary block flow is allocated with an IMMEDIATE ASSIGNMENT (TYPE 2 or TYPE 3) message during a packet access procedure. It is stopped when the network receives a packet from the mobile station on the assigned temporary block flow.

Its value is network dependent.

TUSF: This timer is started when the network has sent an IMMEDIATE ASSIGNMENT TYPE 2 message to MES during packet access procedures. At the expiry of this timer network starts scheduling USF for that MES.

This timer has to be based on estimate of processing delays in UT for decoding IMMEDIATE ASSIGNMENT TYPE 2 and listening to PDCH for its USF.

12.1.3 Other parameters

Same as clause 11.1.3 of 3GPP TS 04.08 [17].

12.2 Timers of mobility management

Same as clause 12.2 of GMR-1 04.008 [19].

12.2.1 Timer T3240

Same as clause 12.2.1 of GMR-1 04.008 [19].

12.2.2 Timers of GPRS mobility management

Table 12.3: GPRS Mobility management timers - MES side

TIMER NUM	TIMER VALUE	STATE	CAUSE FOR START	NORMAL STOP	ON THE 1st, 2nd, 3rd, 4th EXPIRY NOTE 3
T3310	30 s	GMM-REG-INIT	ATTACH REQ sent	ATTACH ACCEPT received ATTACH REJECT received	Retransmission of ATTACH REQ
T3311	30 s	GMM-DEREG ATTEMPTING TO ATTACH or GMM-REG ATTEMPTING TO UPDATE	ATTACH REJ with other cause values as described in clause 5.7.3 "GPRS Attach" ROUTING AREA UPDATE REJ with other cause values as described in clause 5.7.5 "Routing Area Update" Low layer failure	Change of the routing area	Restart of the Attach or the RAU procedure with updating of the relevant attempt counter
T3321	30 s	GMM- DEREG-INIT	DETACH REQ sent	DETACH ACCEPT received	Retransmission of the DETACH REQ
T3330	30 s	GMM-ROUTING-UPDATING-INITIATED	ROUTING AREA UPDATE REQUEST sent	ROUTING AREA UPDATE ACC received ROUTING AREA UPDATE REJ received	Retransmission of the ROUTING AREA UPDATE REQUEST message
NOTE: Please refer to table 12.4a for the numbererd notes.					

Table 12.3a: GPRS Mobility management timers - MES side

TIMER NUM	TIMER VALUE	STATE	CAUSE FOR START	NORMAL STOP	ON EXPIRY
T3302	T3212 See note 4.	GMM-DEREG Or GMM-REG	At attach failure and the attempt counter is greater than or equal to 5. At routing are updating failure and the attempt counter is greater than or equal to 5.	At successful attach At successful routing area updating.	On every expiry initiation of the GPRS attach procedure or RAU procedure.
T3312	54 min See note 1.	GMM-REG	When READY state is left.	When entering state GMM-DEREG	Initiation of the Periodic RAU procedure
T3314 READY	88 s See note 2.	All except GMM-DEREG	Transmission of a PTP PDU	Forced to Standby	No cell-updates are performed
T3316 AA-READY	88 s See note 2.	-	Transmission of a PTP PDU	-	-
NOTE: Please refer to table 12.4a for the numbererd notes.					

Table 12.4: GPRS Mobility management timers - Network side

TIMER NUM	TIMER VALUE	STATE	CAUSE FOR START	NORMAL STOP	ON THE 1st, 2nd, 3rd, 4th EXPIRY NOTE 3
T3322	12 s	GMM-DEREG-INIT	DETACH REQ sent	DETACH ACCEPT received	Retransmission of ATTACH REQ
T3350	12 s	GMM-COMMON-PROC-INIT	ATTACH ACC sent with P-TMSI and/or TMSI RAU ACCEPT sent with P-TMSI and/or TMSI P-TMSI REALLOC COMMAND sent	ATTACH COMPLETE received RAU COMPLETE received P-TMSI REALLOC COMPLETE received	Retransmission of the same message type, i.e. ATTACH ACCEPT, RAU ACCEPT or REALLOC COMMAND
T3360	12 s	GMM-COMMON-PROC-INIT	AUTH AND CIPH REQUEST sent	AUTH AND CIPH RESPONSE received	Retransmission of AUTH and CIPH request
T3370	12 s	GMM-COMMON-PROC-INIT	IDENTITY REQUEST sent	IDENTITY RESPONSE received	Retransmission of IDENTITY REQUEST
NOTE: Please refer to table 12.4a for the numbererd notes.					

Table 12.4a: GPRS Mobility management timers - Network side

TIMER NUM	TIMER VALUE	STATE	CAUSE FOR START	NORMAL STOP	ON EXPIRY
T3313	See note 1.	GMM-REG	Paging procedure initiated	Paging procedure completed	Network dependent
T3314 READY	88 s See note 2.	All except GMM-DEREG	Receipt of a PTP PDU	Forced to Standby	The network shall page the MES if a PTP PDU has to be sent to the MES
T3316 AA-READY	88 s See note 2.	-	Receipt of a PTP PDU	-	-
Mobile Reachable	Default 4 min greater than T3312	All except GMM-DEREG	Change from READY to STANDBY state	PTP PDU received	Network dependent but typically paging is halted on 1st expiry
NOTE 1: The value of this timer is network dependent. NOTE 2: The default value of this timer is used if neither the MES nor the Network sends another value, or if the Network sends this value, in a signalling procedure. NOTE 3: Typically, the procedures are aborted on the fifth expiry of the relevant timer. Exceptions are described in the corresponding procedure description. NOTE 4: T3302 is loaded with the same value which is used to load T3212.					

12.2.3 Timers of GPRS session management

Table 12.5: GPRS Session management timers - MES side

TIMER NUM	TIMER VALUE	STATE	CAUSE FOR START	NORMAL STOP	ON THE 1st, 2nd, 3rd, 4th EXPIRY
T3380	60 s	PDP-ACTIVE-PEND	ACTIVATE PDP CONTEXT REQUEST sent	ACTIVATE PDP CONTEXT ACCEPT received ACTIVATE PDP CONTEXT REJECT received	Retransmission of ACTIVATE PDP CONTEXT REQ
T3390	16 s	PDP-INACT-PEND	DEACTIVATE PDP CONTEXT REQUEST sent	DEACTIVATE PDP CONTEXT ACC received	Retransmission of DEACTIVATE PDP CONTEXT REQUEST

Table 12.5a: GPRS Session management timers - Network side

TIMER NUM	TIMER VALUE	STATE	CAUSE FOR START	NORMAL STOP	ON THE 1st, 2nd, 3rd, 4th EXPIRY
T3385	16 s	PDP-ACT-PEND	REQUEST PDP CONTEXT ACTIVATION sent	ACTIVATE PDP CONTEXT REQ received	Retransmission of REQUEST PDP CONTEXT ACTIVATION
T3386	16 s	PDP-MOD-PEND	MODIFY PDP CONTEXT REQUEST sent	MODIFY PDP CONTEXT ACC received	Retransmission of MODIFY PDP CONTEXT REQ
T3395	16 s	PDP-INACT-PEND	DEACTIVATE PDP CONTEXT REQUEST sent	DEACTIVATE PDP CONTEXT ACC received	Retransmission of DEACTIVATE PDP CONTEXT REQ
T3397	16 s	PDP-INACT-PEND	DEACTIVATE AA PDP CONTEXT REQUEST sent	DEACTIVATE AA PDP CONTEXT ACCEPT received	Retransmission of DEACTIVATE AA PDP CONTEXT REQUEST
NOTE: Typically, the procedures are aborted on the fifth expiry of the relevant timer. Exceptions are described in the corresponding procedure description.					

12.3 Timers of circuit-switched call control

Same as clause 12.3 of GMR-1 04.008 [19].

Annex A (informative): Example of subaddress information element coding

Same as annex A of GMR-1 04.008 [19].

Annex B (informative): Void

Annex C (informative):
Void

Annex D (informative):
Void

Annex E (informative): Void

Annex F (informative): GMR specific cause values for radio resource management

This annex is the same as annex F of GMR-1 04.008 [19].

Annex G (informative): GMR specific cause values for session management

This annex is the same as annex I of GMR-1 04.008 [19].

Annex H (informative): Bibliography

GMR-1 03.013 (ETSI TS 101 376-3-7): "GEO-Mobile Radio Interface Specifications; Part 3: Network specifications; Sub-part 7: Discontinuous Reception (DRX)".

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

GMR-1 03.296 (ETSI TS 101 376-3-18): "GEO-Mobile Radio Interface Specifications; Part 3: Network specifications; Sub-part 18: Terminal-to-Terminal Call (TtT)".

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

GMR-1 03.298 (ETSI TS 101 376-3-20): "GEO-Mobile Radio Interface Specifications; Part 3: Network specifications; Sub-part 20: Technical realization of High-Penetration Alerting".

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

GMR-1 03.299 (ETSI TS 101 376-3-21): "GEO-Mobile Radio Interface Specifications; Part 3: Network specifications; Sub-part 21: Position Reporting services; Stage 2 Service description".

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

GSM 02.03 (ETSI ETS 300 502): "European digital cellular telecommunications system (Phase 2); Teleservices supported by a GSM Public Land Mobile Network (PLMN) (Version 4.3.1)".

GSM 04.11 (ETSI ETS 300 559): "Digital cellular telecommunications system (Phase 2); Point-to-Point (PP) Short Message Service (SMS) support on mobile radio interface; (Version 4.10.0) ".

GPS Interface Control Document ICD-GPS-200C: "NAVSTAR GPS Space Segment/Navigation User Interfaces, Public Release Version. February 1995".

GSM 03.38 (ETSI ETS 300 628): "European digital cellular telecommunications system (Phase 2); Alphabets and language-specific information (GSM Phase 2)".

ITU-T Recommendation E.212: "The international identification plan for mobile terminals and mobile users".

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

GSM 02.09 (ETSI ETS 300 506): "Digital cellular telecommunications system (Phase 2) (GSM); Security aspects (GSM Phase 2)".

GMR-1 03.020 (ETSI TS 101 376-3-9): "GEO-Mobile Radio Interface Specifications; Part 3: Network specifications; Sub-part 9: Security related Network Functions".

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

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

3GPP TS 09.02 (ETSI TS 100 974): "Digital cellular telecommunications system (Phase 2+);Mobile Application Part (MAP) specification (Release 1997)".

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

GMR-1 04.004 (ETSI TS 101 376-4-4): "GEO-Mobile Radio Interface Specifications; Part 4: Radio interface protocol specifications; Sub-part 4: Layer 1 General Requirements".

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

History

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