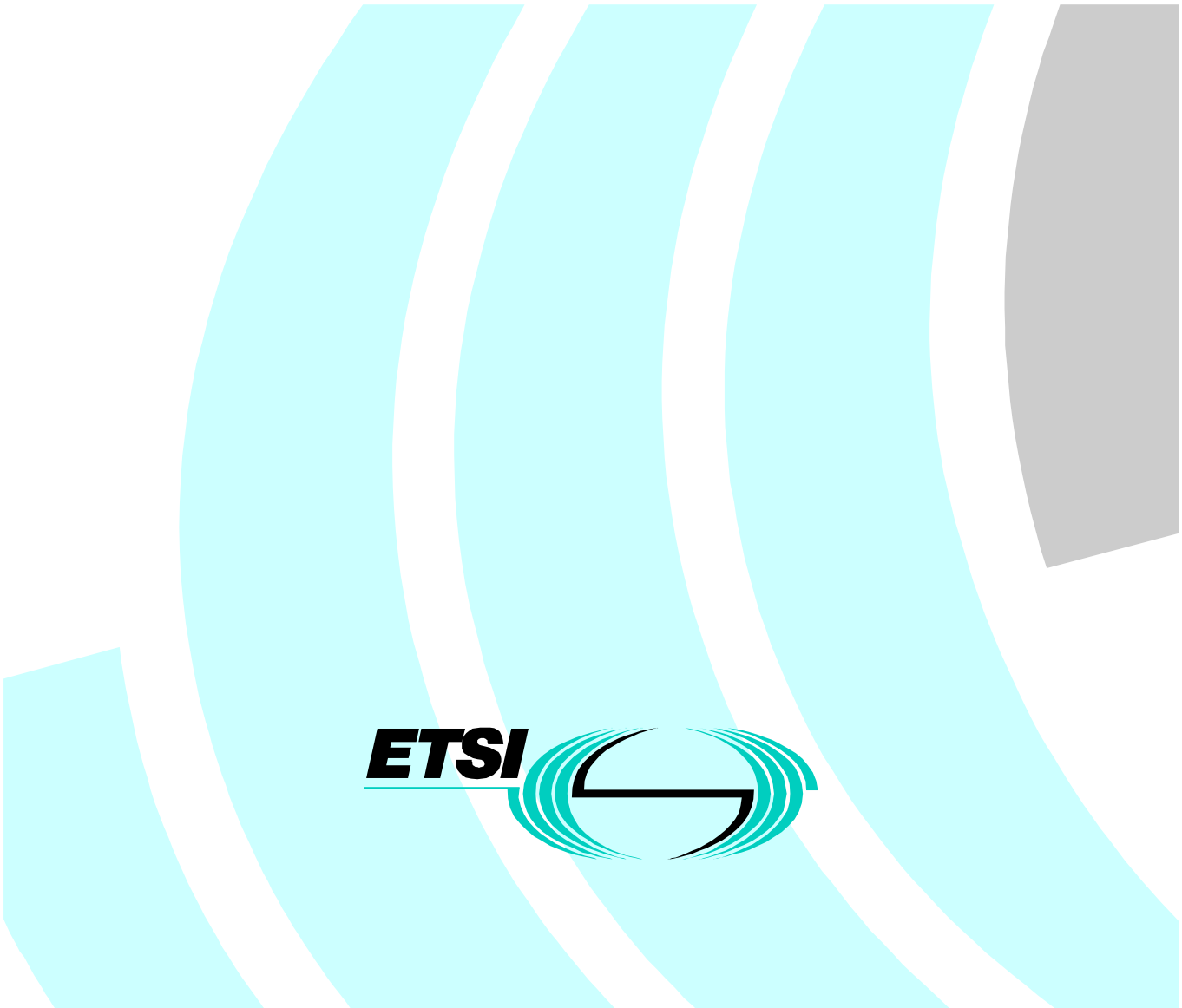
# ETSI TS 101 376-4-8 V1.1.1 (2001-03)

*Technical Specification*

**GEO-Mobile Radio Interface Specifications;**
**Part 4: Radio interface protocol specifications;**
**Sub-part 8: Mobile Radio Interface Layer 3 Specifications;**
**GMR-1 04.008**



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**IPRs:**

| Project | Company | Title | Country of Origin | Patent n° | Countries Applicable |
|---|---|---|---|---|---|
| TS 101 376 V1.1.1 | Digital Voice Systems Inc | | US | US 5,226,084 | US |
| TS 101 376 V1.1.1 | Digital Voice Systems Inc | | US | US 5,715,365 | US |
| TS 101 376 V1.1.1 | Digital Voice Systems Inc | | US | US 5,826,222 | US |
| TS 101 376 V1.1.1 | Digital Voice Systems Inc | | US | US 5,754,974 | US |
| TS 101 376 V1.1.1 | Digital Voice Systems Inc | | US | US 5,701,390 | US |

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| Project | Company | Title | Country of Origin | Patent n° | Countries Applicable |
|---|---|---|---|---|---|
| TS 101 376 V1.1.1 | Ericsson Mobile Communication | Improvements in, or in relation to, equalisers | GB | GB 2 215 567 | GB |
| TS 101 376 V1.1.1 | Ericsson Mobile Communication | Power Booster | GB | GB 2 251 768 | GB |
| TS 101 376 V1.1.1 | Ericsson Mobile Communication | Receiver Gain | GB | GB 2 233 846 | GB |
| TS 101 376 V1.1.1 | Ericsson Mobile Communication | Transmitter Power Control for Radio Telephone System | GB | GB 2 233 517 | GB |

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| Project | Company | Title | Country of Origin | Patent n° | Countries Applicable |
|---|---|---|---|---|---|
| TS 101 376 V1.1.1 | Hughes Network Systems | | US | Pending | US |

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| Project | Company | Title | Country of Origin | Patent n° | Countries Applicable |
|---|---|---|---|---|---|
| TS 101 376 V1.1.1 | Lockheed Martin Global Telecommunic. Inc | 2.4-to-3 KBPS Rate Adaptation Apparatus for Use in Narrowband Data and Facsimile Communication Systems | US | US 6,108,348 | US |
| TS 101 376 V1.1.1 | Lockheed Martin Global Telecommunic. Inc | Cellular Spacecraft TDMA Communications System with Call Interrupt Coding System for Maximizing Traffic ThroughputCellular Spacecraft TDMA Communications System with Call Interrupt Coding System for Maximizing Traffic Throughput | US | US 5,717,686 | US |
| TS 101 376 V1.1.1 | Lockheed Martin Global Telecommunic. Inc | Enhanced Access Burst for Random Access Channels in TDMA Mobile Satellite System | US | US 5,875,182 | |
| TS 101 376 V1.1.1 | Lockheed Martin Global Telecommunic. Inc | Spacecraft Cellular Communication System | US | US 5,974,314 | US |
| TS 101 376 V1.1.1 | Lockheed Martin Global Telecommunic. Inc | Spacecraft Cellular Communication System | US | US 5,974,315 | US |
| TS 101 376 V1.1.1 | Lockheed Martin Global Telecommunic. Inc | Spacecraft Cellular Communication System with Mutual Offset High-argin Forward Control Signals | US | US 6,072,985 | US |
| TS 101 376 V1.1.1 | Lockheed Martin Global Telecommunic. Inc | Spacecraft Cellular Communication System with Spot Beam Pairing for Reduced Updates | US | US 6,118,998 | US |

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# Foreword

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

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

Version 1.m.n

where:

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

The present document is part 4, sub-part 8 of a multi-part deliverable covering the GEO-Mobile Radio Interface Specifications, as identified below:

Part 1: "General specifications";

Part 2: "Service specifications";

Part 3: "Network specifications";

**Part 4: "Radio interface protocol specifications";**

Sub-part 1: "Mobile Earth Station-Gateway Station System (MES-GSS) Interface; GMR-1 04.001";

Sub-part 2: "GMR-1 Satellite Network Access Reference Configuration; GMR-1 04.002";

Sub-part 3: "Channel Structures and Access Capabilities; GMR-1 04.003";

Sub-part 4: "Layer 1 General Requirements; GMR-1 04.004";

Sub-part 5: "Data Link Layer General Aspects; GMR-1 04.005";

Sub-part 6: "Mobile earth Station-Gateway Station Interface Data Link Layer Specifications; GMR-1 04.006";

Sub-part 7: "Mobile Radio Interface Signalling Layer 3 General Aspects; GMR-1 04.007";

**Sub-part 8: "Mobile Radio Interface Layer 3 Specifications; GMR-1 04.008";**

Sub-part 9: "Performance Requirements on the Mobile Radio Interface; GMR-1 04.013";

Sub-part 10: "Rate Adaptation on the Access Terminal-Gateway Station Subsystem (MES-GSS) Interface; GMR-1 04.021";

Sub-part 11: "Radio Link Protocol (RLP) for Data Services; GMR-1 04.022";

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.

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 as follows:

GMR-n xx.zyy

where:

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

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

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

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

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

# 1 Scope

## 1.1 Scope of the technical specification

The present document describes the procedures used at the radio interface (Reference point Um, see GMR-1 04.002 [10]) for Call Control (CC), Mobility Management (MM), and Radio Resource (RR) management. 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 [11].

The structured functions and procedures of this protocol and the relationship with other layers and entities are described in general terms in GMR-1 04.007 [15].

The present document does not cover the complete specifications but only describes where it differs from GSM 04.08 [22].

In the present document, the clause numbering is based on the clause numbering in GSM 04.08 [22]. When a clause of GSM 04.08 [22] 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 GSM 04.08 [22]. 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 GSM 04.08 [22].

## 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 [13] and GMR-1 04.006 [14]. GMR-1 04.007 [15] gives a general description of L3, including procedures, message formats, and error handling.

## 1.3 Structure of layer 3 procedures

Same as clause 0.3 of GSM 04.08 [22].

## 1.4 Use of logical channels

The logical control channels are defined in GMR-1 05.002 [16]. In the following list, control channels that carry signalling information or specific types of user packet information are considered:

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

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

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

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

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

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

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

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

ix) 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;

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

xi) 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 [14]) are defined on signalling L2.

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

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

iii) 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 [13] and GMR-1 04.006 [14]), 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:

a) Clause 4 specifies elementary procedures for RR management:

- Contention resolution (before and during link establishment);
- System Information (SI) and GPS ephemeris data broadcasting;
- RR connection establishment:
  - Immediate assignment procedure;
  - Paging and Alerting procedure;
- 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;
- Radio resources connection release.

b) Clause 5 specifies elementary procedures for MM:

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

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

- Mobile-originating call establishment;
- Mobile-terminating call establishment;
- Signalling procedures during the Active state:
  - User notification procedure;
  - Call rearrangements;
  - In-call modification;
- Call clearing initiated by the mobile earth station;
- Call clearing initiated by the network;
- Miscellaneous procedures:
  - In-band tones and announcements;
  - Status enquiry procedure;
  - Call reestablishment procedure.

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.

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

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

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

[3] GMR-1 03.003 (ETSI TS 101 376-3-3): "GEO-Mobile Radio Interface Specifications; Part 3: Network specifications; Sub-part 3: Numbering, Addressing and identification; GMR-1 03.003".

[4] 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); GMR-1 03.013".

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

[6] 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); GMR-1 03.296".

[7] GMR-1 03.297 (ETSI TS 101 376-3-19): "GEO-Mobile Radio Interface Specifications; Part 3: Network specifications; Sub-part 19: Optimal Routing technical realization; GMR-1 03.297".

[8] 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; GMR-1 03.298".

[9] 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; GMR-1 03.299".

[10] 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; GMR-1 04.002".

[11] 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; GMR-1 04.003".

[12] 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; GMR-1 04.004".

[13] 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; GMR-1 04.005".

[14] 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; GMR-1 04.006".

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

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

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

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

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

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

[21] GSM 02.03 (ETSI ETS 300 502): "European digital cellular telecommunications system (Phase 2); Teleservices supported by a GSM Public Land Mobile Network (PLMN) (GSM 02.03 (V4.3.1))".

[22] GSM 04.08 (ETSI ETS 300 557): "Digital cellular telecommunications system (Phase 2); Mobile radio interface; Layer 3 specification (GSM 04.08 (V4.22.1))".

[23] GSM 04.10 (ETSI ETS 300 558): "Digital cellular telecommunications system (Phase 2); Mobile radio interface layer 3; Supplementary services specification; General aspects; (GSM 04.10 (V4.10.1))".

[24] 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; (GSM 04.11 (V4.10.0))".

[25] GPS Interface Control Document ICD-GPS-200C: "NAVSTAR GPS Space Segment/Navigation User Interfaces, Public Release Version. February 1995".

[26] GSM 03.38 (ETSI ETS 300 628): "European digital cellular telecommunications system (Phase 2); Alphabets and language-specific information (GSM 03.38 (V4.0.1))".

[27] ITU-T Recommendation E.212: "The international identification plan for mobile terminals and mobile users".

[28] GSM 05.10 (ETSI ETS 300 579): "Digital cellular telecommunications system (Phase 2); Radio subsystem synchronization (GSM 05.10 (V4.9.0))".

# 3 Definitions and abbreviations

Abbreviations used in the present document are listed in GMR-1 01.004 [1]. A number of concepts and abbreviations are borrowed from the GSM 04.08 [22]. 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) |
| TS GSM *nn.nn* (*for reference*) | GMR-1 *nn.nnn* (*if reference exists*) |

## 3.1 Random values

Same as clause 2.1 of GSM 04.08 [22].

## 3.2 Vocabulary

The following terms are used in the present document:

- Idle mode: In this mode, the MES is not allocated a dedicated channel; it listens to the Common Control Channel (CCCH), GBCH, and the BCCH; in alert mode, it listens to BACH only.

- RR connected mode: In this mode, the MES is allocated up to two dedicated channels, only one of them is a SACCH.

NOTE: The channel type SDCCH does not have an associated SACCH.

- Main DCCH: in RR connected mode, only two configurations are possible:
  - FACCH and SACCH;
  - SDCCH.

SDCCH or FACCH is called the main DCCH.

- A channel is activated if it can be used for transmission, particularly for signalling, at least with Unnumbered Information (UI) frames.

- A TCH is connected if circuit-mode user data can be transferred. A TCH cannot be connected if it is not activated. A TCH that is activated but not connected is used only for signalling (i.e., as a DCCH).

- The Data Link (DL) of SAPI = 0 on the main DCCH is called the main signalling link. However, during a single-hop TtT call, a FACCH (in MES to network direction)/TACCH (in network to MES direction) combination is used for the SAPI = 0 (main signalling link) DL. Any message specified to be sent on the main signalling link is sent in acknowledged mode except when otherwise specified.

- The DL of SAPI = 2 on the FACCH (L-L connected channel during the single-hop TtT call) is called the TtT signalling link. Any message specified to be sent on the TtT signalling link is sent in acknowledged mode except when otherwise specified.

- The term "to establish" a link is short for "to establish the multiframe mode" on that DL It is possible to send UI frames on a DL even if it is not established as soon as the corresponding channel is activated. Except when otherwise indicated, a Data Link Layer (DLL) is established without an Information field.

- The term "cell" is borrowed from the GSM context and will be considered equivalent to a set of channels from one GS in a spot beam in the GMR-1 context. A spot beam serves multiple GSs, each with its set of CCCHs, and gives access to different Public Land Mobile Networks (PLMNs) and Location Area Identifications (LAIs).

# 4 Radio resource management procedures

## 4.1 Overview/general

### 4.1.1 General

RR management procedures include the common transmission resources' functions related to management (e.g., the physical channels and the data link connections on control channels).

The general purpose of RR procedures is to establish, maintain, and release RR connections that allow a point-to-point dialogue between the network and an MES. These procedures include the spot beam selection/reselection and the handover procedures. Moreover, RR management procedures include reception of the unidirectional BCCH/FCCH (Frequency Control Channel) and CCCH when no RR connection is established. This permits automatic spot beam selection/reselection/Alert Mode Handling.

### 4.1.2 Services provided to upper layers

#### 4.1.2.1 Idle mode

On the MES side, RR procedures include those for automatic spot beam selection/reselection. The RR entity indicates the unavailability of a BCCH/CCCH to upper layers, unavailability of BACH, and the spot beam change when decided by the RR entity. Upper layers are advised of the BCCH broadcast information when a new spot beam has been selected or when a relevant part of this information changes.

#### 4.1.2.2 Establishment and release of an RR connection

Same as clause 3.1.2.2 of GSM 04.08 [22].

#### 4.1.2.3 RR connected mode

When an RR connection is established, RR procedures provide the following services:

- Establishment/release of multiframe mode on DLL connections other than SAPI = 0 on the main DCCH or on the SACCH.

NOTE 1: For a single-hop TtT call, the SMS that uses the SAPI = 3 is not supported.

NOTE 2: For the RR connection using SDCCH as the main DCCH, the SAPI = 3 connection will be supported.

- Transfer of messages on any DLL connection.
- Indication of temporary unavailability of transmission (suspension, resumption).
- Indication of loss of RR connection.
- Frequency handover to maintain the RR connection.
- Setting/change of the transmission mode on the physical channels, including change of channel type, change of coding/decoding/transcoding mode, and setting of ciphering.

### 4.1.3 Services required from data link and physical layers

The RR sublayer uses the services provided by the DLL, as defined in GMR-1 04.005 [13].

Moreover, the RR sublayer directly uses services provided by the physical layer such as BCCH searching, as defined in GMR-1 04.004 [12].

## 4.1.4 RR states

### 4.1.4.1 Network side RR states

#### 4.1.4.1.1 RR – idle

In this state, no dedicated RR connection exists between the MES and the network. The network transmits the SYSTEM INFORMATION messages on the BCCH and GPS satellite(s) ephemeris data on the GBCH. It also transmits GPS Almanac Data on the PCHs (using the unused TMSI slots in the PAGING messages).

#### 4.1.4.1.2 RR – connection pending

In this mode, RR has initiated the paging or alerting procedure and is waiting for the MES to respond and for the establishment of a dedicated signalling connection between the MES and the network.

#### 4.1.4.1.3 RR – dedicated connection

In this state, a dedicated RR connection exists between the MES and the network. The MES is allocated at least one signalling channel and a SAPI = 0 data link multiframe mode connection has been established on the main signalling channels, namely the DCCH. The acknowledged transfer of messages on the main signalling link can take place. There are two substates, as described in the clauses that follow.

##### 4.1.4.1.3.1 Nonciphered mode

Information transfer on the dedicated channel is not ciphered.

##### 4.1.4.1.3.2 Ciphered mode

Information transfer on the dedicated channel is ciphered.

### 4.1.4.2 MES side RR states

#### 4.1.4.2.1 RR – idle state

In this state, no dedicated RR connection exists between the MES and the network. The only RR connection is the unidirectional connection in the form of various broadcast channels from the network.

This state has multiple substates depending upon whether the MES can read/decode the BROADCAST messages being transmitted by the network. The three substates are described below.

##### 4.1.4.2.1.1 Idle – camped on

In this substate, the MES is camped on a suitable spot beam (i.e., the MES is synchronized with the network for the particular spot beam). The MES listens to the BCCH for SI, the CCCH for PAGING messages, and the GBCH for GPS satellite ephemeris data.

##### 4.1.4.2.1.2 Idle – no spot beam

In this substate, there is no spot beam for the MES to camp on. The MES is not receiving BCCH data nor is it receiving CCCH data to enable it to look for the paging. No service is provided by the RR layer.

##### 4.1.4.2.1.3 Idle – alert mode

In this substate, the MES is not able to camp on any spot beam to receive BCCH data. The MES is able to read the BACH of the cell in which it was last registered. It is synchronized with the FCCH of the spot beam and can receive ALERT messages transmitted over the BACH.

#### 4.1.4.2.2 RR – connection pending

In this state, the MES is waiting for the dedicated RR connection between the MES and the network to be established after sending a channel request on RACH.

#### 4.1.4.2.3 RR – dedicated connection

In this state, a dedicated RR connection exists between the MES and the network. The MES is allocated at least one signalling channel, and a SAPI = 0 data link multiframe mode connection has been established on the main signalling channels, namely the DCCH. The acknowledged transfer of messages on the main signalling link can take place. The two substates are described below.

##### 4.1.4.2.3.1 Nonciphered mode

Information transfer on the dedicated channel is not ciphered.

##### 4.1.4.2.3.2 Ciphered mode

Information transfer on the dedicated channel is ciphered.

#### 4.1.4.2.4 RR – position verification pending

In this state, the RR layer on the MES has transmitted a RACH to the network, indicating the current position and awaiting a reply from the network. Any RR establishment requests received from the MM sublayer will be delayed until a response from the network is received or the RR layer times out and goes to the idle state.

### 4.1.5 Change of dedicated channels

#### 4.1.5.1 Change of dedicated channels using SAPI = 0

If a change of dedicated channels is required using a dedicated assignment procedure, the RR sublayer will request that the DLL suspend multiple frame operation before the MES leaves the old channel. When the channel change has been completed, L3 will request that the DLL resume multiple frame operation. L2 suspend/resume procedures are described in GMR-1 04.005 [13] and GMR-1 04.006 [14].

These procedures are specified so that the loss of a L3 message cannot occur on the radio interface. However, MM and CALL MANAGEMENT (CM) messages sent from the MES to the network may be duplicated by the DLL if a message has been transmitted but not yet completely acknowledged before the MES leaves the old channel (see GMR-1 04.006 [14]).

As the RR sublayer controls the channel change, a duplication of RR messages does not occur. However, for some procedures, a duplication of MM/CM messages is possible. For all MM and CM procedures using SAPI = 0, the REQUEST messages sent by the MES contain a sequence number to allow the network to detect duplicated messages, which are then ignored by the network.

Also the sublayer (whether RR sublayer or MM/CM sublayer) associated with the L3 message is also indicated to L2 (see GMR-1 04.006 [14]) while giving it to the L2. This information is useful for sending either one or two messages over the Air Interface in a given L2 transmit window.

#### 4.1.5.2 Change of dedicated channels using SAPIs other than 0

Same as clause 3.1.4.2 of GSM 04.08 [22].

#### 4.1.5.3 Sequenced message transfer operation

MM and CM messages using SAPI = 0 sent from the MES to the network can be duplicated by the DLL in the following case:

A change of dedicated channels is required (assignment procedure) and the last L2 frame has not been acknowledged by the peer DLL before the MES leaves the old channel.

In this case, the MES does not know whether the network has received the message correctly. Therefore, the MES shall send the message again after the new dedicated channel is established (see GMR-1 04.006 [14]).

The network shall be able to detect the duplicated received message. Therefore each MM and CM message using SAPI = 0 shall be marked with a Send state sequence number.

#### 4.1.5.3.1 Variables and sequence numbers

##### 4.1.5.3.1.1 Send state variable V(SD)

Same as clause 3.1.4.3.1.1 of GSM 04.08 [22].

##### 4.1.5.3.1.2 Send sequence number N(SD)

Same as clause 3.1.4.3.1.2 of GSM 04.08 [22].

#### 4.1.5.3.2 Procedures for the initiation, transfer execution, and termination of the sequenced message transfer operation

##### 4.1.5.3.2.1 Initiation

The sequenced message transfer operation shall be initiated by establishing an RR connection. The Send state variable V(SD) shall be set to 0 before L3 asks the DL to establish the link with the DL_ESTABLISH_REQUEST primitive.

##### 4.1.5.3.2.2 Transfer execution

Same as clause 3.1.4.3.2.2 of GSM 04.08 [22].

##### 4.1.5.3.2.3 Termination

Same as clause 3.1.4.3.2.3 of GSM 04.08 [22].

## 4.1.6 Procedure for service request and contention resolution

### 4.1.6.1 Contention resolution before link establishment

The Request Reference received in the RESPONSE messages received on the AGCH might not always be unique to the MES for which the message is intended. Where the Random Reference matches for more than one MES, each of them will assume that the message is intended for itself and act accordingly. In order to avoid serious consequences, a discriminator shall be included in these messages.

The discriminator shall be calculated from the 40-bit GPS Position field sent in the CHANNEL REQUEST message using the 16-bit Cycle Redundancy Check (CRC) generator polynomial (see GMR-1 05.003 [17]) and shall be called the GPS discriminator.

Upon receipt of the message in response to the CHANNEL REQUEST message, the RR entity in the MES shall compare the GPS discriminator (if given for the request reference corresponding to the MES) received in the message with the value calculated locally from the GPS position data. If the two discriminators do not match, the MES shall ignore the message and not take any further action. If the GPS discriminator is not included in the RESPONSE message, but the request reference matches, then the MES shall accept the received response and act on it. If the GPS discriminator is included and both the discriminator and the request reference match the locally determined values, then the MES shall accept the received response and act on it.

NOTE: The RESPONSE message indicating the extended procedure is an exception.

### 4.1.6.2 Contention resolution during link establishment

Upon seizure of the assigned dedicated channel, the MES establishes the main signalling link on this channel by sending an L2 Set Asynchronous Balance Mode (SABM) frame containing an L3 SERVICE REQUEST message. The DLL will store this message to perform the contention resolution. The SERVICE REQUEST message will be returned by the network in the Unnumbered Acknowledgment (UA) frame. Because a partial L3 message may not provide unique reference for contention resolution, if the complete L3 message cannot be accommodated in a SABM frame, the MES shall use the mobile identity to perform contention resolution. The RR sublayer constructs the mobile identity as described below.

- If TMSI and LAI are available, mobile identity is formed as a 9-octet element. The first bit is "1", followed by 7 bits obtained by encoding 2 Mobile Network Code Binary-Coded Decimal (MNC BCD) digits in binary. This 1 byte is followed by 2 bytes of location area code and 4 bytes of TMS, which are followed by 10 bits obtained by encoding 3 Mobile Country Code (MCC) BCD digits in binary. This is padded with 6 spare bits to yield a total of 9 bytes.

- If the TMSI and LAI are not available, and the IMSI is known, the mobile identity is coded as a 7-byte element. The BCD digit 1 is prepended up to 15 BCD digits of IMSI. These are prepended with the required number of 0 BCD digits to make up 16 BCD digits. Each pair of digits is then binary coded in 7 bits, thereby coding the 8 pairs in 7 bytes. The first 2 bits of this element are always 00.

- If neither the TMSI and LAI or the IMSI is available, International Mobile station Equipment Identity (IMEI) is used for coding the mobile identity as a 7-byte element. The BCD digit "2" is prepended up to 15 BCD digits of IMEI. These are prepended with the required number of "0" BCD digits to make up 16 BCD digits. Each pair of digits is then binary coded in 7 bits, thereby coding the 8 pairs in 7 bytes. The first 2 bits of this element are always "00".

- To support further extensions, any other 7-byte element may be used, provided it is unique across the MESs. To distinguish this from the codings described above, the first 2 bits will be "01".

The mobile identity that is formed is passed to L2. If L2 uses the mobile identity for contention resolution, it will truncate the element, depending on the size of frame, by discarding the extra trailing bits. In the case of truncation, the contention resolution will not always be successful. The Mobile Identifier (ID) used for this purpose is referred to as the Contention Resolution parameter.

The DLL in the MES compares the content of the Information field (i.e., the L3 SERVICE REQUEST message or the mobile identity) received in the UA frame with the stored SABM contents and leaves the channel in case they do not match. This procedure resolves contentions in the case where several MESs have accessed the same random access slot, with the same random reference, and one has succeeded due to capture. A full description of this procedure is given in GMR-1 04.006 [14]. If the mobile identity was used in the SABM frame, the L3 message is then transferred to the network. See figure 4.1.

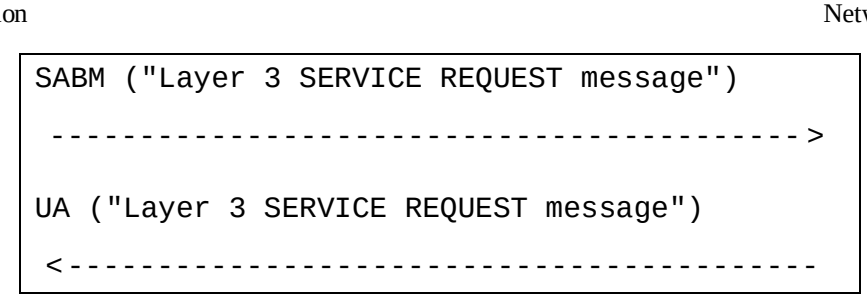


**Figure 4.1: Service request and contention resolution using layer 3 message**

The purpose of the SERVICE REQUEST message is to indicate to the network which service the MES is requesting. This indication allows the network to decide how to proceed (e.g., to authenticate or not).

The SERVICE REQUEST message shall contain the identity of the MES and may include further information, which can be sent without encryption.

The L3 SERVICE REQUEST message is typically one of the following:

- CM SERVICE REQUEST
- Location updating request
- IMSI detach
- Paging response

# 4.2 Idle mode procedures

## 4.2.1 Mobile Earth Station side

In the Idle-Camped On substate, the MES listens to the BCCH and to the paging subchannel for the paging group to which the MES belongs (cf. GMR-1 03.013 [4]) and measures the radio propagation for connection with other spot beams, as explained in GMR-1 03.022 [5].

It measures the BCCHs of other spot beams to assess the need for a spot beam change, as specified in GMR-1 03.022 [5] and GMR-1 05.008 [19]. When the decision to change spot beams is made, the MES switches to the BCCH of the new spot beam. The broadcast information is then used to verify allowance to camp on this spot beam. If allowed, the spot beam change is confirmed, and the broadcast information is treated for MM actions. Similarly, physical contexts are updated (list of neighboring spot beams, frequencies, thresholds for some actions, etc., of GMR-1 05.008 [19]).

### 4.2.1.1 System information decoding

In the idle mode, the MES should read the BCCH that it is camped on. The following rules apply for the MES:

- The MES shall read the Class 1 information being broadcast in the BCCH at least once every 30 seconds. This does not affect the requirement on the MES to read the Class 1 information just before the RACH process.
- The MES shall check the version numbers of the Class 2 and Class 3 information provided in the Class 1 information. If the version numbers do not match that which is stored internally to the MES, the MES shall reacquire Class 2 and Class 3 information.
- If the MES, on reacquiring Class 2 information, detects that Class 4 information has changed, it shall reacquire Class 4 information also.
- In the absence of any change detected via this mechanism, the MES shall reacquire Class 2 and 3 information at least once every 20 and 60 minutes respectively.
- The MES shall acquire the Class 1, 2, and 3 system information and stores the associated version numbers each time it camps on a new BCCH.
- The MES shall acquire the entire system information and store the associated version numbers each time it powers on. Version number information is not stored between power-ons.

The MES shall follow the rules for decoding system information (see clause 4.2.2.1.4).

### 4.2.1.2 GPS determination and reporting

In the idle mode, the MES shall also read the PCH information for almanac data that is transmitted in the unused slots of the paging messages by the network. The MES shall discard any partially received almanac without inserting it into its GPS receiver on the following events: BCCH change, alternation of almanac cutover bit (alternates 0/1 as version of broadcast almanac changes), any part of the partial almanac data is more than 24 hours old, and power-down.

To detect crossing of geographical boundaries not associated with spot beam change, the MES calculates its GPS position and reports to the network for verification as to whether or not the GS can service it at certain intervals at the current GPS position. The position reporting is controlled by the values of the GPS_Update_Distance Timer and the GPS_Update_Timer parameters.

Idle state position acquisition is discussed in GMR-1 03.022 [5]. The values of the GPS Update Timer and GPS Update Distance Timer parameters broadcast in SI are for the idle mode position reporting only. These values may be overridden by customized values for the MES in messages from the network. The new values of these idle mode position reporting parameters shall remain effective until they are replaced by another set of values or the MES camps on a different BCCH, when it will use the parameter values received in that BCCH. These values shall be stored in nonvolatile memory to make them persist across power cycles.

At each expiry of the GPS Update Timer T3119, the MES attempts to update its GPS position from the GPS system. However, if the GPS Update Timer parameter is set to 0, then the GPS Update Timer T3119 is not run at all. In addition, if the GPS Update Distance parameter is nonzero and the currently calculated GPS position exceeds the last reported GPS position by more than the GPS Update Distance, the MES will contact the network to report its current position. The MES will also verify that it can receive service from the GS at this position. This is the position verification procedure done by sending a CHANNEL REQUEST message with the current GPS position and the Establishment Cause as Position Verification. If the position is valid, the network shall send a response indicating that the MES can receive service at the current position. The position shall be updated only in spot beams where position is required to make an access attempt.

When the network updates the value of T3119, it is restarted with a time equal to the time left to expiry, the modulo of the new value of T3119 that is received as the update. Subsequently (or if the earlier modulo operation evaluates to zero), the new value is used for T3119. The values are retained in nonvolatile memory until the MES camps onto a new BCCH, in which case it will use the value received in that BCCH. The procedure to change from the old values to the new values received in the new BCCH is the same as that followed during the update by the network, as described previously. On power-up, if the camped BCCH is the same as the last camped BCCH stored in the nonvolatile memory of the MES, it restores these values from nonvolatile memory; otherwise, it uses the parameter values received in the new BCCH.

Additionally, position reporting may be initiated by certain user operations.

#### 4.2.1.3 Alert mode behavior

In the substate Idle-Alerting, the MES listens to the BACH of the cell to which it is synchronized. It listens to the BACH to receive an ALERT REQUEST messages. Upon receipt of the message, the MES will inform the user and wait for a change in the radio environment. The MES shall attempt to reacquire the BCCH of the spot beam in this mode. While in Idle-Alerting, the MES is camped on a BACH. If the MES is not able to camp on the BACH, it will enter Idle-No Spotbeam.

The MES will not enter into Idle-Alerting after power-up unless it is able to successfully read the system information related to BACH monitoring, and it is registered.

In the substate Idle-No Spotbeam, the MES tries to camp on a suitable spot beam, as explained in GMR-1 05.008 [19].

### 4.2.2 Network side

#### 4.2.2.1 System information broadcasting

SYSTEM INFORMATION messages that are types 1 or 2 are regularly broadcast by the network on BCCH. Each type of SI contains a predetermined set of information from one or more classes. The different classes of information are broadcast at different periodicities, depending on the nature of the information in a particular class. Based on this information, the MES is able to decide whether and how it may gain access to the system via the current cell.

The basic unit for transmission of SI is a block. A block (corresponding to a single BCCH burst) is a 192-bit buffer in which system information may be packed. Each block contains one or more segments of system information as described in clauses 4.2.2.1.2 and 4.2.2.1.3.

Each iteration of the complete transmission schedule for a particular class is henceforth referred to as a "class rotation". A class rotation may include just one block or as many as 120 BCCH bursts.

The block has an 8-bit header that contains the system information format version and other identification.

#### 4.2.2.1.1 Classes and segments

The system information has been subdivided into several classes. The subdivision is on the basis of periodicity requirements, i.e., information belonging to a particular class shall be repeated within a fixed number of blocks (specific to that particular class).

The information broadcast may be grouped as in the following.

##### 4.2.2.1.1.1 Class 1

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

##### 4.2.2.1.1.2 Class 2

This class currently contains information pertaining to spot beam acquisition and camping on procedures. 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 and initial spot beam selection. A full cycle of this information should be transmitted at least once every 16 BCCH bursts.

##### 4.2.2.1.1.4 Class 4

This class contains information for which it is permissible to use stored values while receiving current System Information values.

A maximum cycle time of 120 BCCH bursts shall be allowable for Class 4 information, including all segments that may be added in the future.

##### 4.2.2.1.1.5 Segment

Since it is not possible to transmit a given class in its entirety in a single block (because of size and transmission constraints), the classes are broken up into segments. A segment contains a fixed set of information within a class in a fixed format; it is uniquely identified (except in the case of Class 1, which has only one segment) by its segment type. Knowing the segment type, an MES can identify and decode each field inside the segment.

Each segment (except for segment 1A) has a segment header, identifying the segment type and the class to which the segment belongs. The block header identifies blocks that contain segment 1A.

#### 4.2.2.1.2 Transmission schedules

A transmission schedule is a list of blocks for transmission that contain all information segments, including the periodicity of the classes and segments. This clause describes two examples of transmission schedules.

##### 4.2.2.1.2.1 Slow transmission schedule

The first schedule is the "slow transmission schedule". This is used in normal or heavily loaded cells, which are supporting a large number of normal CCCH and AGCH/CCCH channels due to heavy traffic patterns. In this pattern up to 31 normal CCCHs and 31 AGCHs with CCCH can be supported; Class 1 information is transmitted in every alternate block. A larger number of spare bits are also available for future expansion. The information is transmitted as shown in table 4.1 and repeated thereafter.

**Table 4.1: Slow transmission schedule (note 1)**

| System Information Block | System Information Type | Contains Segments |
|---|---|---|
| 1 | 1 | 1A, 4n (note 2) |
| 2 | 2 | 2A |
| 3 | 1 | 1A, 3A |
| 4 | 2 | 3B |
| 5 | 1 | 1A, 3C |
| 6 | 2 | 2B |
| 7 | 1 | 1A, 3D |
| 8 | 2 | 3E |
| 9 | 1 | 1A, 4n (note 2) |
| 10 | 2 | 2A |
| 11 | 1 | 1A, 3F |
| 12 | 2 | 3G |
| 13 | 1 | 1A, 3H |
| 14 | 2 | 2B |
| 15 | 1 | 1A, 3I |
| 16 | 2 | 3J |

NOTE 1: The position of the segment inside a block is as shown in the respective table. The entries in the table show the order from the start of the block. There are no gaps between the end of the first segment and the start of the next segment.

NOTE 2: Class 4 information is transmitted in the first block of each transmission schedule. The schedule is as follows: 4A, 4B, 4C, 4D, 4E, 4F. In the future, the class 4 cycle may be extended by adding more blocks to the end of the class 4 cycle. Each block contains the number of blocks till the next start of the class 4 cycle.

#### 4.2.2.1.2.2 Fast transmission schedule

The alternate schedule is the "fast transmission schedule". This is used in lightly loaded spot beams. In this pattern, up to 20 normal CCCHs and up to 25 AGCH/CCCHs can be supported. The Class 1 information is transmitted once in each block, thus reducing the occurrence to once in 320 msec. The information is transmitted as shown in table 4.2.

**Table 4.2: Fast transmission schedule (note 1)**

| System Information Block | System Information Type | Contains Segments |
|---|---|---|
| 1 | 1 | 1A, 4n (note 2) |
| 2 | 1 | 1A, 2A*bis* |
| 3 | 1 | 1A, 3A |
| 4 | 1 | 1A, 3B*bis* |
| 5 | 1 | 1A, 3C |
| 6 | 1 | 1A, 2B*bis* |
| 7 | 1 | 1A, 3D |
| 8 | 1 | 1A, 3E*bis* |
| 9 | 1 | 1A, 4n (note 2) |
| 10 | 1 | 1A, 2A*bis* |
| 11 | 1 | 1A, 3F |
| 12 | 1 | 1A, 3G*bis* |
| 13 | 1 | 1A, 3H |
| 14 | 1 | 1A, 2B*bis* |
| 15 | 1 | 1A, 3I |
| 16 | 1 | 1A, 3J*bis* |

NOTE 1: The position of the segment inside a block is as shown in the respective table. The entries in the table show the order from the start of the block. There are no gaps between the end of the first segment and the start of the next segment.

NOTE 2: Class 4 information is transmitted in the first block of each transmission schedule. The schedule is as follows: 4A, 4B, 4C, 4D, 4E, 4F. In the future, the class 4 cycle may be extended by adding more blocks to the end of the class 4 cycle. Each block contains the number of blocks till the next start of the class 4 cycle.

#### 4.2.2.1.3 Change information

Segment 1A contains the current version number for the Class 2 and Class 3 information cycles, as 3-bit and 4-bit numbers, respectively. The GS changes the corresponding version number when the Class 2 or Class 3 information is modified.

The change information for Class 4 information is carried as a 4-bit string in Segment 2A or 2A*bis*, depending on the transmission format being used. The GS changes the version number when Class 4 information is changed.

It should be noted that a change in Class 4 information causes a change in the corresponding version number for Segment 2A. The updated version number is a change in Class 2 information that shall be reflected in the Class 2 version number present in Segment 1A.

If a block contains both a segment of a class and a version number of that class, the version number shall apply to that segment.

The GS shall not mix the normal and the *bis* segments within a particular value of the class version number.

#### 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 "0000" 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 MES's 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 MES's 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

Both the CCCH and the BCCH ARFCN carrier lists are differentially encoded so as to reduce the total number of bits needed for their representation. These bits are then divided into multiple partitions, each of fixed size and included in different segments. The encoding scheme is given below. See GMR-1 05.005 [18] for a description of ARFCN.

No header or trailer bits should be added to any of the partitions, but the serial number of the partitions, like first, second, and so on, should be maintained, while including them in different segments.

The list to be encoded is first sorted in an ascending order. Every item is encoded as a difference number from the previous item (for the first item the previous item is assumed to be 0) with appropriate prefix. Table 4.3 gives the difference type prefix and the difference numbers for various ranges of differences.

<Carrier list> ::=

{<difference type prefix><difference number>}

<Carrier list>

**Table 4.3: Encoding of difference values**

| Difference Range | Difference Type Prefix | Difference Number | Encoded Value |
|---|---|---|---|
| 1 – 16 | 00 | 0 – 15 | <00><bitstring(4)> |
| 17 – 48 | 01 | 0 – 31 | <01><bitstring(5)> |
| 49 – 112 | 10 | 0 – 63 | <10><bitstring(6)> |
| 113 – 240 | 110 | 0 – 127 | <110><bitstring(7)> |
| 241 – 1 087 | 111 | 0 – 846 | <111><bitstring(10)> |

The MES shall concatenate all the partitions of the list received in different segments in correct order and extract the carrier specifications. No carrier specification shall have value greater than 1,087. The MES shall stop processing the list if a carrier specification greater than 1,087 is decoded. The MES shall stop processing the list when the total number of entries, as given in the corresponding SI parameter, has been extracted. The GS should fill any subsequent bits beyond the end of the list with 0s. The MES shall ignore any subsequent bits beyond the end of the list.

#### 4.2.2.1.4.2 Concurrent BCCH list

The list of the concurrent BCCH information is encoded so as to reduce the total number of bits needed for their representation. These bits are then divided into two partitions each of fixed size and included in different segments. The encoding scheme is given below:

<concurrent BCCH information list> ::= <concurrent BCCH information>$^{\text{Number of BCCH}}$

<concurrent BCCH information> ::=
<header:bit string(3)>
<ARFCN: bit string(11)>
<Satellite Id: bit string(2)> - presence is indicated in the header
<MCC: bit string(10)> - presence is indicated in the header
<MNC: bit string(7)> - presence is indicated in the header
<header: bit string(3)> - three bits b3 b2 b1 to indicate
- b1 0 : Satellite id of BCCH same as previous element
- b1 1 : Satellite id of BCCH differs from previous element
- b2 0 : MCC same as the previous element in the list
- b2 1 : MCC differs from the previous element
- b3 0 : MNC same as the previous element in the list
- b3 1 : MNC differs from the previous element
<Satellite Id: bit string(2)> - This is omitted if the Satellite Id of the BCCH carrier
- unchanged from the previous element.
<ARFCN: bit string(11)> - ARFCN value corresponding to the BCCH carrier
<MCC: bit string(10)> - valid range 0 - 999. This is omitted if MCC is unchanged
- from previous element in the list.
<MNC: bit string(7)> - valid range 0 - 99. This is omitted if MNC is unchanged
- from previous element in the list.

NOTE: The current BCCH serves as a previous element for encoding the first element of the list.

The MES shall concatenate all the partitions of the list received in different segments in correct order and extract the carrier specifications. The MES shall stop processing the list when the total number of entries, as given in the corresponding SI parameter, has been extracted. The GS should fill any subsequent bits beyond the end of the list with "0"s. The MES shall ignore any subsequent bits beyond the end of the list.

#### 4.2.2.1.5 Future extensions

In the future, information may be added to the SI in a backward-compatible way as follows:

- New fields may be inserted into existing spare bits in the existing segments.
- There are some segments that contain variable length lists, i.e., Segments 3C, 3D, etc. In case the maximum length of the list is not utilized, the spare bits left may be reused for spare fields by the GS in future versions. Older MESs ignore these spare bits.
- New segments may be created. The transmission schedule may be modified to include the new segment.
- The protocol version in the block header shall be incremented.
- The MES shall ignore unknown fields or segments.

### 4.2.2.2 GPS satellite ephemeris data broadcasting

Ephemeris data of up to 12 GPS satellites probably visible to MESs in the spot beam are continuously transmitted by the network on the GBCH. This data allows a mobile to quickly calculate its position in terms of latitude and longitude based upon the signals received from the GPS satellites. Other supporting information such as current time and satellite Doppler estimates are also transmitted.

GBCH INFORMATION Messages are transmitted in the GBCH.

The GBCH INFORMATION Messages shall be broadcast in a GBCH information cycle that consists of up to 32 GBCH messages. A GBCH information cycle shall be completed in a maximum of 64 frames.

Each message contains a message header containing the message number. The messages shall be broadcast in sequence. Up to 12 satellites may be identified via the VISIBILITY_LIST. Nominally, two other messages exist in the GBCH information cycle for each of the 12 entries of the VISIBILITY_LIST. Satellites may be repeated in the VISIBILITY_LIST if there are less than 12 visible GPS satellites. Alternatively, if there are less then 12 satellites, satellite Ids of "0" may be put into the VISIBILITY_LIST. If done, the GBCH information cycle is not required to contain the GBCH Messages with Type 8 and Type 9 data for the satellites with Ids set to "0". If the GBCH information cycle contains messages for satellites, for which the VISIBILITY_LIST contained a satellite ID of "0", then the contents of those messages shall be discarded.

The full GBCH information cycle is shown in figure 3.4.

**Table 4.4: GBCH information schedule**

| GBCH Message Number | GBCH Information Type |
|---|---|
| 0 | Type 1 |
| 1 | Type 2 |
| 2 | Type 4 |
| 3 | Type 5 |
| 4 | Type 8 – Sat 1 |
| 5 | Type 9 – Sat 1 |
| 6 | Type 8 – Sat 2 |
| 7 | Type 9 – Sat 2 |
| 8 | Type 8 – Sat 3 |
| 9 | Type 9 – Sat 3 |
| 10 | Type 8 – Sat 4 |
| 11 | Type 9 – Sat 4 |
| 12 | Type 8 – Sat 5 |
| 13 | Type 9 – Sat 5 |
| 14 | Type 8 – Sat 6 |
| 15 | Type 8 – Sat 6 |
| 16 | Type 1 |
| 17 | Type 3 |
| 18 | Type 6 |
| 19 | Type 7 |
| 20 | Type 8 – Sat 7 |
| 21 | Type 9 – Sat 7 |
| 22 | Type 8 – Sat 8 |
| 23 | Type 9 – Sat 8 |
| 24 | Type 8 – Sat 9 |
| 25 | Type 9 – Sat 9 |
| 26 | Type 8 – Sat 10 |
| 27 | Type 9 – Sat 10 |
| 28 | Type 8 – Sat 11 |
| 29 | Type 9 – Sat 11 |
| 30 | Type 8 – Sat 12 |
| 31 | Type 9 – Sat 12 |

Each GBCH information cycle has a GBCH sequence number associated with it. All messages within a GBCH information cycle shall have the same sequence number and shall be consistent with one another. All messages with the same message number and sequence number shall be constant, with the exception of doppler. Any change of information content, with the exception of doppler, shall require a change of sequence number. Doppler information may change without a change of sequence number. Following a change of sequence number, the old sequence number shall not be reused for at least two minutes.

#### 4.2.2.3 GPS almanac data transmission

The network will broadcast the GPS Almanac Data via the unused TMSI slots in the PAGING REQUEST 2 and PAGING REQUEST 3 messages. This data shall be slowly broadcast information that is transmitted continuously. The data shall be independently transmitted for each paging subchannel. The Almanac Present flag in the system information indicates whether the almanac data is present on the PCH channel. During paging reorganization, the MES shall resynchronize with the new paging subchannel to obtain this almanac data.

The rate of transmission depends on the paging load of the particular subchannel. Transmission of the GPS Almanac Data will not be affected by paging reorganization. Under conditions of very light paging traffic, the network shall maintain a minimum paging transmission rate, such that, on an average, in each second at least one page shall be transmitted, with one slot being used for GPS Almanac Data transmission.

The cutover bit in the GPS Almanac Data Information Elements (Ies) is used by the MESs to determine whether new GPS Almanac Data is being transmitted. From the network, each cycle of the data uses the value "0" or "1" in this bit alternately. The MES monitors this bit. A change in this bit's value indicates that a new cycle has started.

# 4.3 RR connection establishment

## 4.3.1 RR connection establishment initiated by the Mobile Earth Station: immediate assignment procedure

The purpose of the immediate assignment procedure is to establish an RR connection between the MES and the network.

The immediate assignment procedure can only be initiated by the RR entity of the MES. Initiation is triggered by request from the MM sublayer to establish an RR connection or by the RR entity in response to a PAGING REQUEST/ALERT REQUEST message. It may also be triggered by the RR layer to verify its position to the network. The request by the MM sublayer or the RR entity to establish an RR connection for an MES-initiated call or to answer a PAGING/ALERT message request contains an establishment cause and the initial L3 message to be sent to the network with the SABM. In case the RR layer wishes to verify its position with the network, there is no L3 message to be transmitted because the query is contained in the RACH request itself. Upon such a request, the RR entity of the MES side does the following:

- if a suitable cell is available for access to the network, it checks whether access to network is allowed;
- if no suitable cell is available, then upon receiving the ALERT REQUEST message, the MES starts a timer, T3112 and waits for the environment to change so that the suitable cell is available for access. A suitable cell in this case refers to the LAI in which the ALERT REQUEST message was received;
- if timer T3112 times out without the suitable cell being available, or the immediate assignment procedure was initiated other than in response to ALERT REQUEST message and no suitable cell is available, the RR entity rejects the request with the cause as "no cell available";
- if a suitable cell is available and access to the network is allowed, the RR entity of the MES initiates the immediate assignment procedure as defined; otherwise, it rejects the request.

The request from the MM sublayer to establish an RR connection specifies an establishment cause. Similarly, the request from the RR entity to establish an RR connection in response to a PAGING REQUEST 1, 2, or 3 message or ALERT REQUEST message specifies one of the establishment causes, "answer to paging" or "answer to alerting". If the request is due to the reporting of the current position for verification, the establishment cause is set to "position verification".

### 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 GMR-1 05.008 [19], GMR-1 03.022 [5]). 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).

### 4.3.1.2 Permission to access the network

Same as clause 3.3.1.1 of GSM 04.08 [22].

#### 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.

If the MES 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 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).

The RR entity shall indicate the terminal priority in the CHANNEL REQUEST message. For certain types of terminals, this value is stored in the nonvolatile 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 will resend a CHANNEL REQUEST message for Call Establishment as part of the optimal routing procedures described in GMR-1 03.297 [7]. 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 shall not resend a CHANNEL REQUEST message more than once in a single-satellite optimal routing case. The MES 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 sublayer.

However, 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.

### 4.3.1.4 Answer from the network

#### 4.3.1.4.1 On receipt of a CHANNEL REQUEST message

When the network receives a CHANNEL REQUEST message for a MES-initiated call or in response to a PAGING/ALERT REQUEST message, the network may allocate a dedicated channel to the MES by sending an IMMEDIATE ASSIGNMENT message in any AGCH slot of any frame of the downlink CCCH corresponding to the RACH in which the CHANNEL REQUEST message was received. The network shall not send an IMMEDIATE ASSIGNMENT message in response to a CHANNEL REQUEST message whose establishment cause is "position verification", except to perform the extended immediate assignment procedure to obtain the complete position information. Sometimes the network might not receive the complete CHANNEL REQUEST message and needs to initiate the extended immediate assignment procedure to obtain complete information in which case the GPS discriminator shall not be present. The type of channel allocated (SDCCH or TCH3; the channel mode will be set to signalling only) is a network decision. Timer T3101 is then started on the network side. In spot beams where position reporting is required, the network shall make access decisions on the basis of position information in the CHANNEL REQUEST message. Additionally, optimal routing decisions may be made in the case of mobile-originated (MO) calls.

The IMMEDIATE ASSIGNMENT message contains the following:

- a description of the assigned channel, including a description of radio frequencies and the TDMA slots;
- information about whether the MES should perform a location update before proceeding with the MO call. (During MO calls, the MES may be asked to register in some other GS for optimal routing case). Alternatively, the network may ask the MES to initiate the extended immediate assignment procedure;
- the request reference corresponding to the CHANNEL REQUEST received on the RACH. The request reference contains the random reference sent in the CHANNEL REQUEST message. Additionally, the request reference contains the frame number in which the CHANNEL REQUEST message was received on the RACH and the establishment cause (both encoded appropriately);
- timing and frequency correction to be applied before accessing the assigned dedicated resource;
- power to be used while accessing the assigned dedicated resource;
- the GPS discriminator calculated from the GPS Position field in the CHANNEL REQUEST message received on the RACH.

The network may hold the allocation of the dedicated channel for some time. To avoid the MES timing out on the CHANNEL REQUEST message the network may send the IMMEDIATE ASSIGNMENT message in any AGCH slot of any frame of the downlink CCCH corresponding to the RACH on which the CHANNEL REQUEST message was sent, with a Pause timer indication. The IMMEDIATE ASSIGNMENT message in this case contains:

- the request reference corresponding to the CHANNEL REQUEST message received on the RACH;
- the GPS discriminator for one of the MESs;
- pause timer indication.

The IMMEDIATE ASSIGNMENT message can carry the information for multiple MESs, which requires that the IMMEDIATE ASSIGNMENT message contain request references for multiple (up to four) MESs. In this case, one channel description can be provided in the message for one of the MESs. For the rest of the MESs, only the Pause timer can be indicated. The Pause timer indication is not handled if the establishment cause was "position verification". The MES, on receiving this indication in response to position verification, should ignore the message and no action is taken (timer T3126 is not stopped).

#### 4.3.1.4.2 IMMEDIATE ASSIGNMENT from network

Upon receipt of an IMMEDIATE ASSIGNMENT message corresponding to its last sent CHANNEL REQUEST message, the MES shall stop the T3126 timer (if running). The MES shall ensure that the IMMEDIATE ASSIGNMENT message corresponds to the CHANNEL REQUEST sent by matching the Request Reference and the GPS discriminator, if present for that MES (see clause 4.1.6.1). However, if the last CHANNEL REQUEST message has an establishment cause, "position verification", and the IMMEDIATE ASSIGNMENT message does not indicate an extended immediate assignment procedure, the MES shall ignore the IMMEDIATE ASSIGNMENT message and continue the immediate assignment procedure as if no message had been received by the MES. In this case timer T3126 shall not be stopped.

The IMMEDIATE ASSIGNMENT message received in response to the CHANNEL REQUEST may contain the values of GPS Update Timer and GPS Update Distance parameters. The values in the Idle Mode Position Update Information IE shall replace the idle mode position reporting parameters. The values in the Dedicated Mode Position Update Information IE shall be used for the dedicated mode position reporting by a Vehicular Terminal (VT). These dedicated mode position reporting parameters shall remain effective until the call is over or newer values are received during the call (see clause 4.4.1.3). If the Dedicated Mode Position Update Information is not present in the IMMEDIATE ASSIGNMENT message, the MES shall not report its position during the call even if it is a VT.

Depending on whether a dedicated resource was allocated and on whether an LU or extended procedure is needed, as indicated by the network in the IMMEDIATE ASSIGNMENT message, the MES initiates one of the following procedures (see clause 4.3.1.4.2).

##### 4.3.1.4.2.1 IMMEDIATE ASSIGNMENT with dedicated resource allocated and location update needed

Where the network has allocated a dedicated resource and has indicated a need for location update, the RR entity of the MES switches to the assigned dedicated channel, sets the channel mode to signalling only, and activates the assigned channel. It then sends the DL_EST_REQ to L2 for the establishment of the main signalling link over the assigned channel, with the parameter as the Information field of the SABM. The MES L2 shall then establish the main signalling link with an SABM containing the Contention Resolution parameter (see clause 4.1.6). The RR entity shall discard the service request message from the MM and inform the MM entity that a location update is required. The MM shall next issue a LOCATION UPDATING REQUEST message and later shall issue a CM SERVICE REQUEST message (see clauses 5.5.1.1 and 5.5.1.8).

The LU required indication is only valid for the RR session in progress. If the RR establishment is not successful, this indication is forgotten. This indication is also forgotten after termination of the current session.

Note that if the LU described above has been completed, then upon returning to idle mode, the MES is generally not registered in the LA upon which it is camped. It shall treat this condition as if it has entered a new LA. See GMR-1 03.022 [5]. If prior to re-registering, the signal quality drops to a level where the MES cannot reregister, the MES should treat the condition as if it is not registered. See GMR-1 03.022 [5] and GMR-1 03.297 [7].

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

In a case in which the network has allocated a dedicated resource and has not indicated any need for LU, the RR entity of the MES switches to the assigned dedicated channel, sets the channel mode to signalling only, and activates the assigned channels. It then sends the DL_EST_REQ to L2 for the establishment of the main signalling link over the assigned channel, with the initial L3 message as the Information field of SABM. It also sends the Contention Resolution parameter, which can be used for contention resolution if the initial L3 message does not fit into an SABM frame. The MES's L2 then either establishes the main signalling link with an SABM containing an initial L3 message or establishes the main signalling link with an SABM containing the Contention Resolution parameter. L2 transfers the L3 message to the network (see clause 4.1.6).

#### 4.3.1.4.2.3 IMMEDIATE ASSIGNMENT with dedicated resource allocated and extended procedure needed

In a case in which the network has allocated a dedicated resource and has indicated a need for extended procedure, the RR entity of the MES switches to the assigned dedicated channel, sets the channel mode to signalling only, and activates the assigned channels. It then invokes the DL_EST_REQ primitive of L2 for the establishment of the main signalling link over the assigned channel, with the Contention Resolution parameter. L2 of the MES shall establish the main signalling link with an SABM containing the Contention Resolution parameter. Upon being informed of link establishment, the RR entity transfers the EXTENDED CHANNEL REQUEST message to the network (see clause 4.3.1.4.4).

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

If the network has not allocated a dedicated resource and has instead indicated a pause, the RR entity of the MES starts timer T3115. The timeout value of timer T3115 is according to the PAUSE TIME broadcast in the BCCH.

While timer T3115 is running, the RR entity of the MES continuously monitors the downlink CCCH for messages on the AGCH (in the same way as after sending the CHANNEL REQUEST message on the RACH). On receipt of an IMMEDIATE ASSIGNMENT message corresponding to the last CHANNEL REQUEST message sent, the RR entity at the MES stops timer T3115. It then processes the IMMEDIATE ASSIGNMENT message (see clause 4.3.1.4.2).

Upon receipt of an IMMEDIATE ASSIGNMENT REJECT message corresponding to the last CHANNEL REQUEST message sent, the RR entity at the MES stops timer T3115. It then processes the IMMEDIATE ASSIGNMENT REJECT message (see clause 4.3.1.4.3).

At the expiry of T3115, the immediate assignment procedure is aborted; if the immediate assignment procedure was triggered by a request from the MM sublayer, a random access failure is indicated to the MM sublayer.

### 4.3.1.4.3 Assignment rejection (IMMEDIATE ASSIGNMENT REJECT from network)

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.

Upon receipt of an IMMEDIATE ASSIGNMENT REJECT message corresponding to its last CHANNEL REQUEST message the MES shall stop timer T3126, if running. Subsequent handling varies for different reject causes as given in the following clause.

#### 4.3.1.4.3.1 Lack of resources

If the reject cause is "lack of resources" at the network, 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.

#### 4.3.1.4.3.2 Invalid position for selected LAI

This reject cause is issued when the MES cannot get service from the current LAI but might get service from a different LAI in the same spot beam. The RR sublayer shall abort the immediate assignment procedure. Subsequently, the procedure for choosing a new LAI/PLMN shall be invoked as described in GMR-1 03.022 [5].

#### 4.3.1.4.3.3 Invalid position for selected spot beam

This reject cause is issued when the MES cannot get service in the current spot beam from this system. The MES shall mark the spot beam, along with the associated LAI, as unavailable by position (see GMR-1 03.022 [5] for details).

The IMMEDIATE ASSIGNMENT REJECT message shall contain the new BCCH carrier specification if the reject cause is "invalid position for selected spot beam".

The RI (Reselection Indication) bit shall indicate whether to access the spot beam associated with the given BCCH carrier or to initiate the spot beam reselection using the given BCCH.

The MES shall not add the rejected LAIs to the list of "forbidden location areas". For further details on reinclusion of the rejected LAI into the list of available LAIs, refer to GMR-1 03.022 [5].

If the new BCCH carrier points to a different satellite than the one that the MES is currently using, the MES shall mark all spot beams associated with the current satellite as "unavailable by position".

Upon getting this REJECT message, RR shall reject the pending service request. After switching to the new BCCH (as indicated above), the procedure for to select a new LAI/PLMN shall be invoked as described in GMR-1 03.022 [5].

#### 4.3.1.4.3.4 Invalid position

This reject cause indicates that the MES is in a region where the GMR-1 system does not provide nonemergency service. Upon receiving this reject cause, the MES shall mark all LAIs and PLMNs from this system as unavailable by position and may continue to remain camped on the same spot beam or may continue to search for another GMR-1 system as described in GMR-1 03.022 [5].

#### 4.3.1.4.3.5 Invalid position for service provider

This reject cause is returned by the network to indicate to the MES that it is in a region where the GMR-1 system does not provide nonemergency service to the MES based on its SP/HPLMN. Upon receiving this reject cause, the MES shall mark all LAIs and PLMNs from this system as unavailable by position. The MES may remain camped on the same spot beam or may continue to search for another GMR-1 system as described in GMR-1 03.022 [5].

#### 4.3.1.4.3.6 Position too old

This reject cause may be returned by the network when the MES is operating in a spot beam in which position reporting is required and the MES has sent a CHANNEL REQUEST message to the network with a position that is not current.

Upon getting this reject cause, the RR rejects the pending service request. Subsequently the MES should continue to try to obtain a new position until it is successful or until the MES goes into spot beam reselection.

#### 4.3.1.4.3.7 Redirect to new satellite

Upon receipt of this reject cause from the network, the MES shall switch over to a new satellite for optimal routing.

This reject cause shall be accompanied by a BCCH specification for the satellite to which the MES is required to switch. The MES uses the BCCH specification to tune to the new BCCH and acquire a new LAI. The MES shall resend the pending CHANNEL REQUEST message to the new GS.

The IMMEDIATE ASSIGNMENT REJECT message from the old GS shall contain the Mobile Switching Center Identifier (MSC ID) of the optimal GS instead of the dialled number. The MES shall transmit this MSC ID in the CHANNEL REQUEST message to the new GS. The MES shall also indicate to the new GS in the CHANNEL REQUEST message that it has been redirected to a new GS.

Upon accessing the new GS, if the response is an IMMEDIATE ASSIGNMENT message, the MES L2 shall establish the main signalling link with an SABM containing the Contention Resolution parameter (see clause 4.1.6). The RR entity shall wait for establishment of the main signalling link and then discard the request message from MM. RR shall then inform the MM entity that a location update is required. MM will next issue a LOCATION UPDATING REQUEST message and later will issue a CM SERVICE REQUEST message (see clauses 5.5.1.1 and 5.5.1.8).

If the response is an IMMEDIATE ASSIGNMENT REJECT message or if there is no response, the MES shall return on the original BCCH to which it was camped. The MES shall resume the pending connection request to the old GS by resending the CHANNEL REQUEST message. The MES shall indicate to the old GS that it is returning after being redirected unsuccessfully to a new satellite. This reject reason can be in response only to a CHANNEL REQUEST message to service a call request.

#### 4.3.1.4.3.8 Additional data in REJECT message

The following additional data may be in the REJECT message.

The Wait Indication IE (i.e., T3122) relates to the cell from which it was received. While this timer is running, no nonemergency call attempt shall be allowed to go through by the MES.

After the T3122 expiry, no CHANNEL REQUEST message shall be sent as a response to a page until a fresh PAGING REQUEST message for the MES is received.

The Wait Indication IE (i.e., T3122) relates to the cell from which it was received. This field is only valid if the reject cause is "lack of resources". For any other cause in the IMMEDIATE ASSIGNMENT REJECT message, the MES shall ignore the contents of this field. The network shall set the contents of this field to 0 if the reject cause is not "lack of resources".

### 4.3.1.4.4 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. 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.

#### 4.3.1.4.4.1 EXTENDED IMMEDIATE ASSIGNMENT from network

Upon receipt of the EXTENDED CHANNEL REQUEST message, T3101 is stopped. The network may then allocate a new dedicated channel and send an EXTENDED IMMEDIATE ASSIGNMENT message on the main signalling link to the MES. Alternately, the network may choose to indicate to the MES that it can continue to use the same channel and proceed with the L3 call setup protocol directly. The EXTENDED IMMEDIATE ASSIGNMENT message has information similar to the IMMEDIATE ASSIGNMENT message for the MES identified by request reference 1. Thus it may have parameters such as description of the assigned channel (if a new one has been allocated), information regarding location update, timing, and frequency correction, power to be used, and GPS Update Timer parameter and GPS Update Distance Timer parameter. Information as to whether the MES shall change to a new channel or whether it may continue to use the same channel is included in the MES Information 2 Flag. The network starts timer T3101 again on sending the EXTENDED IMMEDIATE ASSIGNMENT message to the MES.

If the L bit is set in the MES Information 2 Flag, the MES shall discard the service request message from MM and inform the MM entity that a location update is required. MM will next issue a LOCATION UPDATING REQUEST message and later will issue a CM SERVICE REQUEST message (see clauses 5.5.1.1 and 5.5.1.8).

The EXTENDED IMMEDIATE ASSIGNMENT message may contain the GPS Update Timer and GPS Update Distance values. The values in the Idle Mode Position Update Information IE shall replace the idle mode Position Reporting parameters. The values in the Dedicated Mode Position Update Information IE shall be used for the dedicated mode position reporting by the VT. These dedicated mode position reporting parameters shall remain effective until the call is over or newer values are received during the call (see clause 4.4.1.3). If the Dedicated Mode Position Update Information is not present in the EXTENDED IMMEDIATE ASSIGNMENT message, the MES shall not report its position during a call, even if it is a VT.

The network shall not send EXTENDED IMMEDIATE ASSIGNMENT message if the establishment cause was "position verification". The MES, upon receiving this message (in case it has sent a CHANNEL REQUEST message with establishment cause as "position verification"), shall discard this message and abort the RR connection (see clause 4.3.1.4.2.1). When the MES receives an EXTENDED IMMEDIATE ASSIGNMENT message, handling of this information and MES behavior are similar to the case of the IMMEDIATE ASSIGNMENT message (see clauses 4.3.1.4.2.1 and 4.3.1.4.2.2), except that T3127 is stopped. Also, if the EXTENDED IMMEDIATE ASSIGNMENT message requires the MES to change over to a new channel, a local-end release is performed on the old link allocated in the IMMEDIATE ASSIGNMENT message before establishing an L2 link on the new channel. Further, contention resolution is not required while establishing the new link. The initial L3 message can then be transferred over the new signalling link established. If the MES does not have to change the channel, it can proceed with the initial L3 message directly. The handling related to the Pause timer is not applicable in the EXTENDED IMMEDIATE ASSIGNMENT message case.

Upon receiving the initial L3 message from the MES, the network stops timer T3101, and processes the message in a manner similar to processing on receipt of the initial L3 message immediately after the IMMEDIATE ASSIGNMENT message (see clause 4.3.1.5). Additionally, a local-end release is performed on the old signalling link (if a new channel was allocated during the EXTENDED IMMEDIATE ASSIGNMENT message).

The success case scenario is illustrated in figure 4.2.

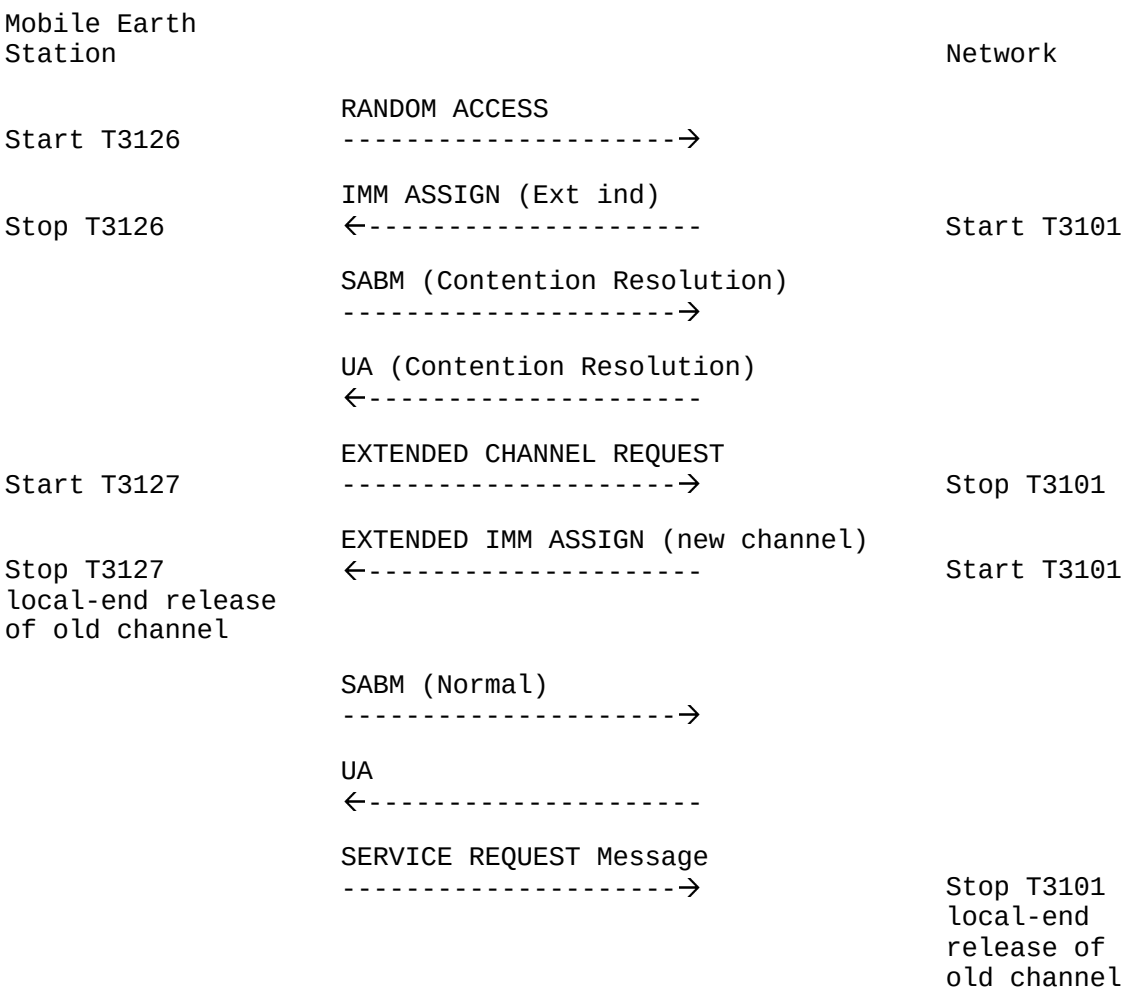


**Figure 4.2: Extended immediate assignment procedure**

4.3.1.4.4.2 EXTENDED IMMEDIATE ASSIGNMENT REJECT from network

If no channel is available for assignment, or a dedicated channel shall not be provided, the network should send the MES an EXTENDED IMMEDIATE ASSIGNMENT REJECT message with information similar to the IMMEDIATE ASSIGNMENT REJECT message. The network starts timer T3109 to guard against MES-initiated release of the current channel.

Upon receipt of the EXTENDED IMMEDIATE ASSIGNMENT REJECT message, the MES stops timer T3127, and the rest is handled as described in clause 4.3.1.4.3. Prior to processing the REJECT message, the MES starts timer T3110 and disconnects the old signalling link using normal release procedure. When T3110 times out, or when the disconnection is confirmed, the mobile earth station deactivates all the channels, considers the RR connection as released, and returns to idle mode. It then starts timer T3122 if required (under similar conditions as in an IMMEDIATE ASSIGNMENT REJECT message). If the reject cause is "redirect to new satellite", the MES shall release the old link (local end release) and resend the CHANNEL REQUEST message as described in clause 4.3.1.3.

The EXTENDED IMMEDIATE ASSIGNMENT REJECT message may contain the GPS Update Timer and GPS Update Distance Timer values. The values, if available, replace the corresponding idle mode Position Reporting parameters. Optionally, the message may contain the Position Display information. The MES should store the country/region information (given in the Position Display IE) and display it to the user. If the country/region information is not given, the MES may choose to display a generic string.

On the network side, when the main signalling link is disconnected, the network stops timer T3109 and starts timer T3111. When timer T3111 times out, the network deactivates the channels; they are then free to be allocated to another connection.

If timer T3109 times out, the network deactivates the channels; they are then free to be allocated to another connection.

#### 4.3.1.4.4.3 Abnormal cases (during extended immediate assignment procedure)

At the expiry of T3127, the MES starts timer T3110 and disconnects the old signalling link using normal release procedure. When T3110 times out, or when the disconnection is confirmed, the mobile earth station deactivates all the channels, disconnects the main signalling link using normal release procedure, and aborts the immediate assignment procedure.

In case the network has indicated a new channel, if the network detects a connection release on the old signalling link before it gets the initial L3 message on the new link, it releases the old as well as the new resources and the call is cleared. However, lower layer failures on the old channel after sending the EXTENDED IMMEDIATE ASSIGNMENT message are ignored.

When the network has asked the MES to continue to use the same channel and lower layer failure is detected before the first L3 message, the resource will be released by the network and the call will be cleared, as in the case of radio link failure.

If timer T3101 expires on the network side before receiving the initial L3 message, in addition to the processing, the old link is also locally released.

The success case scenario is illustrated in figure 4.3.

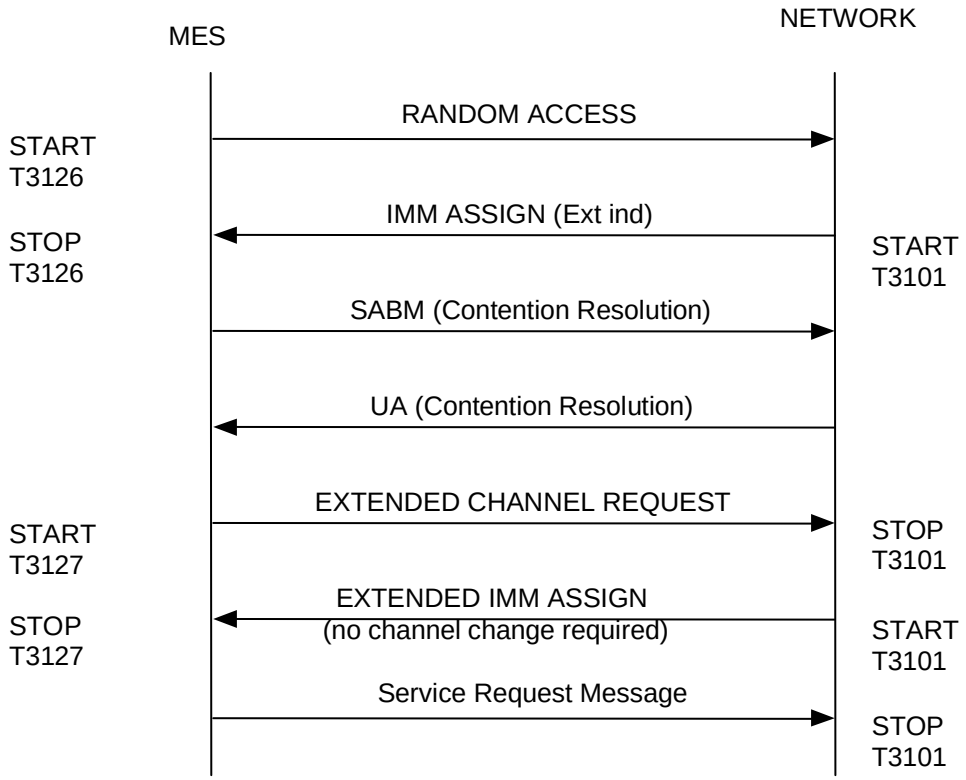


**Figure 4.3: Extended immediate assignment procedure, continued on the old channel**

#### 4.3.1.4.5 Position verification procedure

Upon receipt of the CHANNEL REQUEST message, if the establishment cause is "position verification", the network checks the reported position. If it is an acceptable position (i.e., the network can service the MES at the reported position), the network sends a POSITION VERIFICATION NOTIFY message in any AGCH slot of any frame of the downlink CCCH corresponding to the RACH in which the CHANNEL REQUEST message was received. After sending the POSITION VERIFICATION NOTIFY message, the network forgets the request. Under certain conditions (the country/region display service is unavailable or congestion on AGCH), the network may respond with an IMMEDIATE ASSIGNMENT REJECT TYPE 1 message with the cause being "reported position acceptable" instead of POSITION VERIFICATION NOTIFY message.

If the position is not deemed acceptable by the network, the network responds with IMMEDIATE ASSIGNMENT REJECT message with the appropriate reject cause.

The POSITION VERIFICATION NOTIFY message contains the Request Reference and the GPS discriminator (both derived from the information in the received RACH). It contains the country/region information and may contain the Position Update Information.

The MES matches the request reference and the GPS discriminator with the corresponding locally calculated values to determine if the POSITION VERIFICATION NOTIFY message is addressed to it.

Upon receipt of a POSITION VERIFICATION NOTIFY message or IMMEDIATE ASSIGNMENT REJECT TYPE 1 message (with the cause, "reported position acceptable"), corresponding to its last sent CHANNEL REQUEST message, the MES stops the T3126 timer (if running).

If the values of the GPS Update Timer and GPS Update Distance parameters are present in the received message, they shall replace the corresponding idle mode Position Reporting parameters; otherwise, the MES continues to use the old idle mode Position Reporting parameters.

After receiving the POSITION VERIFICATION NOTIFY/IMMEDIATE ASSIGNMENT REJECT TYPE 1 messages (with the cause, "reported position acceptable"), MES shall store the reported position as the last reported position, end the immediate assignment procedure, and go back to idle mode (camped-on substate).

#### 4.3.1.5 Assignment procedure completion

The immediate assignment procedure is terminated on the network side when the main signalling link is established and the L3 SERVICE REQUEST message is received. Timer T3101 is stopped and the MM sublayer on the network side is informed that an RR connection exists.

On the MES side, the procedure is terminated when the establishment of the main signalling link is confirmed, except when the CHANNEL REQUEST message was sent as part of the position verification procedure. The MM sublayer is informed that an RR connection exists.

Early classmark sending consists of an MES sending a CLASSMARK CHANGE message to provide the network with additional classmark information as early as possible after access.

An MES that implements the <<Controlled Early Classmark Sending>> option shall perform the early classmark sending if, and only if, explicitly accepted by the network, as indicated in the Early Classmark Sending Control (ECSC) bit in the SI transmitted over the BCCH.

An MES that implements the <<Controlled Early Classmark Sending>> option shall indicate it in the classmark (ES IND) bit.

#### 4.3.1.6 Abnormal cases

If a lower layer failure occurs on the MES side on the new channel before the successful establishment of the main signalling link, the allocated channels are released. The subsequent behavior of the MES depends on the type of failure and previous actions.

- If the failure is due to Information field mismatch in the contention resolution procedure, and no repetition, as described in this clause, has been performed, the immediate assignment procedure will be repeated.
- If the failure is due to any other factor or if a repetition triggered by a contention resolution failure has been performed, the MES returns to idle mode (RR connection establishment failure), transactions in progress are aborted, and spot beam reselection may take place.

If the information available in the MES after the reception of an IMMEDIATE ASSIGNMENT message does not satisfactorily define a channel, an RR connection establishment failure has occurred.

On the network side, if timer T3101 elapses before the main signalling link is established (on the newly allocated link in case of extended immediate assignment procedure with channel change indicated), and the L3 SERVICE REQUEST message or EXTENDED CHANNEL REQUEST message (in case the network has requested the extended immediate assignment procedure) is received, then if the main signalling is already established, the network initiates normal release of the main signalling link through the channel release procedure. Otherwise, the newly allocated channels are released and the request is forgotten. The network has no means of distinguishing between initial attempts and repeated attempts from an MES.

To avoid a large value of T3101 and to detect the failure of signalling link establishment by the MES early on, the network may optionally employ the following procedure. The network starts the T3101 Timer value long enough for an L2 establishment (with maximum retries), expiry of which can be taken as failure of the MES to establish the main signalling link; the network releases the allocated channel, and the request is forgotten. After the establishment of the main signalling link, the network can restart timer T3101 with a value long enough for the I-frame transmissions (with maximum retries), expiry of which triggers a channel release procedure by the network.

## 4.3.2 RR connection establishment initiation by the network: paging procedure

The network can initiate the establishment of an RR connection by the paging procedure. Such a procedure can only be initiated by the network.

### 4.3.2.1 Paging initiation by the network

The network shall initiate the paging procedure by broadcasting a PAGING REQUEST message on the appropriate paging group on the appropriate CCCH and starts timer T3113. Determination of the appropriate paging groups and CCCH is specified in GMR-1 05.002 [16] and GMR-1 03.013 [4].

There are three types of paging messages:

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

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

A PAGING REQUEST message may include more than one MES identification.

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

The GSC shall page an MES N_page_occurrences+1 number of times for each paging message received from the MSC, where N_page_occurrences is a configurable parameter at the network, nominally set to 2. The pages have to be transmitted in separate PAGING REQUEST messages, which are to be separated by exactly 16 frames, i.e., 640 msec.

The value of "N_page_occurrences" shall be broadcast as part of the SI.

The MES shall receive and analyse the PAGING messages sent on the paging subchannel corresponding to its paging subgroup on the appropriate CCCH, as specified in GMR-1 05.002 [16].

The paging messages contain a Page Mode IE. This IE controls possible additional requirements on MESs belonging to the paging subgroup corresponding to the paging subchannel on which the message was sent. The MES shall take into account the Page Mode IE of any message sent on its own paging subchannel of its CCCH. The MES shall not take into account the Page Mode IE of messages sent on paging subchannels other than its own paging subchannel. The requirements yielded by the Page Mode IE are as follows:

- Normal paging: no additional requirements.
- Paging reorganization: The MES shall continue to read its current paging channel while it reads the BCCH data regarding allocation of paging groups and channels. Once it reads this data, it shall recalculate its allocated paging group and appropriate CCCH and switch to reading this new paging subchannel. In the paging reorganization mode, the MES, after reading the new BCCH data and switching to the new paging subchannel, shall not react to any paging reorganization mode unless it has received a paging mode other than paging reorganization in its paging subchannel.

  During the paging reorganization period, the network shall calculate the paging channel/paging group for every MES according to both the old (before the paging reorganization period) and current BCCH data. The network shall page the same MES message in both paging subchannels. During this overlap, the network shall set the Page Mode fields on every page message to page mode reorganization. After 10.24 seconds, the network shall switch the page mode on every paging group to "normal paging" and shall transmit pages according to the new CCCH configuration as broadcast in the current BCCH information.

If a terminal is paged during the reorganization period, it shall respond to the page immediately. The recalculation of the MES's paging group may be completed the next time the terminal returns to idle mode after the end of the call.

- Same as before: No change of page mode from the previous page mode.

### 4.3.2.2 Paging response

Upon receipt of a PAGING REQUEST message, and if access to the network is allowed, the addressed MES shall, when camped on a cell, initiate the immediate assignment procedure. The establishment of the main signalling link is then initiated by use of an SABM with Information field containing the PAGING RESPONSE message or the Contention Resolution parameter. The MM sublayer in the MES is informed that an RR connection exists.

Upon receipt of the PAGING RESPONSE message, the network layer RR entity stops timer T3113. The MM sublayer in the network is informed that an RR connection exists.

### 4.3.2.3 Alerting initiation by the network

If timer T3113 at the network side RR sublayer times-out before receiving a PAGING RESPONSE message from the MES side, the network, after attempting paging a configurable number of times, may initiate the alerting procedure (see GMR-1 03.298 [8]). The network initiates the alerting procedure by broadcasting an ALERT REQUEST message on the appropriate Alerting Group (see GMR-1 05.002 [16]) on the BACH and starting timer THPA. The ALERT REQUEST message contains the TMSI of the mobile subscriber being paged. See figures 4.4 and 4.5**.**

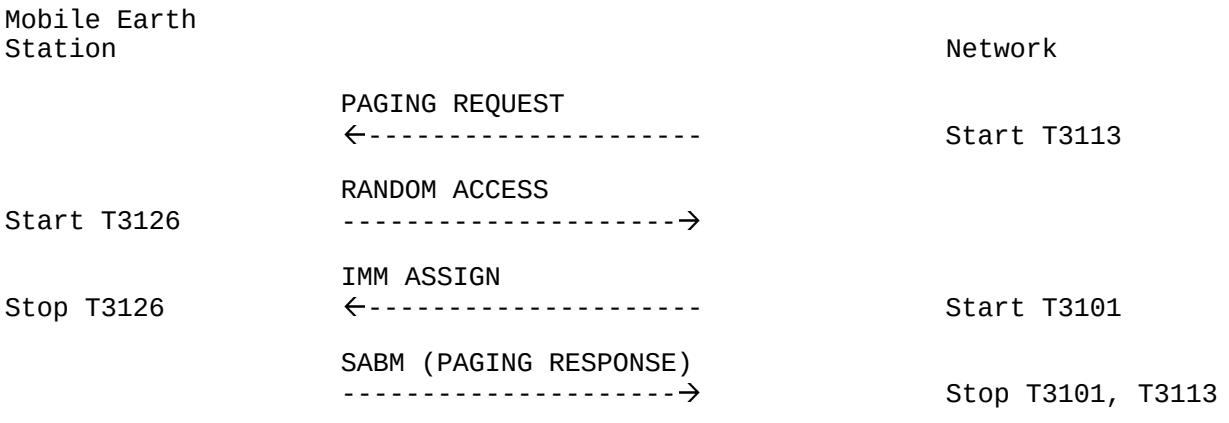


**Figure 4.4: Paging sequence**

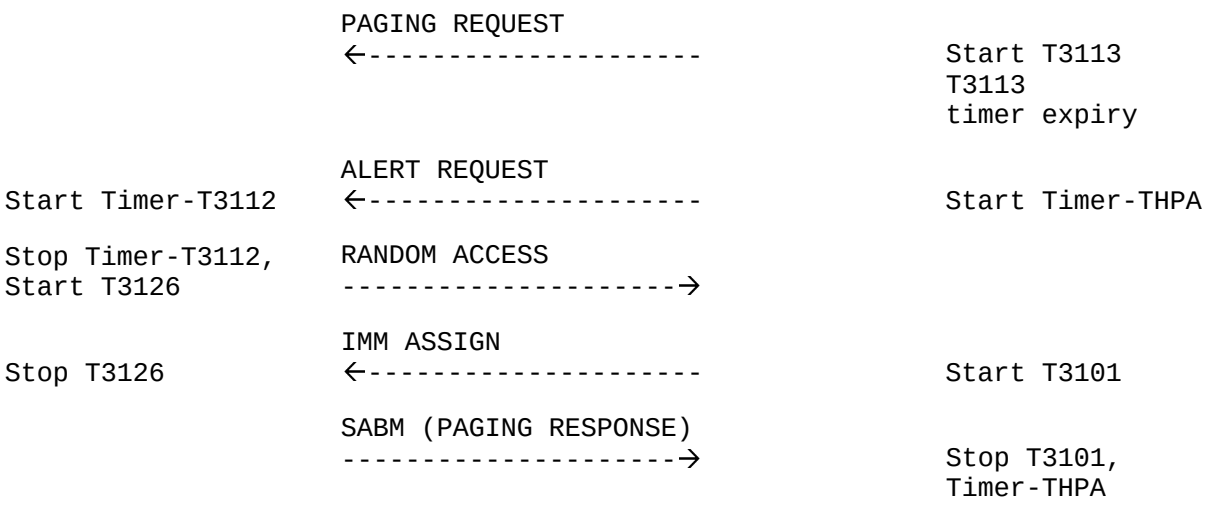


**Figure 4.5: Alerting sequence**

The MES, when in the Idle-Alert substate, monitors its alerting subchannel that corresponds to its alerting subgroup on the appropriate BACH, as specified in GMR-1 05.002 [16]. For calculation of the alerting subgroup and also the appropriate BACH, MES uses the information received in the latest SI read before entering into the Idle-Alerting substate.

Each BCCH SI cycle contains an SI update identifier, which indicates the identification for the current SI. The MES, when reading the SI, also reads this identifier and stores this identifier along with the other SI. Network toggles this identifier whenever there is a change in SI related to BACH monitoring. Every alerting message also contains an SI update identifier that gives the identifier currently in use for SI on the BCCH. This identifier is used in determining whether the BCCH information read earlier is or is not still valid. The MES, while monitoring the BACH for alerts, continuously monitors this identifier in the alert messages transmitted by the network, irrespective of whether the alert message was meant for that MES or not. The MES compares this SI update identifier received in the BACH with the stored identifier that corresponds to the last read SI. If the two identifiers match, it indicates that the SI related to BACH monitoring has not changed since the MES last read it from the BCCH before entering into the high penetration alerting mode. If there is a mismatch between the identifiers received from the BACH and those received from the BCCH, it indicates that the SI related to BACH monitoring has changed. The MES stops monitoring the BACH until it is able to successfully read the SI from the BCCH. The RR at the MES informs MM of the loss of signal and unavailability of a BACH for camping on and goes into the Idle-No Spotbeam substate. The MES continues to monitor signal strength for transition to the Idle-Camped On substate.

#### 4.3.2.4 Page response by the MES due to alerting

The addressed MES side RR entity, upon receiving the ALERT REQUEST, informs the network services layer about receipt of the ALERT REQUEST (which the network services layer uses to provide High-Penetration Alerting (HPA) indication to the user) and starts timer T3112. When the MES transitions to Idle substate, Idle-Camped On, and if access to the network is allowed, the addressed MES RR entity will stop timer T3112 and initiate the immediate assignment procedure. The establishment of the main signalling link is then initiated using an SABM with an Information field containing the PAGING RESPONSE message or the Contention Resolution parameter. Once the link is established, the MM sublayer on the MES side is informed that an RR connection exists.

Upon receiving the PAGING RESPONSE message, the network side RR stops timer THPA, and the network side MM sublayer is informed that an RR connection exists.

#### 4.3.2.5 Abnormal cases

Lower layer failure during the immediate assignment procedure is treated as specified for that procedure.

If timer T3113 expires and a PAGING RESPONSE message has not been received, the network may repeat the PAGING REQUEST message and start timer T3113 again. The number of successive paging attempts is a network-dependent choice. After paging the MES for successive attempts, the network may initiate the alerting procedure (see GMR-1 03.298 [8]). If timer THPA expires and a PAGING RESPONSE message has not been received from the addressed MES, the network may repeat the ALERT REQUEST message one more time and start timer THPA again. Whether the network initiates the alerting procedure or repeats the ALERT REQUEST message is network-dependent.

## 4.4 RR connection transfer phase

### 4.4.1 SACCH procedures

#### 4.4.1.1 General

In the RR connected mode, the SACCH is used in the signalling layer. In the case of TCH3, the mechanism of SACCH transmission at the physical layer is different from the mechanism in the case of other channels. Refer to GMR-1 05.002 [16] for details.

There is no requirement for continuous transmission on SACCH when present.

#### 4.4.1.2 Measurement report

This function is not currently supported in GMR-1.

#### 4.4.1.3 Dedicated mode position reporting

At certain intervals a VT may be required by the GS to report its position to the network while the call is in progress. If any MES undergoes a classmark change during a call and becomes a VT, then it shall start dedicated mode position reporting provided the network has indicated to do so during the immediate assignment (or extended immediate assignment) procedure. Similarly, an MES that undergoes a classmark change and is no longer a VT shall not report its position in dedicated mode. The network shall inform the MES as to whether dedicated mode position reporting is required in the IMMEDIATE ASSIGNMENT or EXTENDED IMMEDIATE ASSIGNMENT message. The GPS Update Timer and the GPS Update Distance values received in these messages shall be used by the MES for the dedicated mode position reporting.

When required to do dedicated mode position reporting, the VT (on the expiry of GPS Update Timer) periodically measures its GPS position. If it differs from its last reported position by more than the GPS Update Distance, the MES sends its new GPS position to the network in a POSITION UPDATE REQUEST message. The MES shall then start timer T3117.

Upon receipt of a POSITION UPDATE REQUEST message, the RR entity on the network determines if the MES has moved into an unauthorized position (see GMR-1 03.299 [9]). If the MES has moved into an unauthorized position, the RR entity at the GS should use the POSITION UPDATE ACCEPT message to indicate that the current call shall be disconnected. This is done by setting the I bit in the Disconnect Indication field in the POSITION UPDATE ACCEPT message. Subsequently, it shall clear the call. If the MES is not in an unauthorized position, the RR entity shall send the POSITION UPDATE ACCEPT message to the MES with the I bit of the Disconnect Indication field set to "0".

Upon receiving the POSITION UPDATE ACCEPT message, the MES stops timer T3117 and marks the last calculated position as the last reported position to the network. If the I bit of the Disconnect Indication field is set, the MES shall warn the user that the MES is in an unauthorized position and the call will be cleared soon. Future evaluations of the distance moved by the MES are based on this last reported position.

If T3117 expires before receipt of the POSITION UPDATE ACCEPT message, the MES resends the POSITION UPDATE REQUEST message and restarts T3117. If the current GPS position has been updated since the last transmission of the POSITION UPDATE REQUEST message (due to another expiry of GPS Update Timer), the new position is used in reporting to the network.

The network updates the dedicated mode Position Reporting parameters in the MES (i.e., GPS Update Distance and GPS Update Timer) by sending these parameters in the POSITION UPDATE ACCEPT message. These values remain effective until the call is over or newer values are received. The network computes the new GPS Position parameters based on the last position reported by the MES and passes these parameters to the MES. Upon receiving these updated values, the MES overrides the current values. The new values are put into effect immediately, i.e., the timer T3119 is restarted with the value "time to expiry", modulo of the "new value" of T3119. If the value "time to expiry" modulo's new value is zero, then the T3119 is set to the new value.

The POSITION UPDATE REQUEST message shall be transmitted in unacknowledged mode over SDCCH or SACCH. The POSITION UPDATE ACCEPT messages shall be transmitted in unacknowledged mode over SDCCH, TACCH, or SACCH. The service grade for transmission over SACCH shall be "Wait-then-Go". The POSITION UPDATE ACCEPT message with disconnect indication (I bit in the Disconnect Indication IE set to 1) may instead be sent in acknowledged mode over FACCH, TACCH/FACCH, or SDCCH.

## 4.4.2 Transfer of messages and link layer service provision

Same as clause 3.4.2 of GSM 04.08 [22].

## 4.4.3 Channel assignment procedure

An intracell change of channel can be requested by upper layers for changing the channel type or decided by the RR sublayer (e.g., for a frequency change in case of interference in the existing radio channel). The channel assignment procedure is also used in order to move the MES to the Terminal-to-Terminal Channel (TTCH) for a single-hop, terminal-to-terminal call. This change may be performed through the channel assignment procedure.

The purpose of the channel assignment procedure is to completely modify the physical channel configuration of the MES without frequency redefinition or change in synchronization while staying in the same spot beam.

The channel assignment procedure occurs only in RR connected mode. This procedure cannot be used in Idle mode; in this case the immediate assignment procedure is used.

The channel assignment procedure at the MES includes:

- Suspension of normal operation except for RR management (L3)
- Suspension of the main signalling link, release of the other links and the disconnection of TCHs, if any
- Deactivation of previously assigned channels (L1)
- Activation of the new channels and their connection, if applicable
- Resumption of the data link connections for SAPI = 0.

The channel assignment procedure is always initiated by the network. There are two types of channel assignment procedures: Channel assignment (associated signalling) and channel assignment (nonassociated signalling). Both are described below.

### 4.4.3.1 Channel assignment (associated signalling)

Channel assignment (associated signalling) procedure involves switching to a radio path where the path used for signalling from the network to the MES is a dedicated physical path between the MES and the network, i.e., SDCCH/4 or FACCHn (n = 3, 6, or 9). This procedure is used for every change of physical path except in the case of switching to TTCH during a single-hop, TtT call (e.g., for channel type changes or frequency handover to another frequency in the case of interference detection).

#### 4.4.3.1.1 Channel assignment initiation

The network initiates the channel assignment procedure by sending an ASSIGNMENT COMMAND 1 message to the MES on the main signalling link. It then starts timer T3107.

When sending this message on the network side and when receiving it on the MES side, all transmission of signalling layer messages, except for those RR messages needed for this procedure and for abnormal cases, is suspended until resumption is indicated.

Upon receipt of the ASSIGNMENT COMMAND 1 message, the MES initiates suspension of the SAPI = 0 connection. It also initiates a local-end release of SAPI = 2 and SAPI = 3 link layer connections (if any), disconnects the physical channels, commands the switching to the assigned channels, and initiates the establishment of lower layer connections (this includes the activation of the channels, their connection, and the establishment of the main signalling links).

The ASSIGNMENT COMMAND 1 message may contain a Power Control Parameter IE, a Timing Correction IE, and/or a Frequency Offset IE. These values are applied by the MES on a new channel, if present. They will not affect the values used on the old channel(s).

The ASSIGNMENT COMMAND 1 message may contain a Cipher Mode Setting IE. In this case, the mode shall be applied on the new channel. If no such information is present, the ciphering mode is the same as on the previous channel. The ASSIGNMENT COMMAND 1 message will not contain a Cipher Mode Setting IE that indicates "start ciphering" unless a CIPHERING MODE COMMAND message has been transmitted earlier in the RR connection. If such an ASSIGNMENT COMMAND 1 message is received, it will be regarded as erroneous, an ASSIGNMENT FAILURE message with the cause, "protocol error unspecified", will be returned immediately, and no further action taken.

The ciphering key to be used on the newly assigned channel, if ciphering shall be applied, should be the permanently stored ciphering key (corresponding to Ciphering Key Sequence Number (CKSN)). Any ciphering key that had been received during the session via an earlier message exchange shall be discarded once this procedure is successfully completed.

#### 4.4.3.1.2 Assignment completion

After the main signalling link is successfully established, the MES returns an ASSIGNMENT COMPLETE message, specifying the cause, "normal event", to the network on the main DCCH. The MES does not initiate any SAPI = 2 connection even if one exists before this procedure.

Sending this message on the MES side and its receipt on the network side allow the resumption of the transmission of SIGNALLING LAYER messages that had been blocked during the initiation of this procedure.

At the receipt of the ASSIGNMENT COMPLETE message, the network releases the previously allocated resources and stops timer T3107.

#### 4.4.3.1.3 Abnormal cases

If the ASSIGNMENT COMMAND 1 message instructs the MES to use a channel description or channel mode that it does not support, the MES shall return an ASSIGNMENT FAILURE message with the cause, "channel mode unacceptable". The MES shall remain on the current channel(s) and use the old channel description or channel mode.

If the ASSIGNMENT COMMAND 1 message instructs the MES to use a frequency that it is not capable of using, the MES shall return an ASSIGNMENT FAILURE message with the cause, "frequency not implemented", and the MES shall remain on the current channel(s).

On the MES side, if a lower layer failure occurs on the new channel before the ASSIGNMENT COMPLETE message has been sent, the MES deactivates the new channels, reactivates the old channels, reconnects the TCHs, if any, and triggers the establishment of the main signalling link. The MES shall not initiate any TtT signalling link (SAPI = 2 connection) establishment even if one existed before (the other MES need no longer be connected to the L-L single-hop connection for the SAPI = 2 establishment to be successful). It then sends an ASSIGNMENT FAILURE message, with the cause, "protocol error unspecified", on the main DCCH and resumes the normal operation as if no assignment attempt had occurred. The operational parameters (e.g., ciphering mode, ciphering key) when returning to the old channel are those applied before the attempt procedure.

Upon receiving the ASSIGNMENT FAILURE message, the network stops timer T3107 and releases the resources allocated for new channels.

If a lower layer failure occurs while attempting to connect back to the old channels, the radio link failure procedure is applied.

On the network side, if timer T3107 elapses before the ASSIGNMENT COMPLETE message has been received on the new channels, an ASSIGNMENT FAILURE message is received on the old channels, or the MES has re-established the call, the old channels and the new channels are released, and all contexts related to the connections with that MES are cleared.

On the network side, lower layer failure occurring on the old channels after the sending of the ASSIGNMENT COMMAND 1 message is ignored until the channels are released or SABM frame is received on these channels. Lower layer failures occurring after the receipt of the SABM frame on the corresponding signalling link are treated following the general scheme. Lower layer failures are ignored when occurring before the receipt of the SABM frame on the new main signalling link.

### 4.4.3.2 Channel assignment (nonassociated signalling)

Channel assignment (nonassociated signalling) involves switching to a radio path where the TACCH/2 is used for signalling from the network to the MES. See GMR-1 04.003 [11] and GMR-1 05.002 [16] for a description of TACCH/2. This procedure is used for switching over to the TACCH/2 for signalling during a single-hop, TtT call. Because the TTCH is a broadcast channel, the MES receives all the messages on its allocated subchannel of the TTCH and identifies the messages meant for it by matching the MES identifier (given to the MES during the channel assignment procedure) embedded in the message.

#### 4.4.3.2.1 Channel assignment initiation

The network shall initiate the channel assignment procedure by sending an ASSIGNMENT COMMAND 2 message to the MES on the main signalling link. It then starts timer T3108.

After the network transmits this message, it shall stop transmission of all RR messages until that point where it detects that the procedure is terminated and resumption of the main signalling link on DLL is indicated. The MES, after receiving this message, shall also stop transmission of all RR messages until the procedure is terminated and resumption of the main signalling channel is resumed by the DLL.

Upon receipt of the ASSIGNMENT COMMAND 2 message, the MES shall perform the following actions:

- The originating MES shall establish a new link with the network, as follows. The MES shall first initiate suspension of the SAPI = 0 connection. It shall then disconnect the physical channels, command the switching to the newly assigned channel, then initiate the establishment of lower layer connections (this includes the activation of the channels, their connection, and the establishment of the main signalling links). The main signalling link so established shall use the FACCH for reverse signalling (MES to network) and the TACCH/2 for forward signalling (network to MES). The MES shall start ignoring receipt of SAPI = 0 messages on the FACCH after receiving this message until the MES switches to some other physical channel. This reaction may be either because of failure of this procedure or initiation of some other procedure.

- The destination MES shall first switch to the new channels (L-L switched channel and the TTCH) and then request L2 to open a SAPI = 2 data link connection to the other MES over the L-L channel (FACCH in both directions). This procedure establishes the TtT signalling link. Upon successful establishment of the TtT signalling link, it shall re-establish the main signalling link to the network, using the new channel. For establishing the main signalling link (SAPI = 0 link), the procedure is the same as described above for originating MES. The RR entity at the originating MES gets an indication from L2 at this point that the TtT signalling link is established.

- The MES given the role of the terminal shall initiate the SAPI = 2 link establishment procedure. Indication as to which MES acts as the terminal or network shall be provided to the MES by the network in the ASSIGNMENT COMMAND 2 message.

- One of the MESs shall act as a network as far as ciphering is concerned. Indication as to which MES shall act as a network for ciphering during the single-hop, TtT connection shall be provided to the MES by the network in the ASSIGNMENT COMMAND 2 message.

- MESs and the network shall share the same ciphering key (Ktt), which shall be included in the ASSIGNMENT COMMAND 2 message. This new value of the ciphering key shall be used only while applying ciphering on the new allocated channel (the channel allocated via ASSIGNMENT COMMAND 2 message). Ciphering shall be applied while sending or receiving on the FACCH only. No ciphering is applied for data over the TACCH.

- MESs shall decrement the frame number to be used while deciphering if so indicated by the network in the message.

- The MESs shall change the mode of channel on transfer of ASSIGNMENT COMPLETE message to the network.

- MESs extract the MES Identifier TTID (Temporary Terminated Identification) and the TACCH subchannel number from the ASSIGNMENT COMMAND 2 message and use it to receive messages destined to them on TACCH/2 (refer to GMR-1 05.003 [17]).

The ASSIGNMENT COMMAND 2 message may contain a Power Control Parameter IE, a Timing Correction IE, and/or a Frequency Offset IE. These values shall be by the MES on the new channel, if present. They shall not affect the values used on the old channel.

The ASSIGNMENT COMMAND 2 may contain a Cipher Mode Setting IE. In that case, the mode shall be applied on the new channel. Note that the MES shall stop the ciphering process and start with the new assigned key (Ktt) whenever ciphering needs to be applied on the assigned channel. The ciphering algorithm to use if ciphering needs to be applied shall be the one indicated in the Cipher Mode Setting IE.

The explicitly provided ciphering key provided shall not be stored by the MES and shall be used only in the context of this newly assigned channel. The key provided during this procedure shall be discarded whenever this assigned channel is changed. The CKSN stored in the Subscriber Identity Module (SIM) shall not be changed or deleted.

If a Cipher Mode Setting IE is absent, then the ciphering mode is the same as that on the previous channel, and ciphering, if required, is done using the earlier parameters.

#### 4.4.3.2.2 Assignment completion

After the main signalling link is successfully established on the new channels, the MES returns an ASSIGNMENT COMPLETE message, specifying the cause, "normal event", to the network on the main signalling link.

Sending this message on the MES side and its receipt on the network side allows the resumption of the transmission of signalling layer messages that had been blocked during the initiation of this procedure. The network performs a local-end release of SAPI = 3 connection, if any.

The ASSIGNMENT COMPLETE message shall be sent over the main signalling link. The destination MES shall send it only after successfully setting up the TtT signalling link using the L-L switched channel.

Upon receipt of the ASSIGNMENT COMPLETE message, the network releases the previously allocated resources and stops timer T3108.

#### 4.4.3.2.3 Abnormal cases

If the ASSIGNMENT COMMAND 2 message instructs the MES to use a channel description or mode that it does not support, the MES shall return an ASSIGNMENT FAILURE message with the cause, "channel mode unacceptable". The MES shall remain on the current channel(s) and use the old channel description, channel mode, or the ciphering key.

If the ASSIGNMENT COMMAND 2 message instructs the MES to use a nonexistent channel or any other condition that makes these messages invalid, the MES will return an ASSIGNMENT FAILURE message with the causes, "frequency not implemented" (in case a nonexistent channel is specified) and "invalid mandatory information" (any other condition that makes the message invalid), respectively. The MES will remain on the current channel(s).

On the MES side, if a lower layer failure is detected on the new channel, either on SAPI = 2 (TtT signalling link) or SAPI = 0 (main signalling link) before the ASSIGNMENT COMPLETE message has been sent, the MES deactivates the new channels, reactivates the old channels, and reconnects the main signalling link. The MES does not attempt to reconnect the SAPI = 2 connection. In case the SAPI = 0 link fails and that SAPI = 2 link is in the established state, the MES performs a local-end release of the SAPI = 2 connection before reconnecting the main signalling link (SAPI = 0 connection).

After reconnecting the main signalling link, the MES shall send an ASSIGNMENT FAILURE message with the cause, "protocol error unspecified" on the main signalling link and resumes the normal operation as if no assignment attempt had occurred. The operational parameters (e.g., Ciphering Mode, Ciphering Key), when returning on the old channel, shall be same as those applied before the procedure.

If the ASSIGNMENT COMMAND 2 message instructs the MES to use a frequency that it is not capable of using, the MES will return an ASSIGNMENT FAILURE message with the cause, "frequency not implemented" and will remain on the current channel(s).

When receiving the ASSIGNMENT FAILURE message, the network stops timer T3108 and releases the resources allocated for new channels.

If a lower layer failure occurs while attempting to connect back to the old channels, the radio link failure procedure applies.

On the network side, if timer T3108 elapses before either the ASSIGNMENT COMPLETE message has been received on the new channels, an ASSIGNMENT FAILURE message is received on the old channels, or the MES has re-established the call, the old channels, and the new channels are released and all contexts related to the connections with that MES are cleared.

On the network side, lower layer failure on the old channels after sending the ASSIGNMENT COMMAND 2 message is ignored until the channels are released or a SABM frame is received on these channels. Lower layer failures occurring after the receipt of the SABM frame on the corresponding signalling link are treated following the general rules. Lower layer failures are ignored when occurring before the receipt of the SABM frame on the new main signalling link.

## 4.4.4 Handover procedure

In dedicated mode the network may reassign the MES to a different channel of the same type within the same beam. This change shall be performed through the handover procedure.

The channel assignment procedure at the MES includes:

- the suspension of normal operation except for RR management (L3);
- the suspension of the main signalling link, release of the other links and the disconnection of the TCH;
- the deactivation of previously assigned channels (L1);
- the activation of the new channels and their connection if applicable;
- the resumption of the data link connections for SAPI = 0.

The handover procedure shall always be initiated by the network.

The handover procedure shall not be used while the MES is engaged in a single-hop, TtT call.

### 4.4.4.1 Handover initiation

The network shall initiate the handover procedure by sending a HANDOVER COMMAND message repeatedly to the MES in unacknowledged mode on the main signalling link on the existing channel. The network shall start timer T3103 after sending the first HANDOVER COMMAND message. HANDOVER COMMAND message shall be repeated continuously one after another, until the network receives SABM over the new channel or T3103 timer expires.

When sending this message on the network side and when receiving it on the MES side, all transmission of signalling layer messages except for those RR messages needed for this procedure and for abnormal cases, shall be suspended until resumption is indicated.

Upon receipt of the HANDOVER COMMAND message, the MES initiates suspension of the SAPI 0 connection and a local end release of SAPI 3 link layer connections (if any), disconnects the physical channels, commands the switching to the assigned channels and initiates the establishment of lower layer connections (this includes the activation of the new channel, their connection and the resumption of the data links on SAPI = 0).

The HANDOVER COMMAND message contains Absolute RF Channel Number (ARFCN), transmit and receive timeslot numbers, and timing and frequency offset values, which the MES shall apply to the new channel.

Both the MES and the network shall use the old values of channel mode, channel type, Dual Keep Alive Burst (DKAB) location, and cipher mode setting on the new channel.

When the network receives SABM from the MES on the new channel, it shall stop the transmission of HANDOVER COMMAND message on the old channel and shall respond to the MES with UA on the new channel.

On the network side, immediately after the first HANDOVER COMMAND message is sent, voice/data communication shall be stopped on the old channel and shall then resume on the new channel.

On the MES side, immediately after the MES receives the HANDOVER COMMAND message, voice/data communication shall be stopped on the old channel and shall then resume on the new channel.

#### 4.4.4.2 Handover completion

After the main signalling link is successfully established, the MES shall return a HANDOVER COMPLETE message, specifying the cause, "normal event" to the network before any other message in acknowledged mode on the main signalling link.

The sending of this message on the MES side and its receipt on the network side allows the resumption of the transmission of SIGNALLING LAYER messages that had been blocked during the initiation of this procedure.

On the receipt of HANDOVER COMPLETE message by the network on the new channel, T3103 timer shall be stopped and the old channel shall be released.

#### 4.4.4.3 Abnormal cases

On the MES side, if a low-layer failure happens on the new channel before the HANDOVER COMPLETE message has been sent, both the old channel and the new channel shall be deactivated.

On the network side, if timer T3103 elapses before the HANDOVER COMPLETE message is received on the new channel, both the old channel and the new channel shall be released and all contexts related to the connections with that MES shall be cleared.

### 4.4.5 Frequency redefinition procedure

This function is not currently supported in GMR-1.

### 4.4.6 Channel mode modify procedure

Same as clause 3.4.6 of GSM 04.08 [22].

#### 4.4.6.1 Initiation of the channel mode modify procedure

Same as clause 3.4.6.1 of GSM 04.08 [22].

#### 4.4.6.2 Completion of channel mode modify procedure

Same as clause 3.4.6.2 of GSM 04.08 [22].

#### 4.4.6.3 Abnormal cases

Same as clause 3.4.6.3 of GSM 04.08 [22].

### 4.4.7 Ciphering mode setting procedure

Same as clause 3.4.7 of GSM 04.08 [22].

#### 4.4.7.1 Ciphering mode setting initiation

Same as clause 3.4.7.1 of GSM 04.08 [22].

The CIPHER MODE COMMAND message may include the country and region name string to be displayed by the MES. This string is passed from the RR to the network services layer. The absence of this string in the CIPHER MODE COMMAND message should be treated by the MES as if the network does not have country/region name available to send to the MES. Absence of this country and region name string can be due to the fact that the network does not have the MES's position or that the network is unable to map the reported position to a country/region name.

#### 4.4.7.2 Ciphering mode setting completion

Same as clause 3.4.7.2 of GSM 04.08 [22].

The CIPHER MODE COMPLETE message may include the timestamp for the position sent by the MES in its INITIAL ACCESS message on RACH. The MES shall send the timestamp (at which the reported position was taken) whenever it shall send the position in the CHANNEL REQUEST/EXTENDED CHANNEL REQUEST message to the network.

### 4.4.8 Additional channel assignment procedure

This function is not currently supported in GMR-1.

### 4.4.9 Partial channel release procedure

This function is not currently supported in GMR-1.

### 4.4.10 Classmark change procedure

Same as clause 3.4.10 of GSM 04.08 [22].

### 4.4.11 Classmark interrogation procedure

Same as clause 3.4.11 of GSM 04.08 [22].

#### 4.4.11.1 Classmark interrogation initiation

Same as clause 3.4.11.1 of GSM 04.08 [22].

#### 4.4.11.2 Classmark interrogation completion

Same as clause 3.4.11.2 of GSM 04.08 [22].

### 4.4.12 POWER CONTROL PARAMETERS UPDATE procedure

During a call, this procedure is used by the network to update the Power Control parameters at the MES. An MES shall initially read the values of different Power Control parameters from the BCCH. During the call, the network may decide to override values for some of these parameters. To update the Power Control parameter values, the network may send the POWER CONTROL PARAMETERS UPDATE message. This message contains a list of Power Control parameter identifiers along with their new values. On receiving this message, an MES shall:

- update the values of the parameters according to the parameter list in the message. The updated values apply only for the duration of the call, so these values are not updated in the nonvolatile memory;
- reinitialize its power control algorithm, if indicated in the message.

The POWER CONTROL PARAMETERS UPDATE message shall be sent using the acknowledged information transfer mode of L2 over the main signalling link.

## 4.4.13 DTMF transmission and reception procedures

The DTMF transmission and reception service operates only in the dedicated connection mode of RR. This service consists of a reception part and a transmission part.

The DTMF Transmission and Reception Service (DTRS) protocol module uses the RR_DATA_REQ and RR_DATA_IND primitives to transmit messages to the peer entity and to receive messages from the peer entity, respectively. The RR entity sends DTRS messages over FACCH. For transmission, it checks whether a DL connection over SAPI = 2 exists. If the connection exists, it transmits these messages over that DL connection; otherwise, it uses any existing SAPI = 0 DL connection. If no RR connection exists, the transmission is suppressed. The GS side RR entity suppresses transmission of these messages if it is in a single-hop TtT call.

### 4.4.13.1 Transmission of the DTMF digits information

The DTRS protocol entity in the MES initiates the transmission of DTMF digit information upon receiving a request from the network services layer, which informs the DTRS about each keypress and key release using the DTMF_DIGIT_START_REQ and DTMF_DIGIT_STOP_REQ primitives, respectively. Upon receiving the request, the DTRS at the MES processes them as described below.

A DTMF_DIGIT_START_REQ primitive received by the DTRS is handled as follows:

- the request is buffered and timer T31DT is started;
- while there is a previous tone request that has not been acknowledged (and guard timer T31DA has not expired), this request remains buffered;
- when T31DT expires, the DTRS entity will mark this request as eligible for transmission;
- when a previous message is successfully transmitted (i.e., its acknowledgment is received from the peer), as many buffered tone requests as possible that are eligible for transmission (that is, whose T31DT timer has expired) may be transmitted in a single message;
- when a message is transmitted, it is guarded with the timer T31DA. This timer is stopped when acknowledgment is received from the peer. If this timer expires, the message may be flushed from the queue and the rest of the messages waiting in the queue may be processed.

A DTMF_DIGIT_STOP_REQ primitive received by the DTRS is handled as follows:

- if the tone request from the corresponding DTMF_DIGIT_START_REQ primitive is still buffered, its T31DT timer is stopped and the tone request is marked eligible for transmission;
- if the corresponding DTMF_DIGIT_START_REQ has already been transmitted, the DTMF_DIGIT_STOP_REQ may be transmitted as part of a DTMF TONE GENERATE REQUEST message as soon as the previous message is acknowledged.

A DTMF TONE GENERATE REQUEST message can have up to 124-digit Ies embedded in it, the only limit being that the maximum length of this message should be less than the maximum number of octets of an L3 message permitted by the L2 services.

### 4.4.13.2 Reception of DTMF digits information

#### 4.4.13.2.1 At the peer MES (MES receiving the DTMF digits)

The peer MES, after receiving the DTMF TONE GENERATE REQUEST message, checks for the consistency of the message. After checking the consistency of the message, it transmits a DTMF TONE GENERATE ACKNOWLEDGE message, acknowledging the receipt and decoding of the message, to the requesting MES. If an error is detected in the message, it is dropped silently. No tone is passed up to the network services layer. However, the DTMF TONE GENERATE ACKNOWLEDGE message is still transmitted to the peer.

Subsequently, the message is decomposed into its constituent DTMF Digit Ies. If a DTMF Digit IE of Type = Stop is received for which the corresponding DTMF Digit IE of Type = Start has been discarded, the DTMF Digit IE of Type = Stop will be discarded silently.

After successful processing of the message, the DTRS at the receiving MES generates a DTMF_DIGIT_START_IND or a DTMF_DIGIT_STOP_IND, as appropriate, for each DTMF Digit IE as indication to the network services layer that it can present the tones to the user in appropriate form. In doing so, it maintains the minimum duration provided in the stop digit information (i.e., the time between start of the digit and stop of the digit shall be at least equal to that which was specified in the Stop Digit IE). If this time period has already passed by the time the Stop Digit IE reaches the receiving MES, the network shall stop the tone being generated as soon as possible. For a DTMF Digit IE of Type = Complete, that is received (i.e., the IE has both value and duration information), the DTRS entity shall break it up into the corresponding DTMF_DIGIT_START_IND and DTMF_DIGIT_STOP_IND primitive pair with the appropriate time duration maintained between the two.

The DTRS entity may also initiate in-band generation of tone, corresponding to the DTMF digits, toward the user.

DTMF digits are always passed in the same order as they appear in the message.

#### 4.4.13.2.2 At the network (GS receiving the DTMF digits)

The network DTRS entity, upon receiving the DTMF digit message, checks for consistency of the message with respect to its ability to successfully generate the DTMF digits in the message. After checking for consistency, it transmits a response DTMF_TONE_GENERATE_ACK acknowledging the receipt to the requesting MES. However, the RR sublayer shall detect that it is at the network side of a TtT call and suppress transmission of these messages silently. If a protocol error is detected in the message in any one of the elements, the message shall be discarded silently. Processing of these messages and conversion of the information received in the DTMF_TONE_GENERATE_REQ message to the correct corresponding primitive(s) shall take place.

After successful processing of the message, the network generates the in-band DTMF tones toward the remote user according to the digit value and duration appearing in the message. The network generates the tone in the same order as it appears in the message. Upon detecting the start digit information in the message, the network starts generating the DTMF tone for that digit toward the remote user. Upon detecting the stop digit information, the network stops the tone that was generated. In doing so, it maintains the minimum duration provided in the stop digit information (i.e., the time between start of the digit and stop of the digit shall be at least equal to that which was specified in the Stop Digit IE). If this time period has already passed by the time the Stop Digit IE reaches the network, the network shall stop the tone being generated as soon as possible.

### 4.4.13.3 Handling of release/abort indication

When an established RR connection is released for any reason or is aborted due to a lower level failure, the RR will inform the MM and the DTRS using the release indication. The DTRS, upon detecting the release indication or abort indication primitive, will flush its transmit buffers of any tone requests waiting to be transmitted.

## 4.4.14 Dedicated mode frequency/timing control

During a call, the network can control the transmission frequency and timing of the MES by providing close loop feedback in the form of LINK CORRECTION messages. The LINK CORRECTION messages are applied to both the timing and frequency parameters. The procedure is as follows:

- The transmission frequency offset and timing correction parameters are transmitted by the network to the MES as and when the network considers it necessary to correct the transmission of the MES as a LINK CORRECTION message. The LINK CORRECTION message contains two fields: the Timing Correction parameter and the Frequency Offset parameter.

- The MES, upon receiving the LINK CORRECTION message, shall apply the appropriate correction while transmitting the next burst. Refer to GMR-1 05.010 [20] for the procedure.

- The LINK CORRECTION messages shall be transmitted using the unacknowledged information transfer mode supported by the DLL over SACCH, TACCH, or SDCCH. In case of SACCH the network may use service grade "Wait-then-Go" or "Immediate".

## 4.4.15 RX/TX guard time violation reporting

The MES shall monitor the guard time between the reception of a burst and the transmission of a burst. If the MES detects that the guard time has crossed the minimum threshold (see GMR-1 05.010 [20]), the MES shall transmit a GUARD TIME VIOLATION message to the network, using the acknowledged service of L2 over the main signalling link.

The message shall include the timing offset between the uplink frame N+7 and the downlink frame N as measured at the MES (see GMR-1 05.010 [20]).

The MES shall monitor the guard time with a minimum given periodicity (see GMR-1 05.010 [20]). It shall generate one GUARD_TIME_VIOLATION message for each detected violation.

## 4.4.16 In call handling of information messages

During a call, the network may request diagnostic information from the MES over the dedicated connection. The diagnostic messages from the network contain requests for specific information. The MES responds to these queries with specific responses. The procedure is as follows:

- The INFORMATION REQUEST message may be transmitted from the network during dedicated mode operations. The INFORMATION REQUEST message shall contain two request codes that specify the information being requested.

- The MES, upon receiving an INFORMATION REQUEST message, shall reply with INFORMATION RESPONSE messages containing the data requested by the network.

- The MES shall respond to the first request code in full before answering the second request code. The GS shall not send the same request code twice. The first request code shall not be null. As specified below, the two request codes can be related so that one request code modifies the meaning of the other request code.

- If the MES cannot provide the data requested in the INFORMATION REQUEST message, it shall reply with an INFORMATION RESPONSE ERROR message containing an error code, indicating why it cannot comply. If the problem is related to the first request code, the MES shall ignore the second request code. If the problem solely involves the second request code, the MES shall respond normally to the first request code.

- The network may send a subsequent INFORMATION REQUEST message before it has received all of the responses to the previous message. If the MES receives an INFORMATION REQUEST message while it is still replying to a previous INFORMATION REQUEST message, its behavior is determined by the setting of the override (Ov) bit in the most recent INFORMATION REQUEST message.

  If the override bit is not set, the MES shall finish responding to the initial message and then may either respond to or ignore the second message.

  If the override bit is set, the MES may first finish responding to the initial message if it is able do so without significant delay. Otherwise the MES shall take no further action to respond to the first message. The MES shall then respond to the second message.

- The network shall transmit the INFORMATION REQUEST message in unacknowledged mode on the SDCCH, TACCH, or SACCH. The network may use any service grade when sending the INFORMATION REQUEST over SACCH. The MES shall transmit the INFORMATION RESPONSE message in unacknowledged mode on the SDCCH or the SACCH. The network shall specify in the INFORMATION REQUEST message's SG field the service grade that the MES shall use when transmitting the INFORMATION RESPONSE message over the SACCH.

The following request codes may be sent by the network and shall be supported by the MES:

1) Spot Beam Selection: The network may use this command code to request the MES to transmit the measured strengths of the spot beam that the MES picked up in the last spot beam selection/reselection and its neighbours (see GMR-1 05.008 [19] for details). The MES shall respond by sending an INFORMATION RESPONSE SPOT BEAM SELECTION message describing all the spot beams in its list.

2) Current Beam: The network may use this request code to request the MES to transmit the measured strength of the spot beam that the MES is currently camped on (see GMR-1 05.008 [19] for details). The MES shall respond with an INFORMATION RESPONSE CURRENT BEAM message describing the current spot beam.

3) Position: The network may use this request code to request the position of the MES. The MES shall respond with an INFORMATION RESPONSE POSITION message. The position reported shall be the most recently measured position. If no position is available, the reported position shall be null. If the other request code is Spot Beam Selection, the MES shall report the position measured closest to the time of the last spot beam selection or reselection.

4) Power Control: The network may use this request code to request the MES to transmit the values of call statistics relating to power control (see GMR-1 05.008 [19] for details). The MES shall respond with an INFORMATION RESPONSE POWER CONTROL message.

5) Version: The network may use this request code to request the MES to transmit information about itself. The MES shall respond with the INFORMATION RESPONSE VERSION message.

6) Vendor Specific: The network may use this request code to request vendor-specific information from the MES. The INFORMATION REQUEST message shall include a subcommand field that may have vendor-specific significance to the MES. The MES shall respond to this message in one of the following ways: INFORMATION RESPONSE ERROR message with error code IRVS Not Supported, INFORMATION RESPONSE ERROR message with an error code in the vendor specific range, or one or more INFORMATION RESPONSE VENDOR SPECIFIC messages. The number and content of the INFORMATION RESPONSE VENDOR SPECIFIC messages shall be determined by the MES vendor.

7) Null: The MES shall not respond to this request code.

## 4.5 RR connection release procedure

In any of the release procedures described below, the indication to perform a location update at the end of call may be present at the RR sublayer. In this case, on return to idle mode, the RR entity tells the MM sublayer that the old LAI is the only available LAI, thereby forcing the MM sublayer to select that LAI and perform a location update.

### 4.5.1 Normal release procedure

The release of the RR connection can be requested by upper layers.

The purpose of this procedure is to deactivate all the dedicated channels in use. When the channels are released, the MES returns to the CCCH configuration, idle mode. The channel release procedure can be used in a variety of cases, including TCH release after a call release and DCCH release when a dedicated channel allocated for signalling is released.

The channel release procedure is always initiated by the network.

#### 4.5.1.1 Channel release procedure initiation

The network initiates the channel release by sending a CHANNEL RELEASE message to the MES on the main DCCH.

Upon receipt of a CHANNEL RELEASE message, the MES starts timer T3110 and disconnects the main signalling link. When T3110 times out, or when the disconnection is confirmed, the MES deactivates all channels, considers the RR connection as released, and returns to CCCH idle mode.

Data links other than the main signalling link are disconnected by local-end link release.

On the network side, when the main signalling link is disconnected, the network stops timer T3109 and starts timer T3111. When timer T3111 times out, the network deactivates the channels and they are free to be allocated to another connection.

The purpose of timer T3111 is to allow time to acknowledge the disconnection and to protect the channel in case of loss of the acknowledge frame.

If timer T3109 times out, the network deactivates the channels; they are then free to be allocated to another connection.

The CHANNEL RELEASE message will include an RR cause indication as follows:

| | |
|---|---|
| #0 | If it is a normal release (e.g., at the end of a call or at normal release of a DCCH). |
| #1 | To indicate an unspecified abnormal release. |
| #2, #3 or #4 | To indicate a specific release event. |
| #5 | If the channel is to be assigned for servicing a higher priority call (e.g., an emergency call). |
| #65 | If the call has already been cleared. |

#### 4.5.1.2 Abnormal cases

Abnormal cases are taken into account in the main part of the description of the procedure.

### 4.5.2 Radio link failure

The main part of these procedures concerns the "normal" cases (i.e., those without any occurrence of loss of communication means). A separate paragraph at the end of the description of each procedure treats a loss of communication case, which is called a radio link failure. In most cases the reaction of the MES or the network is the same in RR-connected mode. These reactions are described in this clause to avoid repetition.

A radio link failure can be detected in several ways:

1) By analysis of reception at L1, as specified in GMR-1 05.008 [19].

2) By a DLL failure on the main signalling link, as specified in GMR-1 04.006 [14]. A data link failure on any other data link will not be considered as a radio link failure.

3) When a lower layer failure occurs while the MES attempts to connect back to the old channels in a channel assignment procedure.

4) In some cases where timers are started to detect the lack of an answer from the other party, as described in clause 3.

The first two cases are known as "lower layer failure".

#### 4.5.2.1 Mobile Earth Station side

When a radio link failure is detected by the MES:

- The MES will perform a local-end release on all signalling links unless otherwise specified.
- The MES will deactivate all channels.
- The RR sublayer of the MES will indicate an RR connection failure to the MM sublayer unless otherwise specified.

NOTE: Upper layers may decide on a reestablishment.

#### 4.5.2.2 Network side

In RR connected mode, the reaction of the network to a lower layer failure depends on the context. Except when otherwise specified, it is to release the connection either with the channel release or with the following procedure. The network starts timer T3109.

When a radio link failure has been detected, an indication is passed to the upper MM sublayer on the network side.

When timer T3109 expires, the network can regard the channels as released and free for allocation.

NOTE: The network should maintain the transaction context for a while in order to allow call reestablishment. The length of the timer requires further study.

### 4.5.3 RR connection abortion

The MES aborts the RR connection by initiating a normal release of the main signalling link, performing local-end releases on all other signalling links and disconnecting all traffic channels, if any.

On the network side, when the main signalling link is disconnected, the network starts timer T3111. When timer T3111 times out, the network deactivates the channels and they are free to be allocated to another connection.

### 4.5.4 Handling of TtT signalling link (SAPI = 2 link) failure

For a single-hop TtT call, the DLLs on either the originating MES or the destination MES may detect failure of the TtT signalling link (SAPI = 2 link over the L-L switched channel). In this case, the MES detecting the failure of the TtT signalling link is required to send a TtT SIGNALLING LINK FAILURE message to the network, using acknowledged mode service of the L2 over the main signalling link. MES does not try to reinitiate any TtT signalling link establishment and does a local-end release of the SAPI = 2 connection. After sending the message, the MES behaves as if no TtT signalling link exists and continues using the main signalling link to communicate with the network. The network may respond to the MES by initiating a channel assignment or channel release procedure, or it may ignore the message, depending on the phase of the call.

## 4.6 Receiving an RR STATUS message by an RR entity

If the RR entity of the MES receives an RR STATUS message, no transition and no specific action shall be taken as seen from the radio interface (i.e., local actions are possible).

The action to be taken on receiving an RR STATUS message in the network is an implementation-dependent option (see clause 8).

# 5 Elementary procedures for mobility management

## 5.1 General

Same as clause 4.1 of GSM 04.08 [22].

### 5.1.1 Type of MM procedures

Same as those defined in clause 4.1.1 of GSM 04.08 [22].

### 5.1.2 MM sublayer states

Same as clause 4.1.2 of GSM 04.08 [22].

### 5.1.2.1 MM sublayer states in the Mobile Earth Station

Same as clause 4.1.2.1 of GSM 04.08 [22], with the following addition:

A transition from state 14 Wait for RR Connection (MM Connection) to state 3 Location Update Initiated is made if a mobile originated call setup is optimally routed. During this transition, the MM sublayer sends a LOCATION UPDATE REQUEST message with Follow-on-Request indicator, and stores the CM SERVICE REQUEST message to be sent after the location update is complete and the network has indicated Follow-on-Proceed. See clause 5.5.1.8.

#### 5.1.2.1.1 Main states

Same as clause 4.1.2.1.1 of GSM 04.08 [22].

#### 5.1.2.1.2 Substates of the MM idle state

Same as clause 4.1.2.1.2 of GSM 04.08 [22], except substituting the description for state 19.5 and adding new states 19.9 and 19.10.

19.5 No Cell Available

No cell can be selected. This state is entered several different ways:

- after a first intensive search failed (state 19.7);
- signal drops while in any of the states: Normal Service (signal is attenuated below the level necessary for Alerting), Attempting to Update, Limited Service, No IMSI, either PLMN Search state, High-penetration Alerting Service, Invalid Position, Location Update Needed.

The MES may be synchronized to the BACH if the High Penetration Alerting Service (19.9) state is not allowed. Otherwise, or in addition cells may be searched at a low rhythm. No services are offered. . If a cell is selected, then the next state may be any of the states from which the no cell state was entered, depending upon the update status, stored TMSI/LAI, signal level, previous reception of a position restriction, or previous reception of a requirement from RR to perform a location update (see clause 5.5.1.8).

19.9 High-Penetration Alerting Service

Valid subscriber data is available, update status is U1, and a cell is selected that belongs to the LA where the subscriber is registered. However, the MES shall not enter this service state from the INVALID POSITION service state (19.10).

Due to the low signal quality, only alerting service can be offered by the RR. The MES remains synchronized with the network by following the FCCH and the BACH. This state ends when either the signal level increases so that normal service can be provided (the new state is 19.1 or 19.6) or drops so low that even the alerting service cannot be maintained (the new state is 19.5).

19.10 Invalid Position

Valid subscriber data is available, update status is U1 or U2, and a cell is selected, but the position allows only network access for emergency calls because of position restrictions (IMMEDIATE ASSIGNMENT REJECT message with the Reject Cause of "invalid position", "invalid position for service provider", or "invalid position for the selected LAI" with no other unrestricted LAIs available for selection). This state ends when the network informs the terminal that the position allows network access again (various states depending on update status) or when No IMSI (new state is 19.4) or No Cell (loss of coverage or alerting signal level, see state 19.5) states are entered.

### 5.1.2.2 Update status

Same as clause 4.1.2.2 of GSM 04.08 [22].

### 5.1.2.3 MM sublayer states on the network side

Same as clause 4.1.2.3 of GSM 04.08 [22], except that the WAIT FOR RE-ESTABLISHMENT state is not supported.

# 5.2 Behavior in MM idle state

Same as clause 4.2 of GSM 04.08 [22].

## 5.2.1 Primary service state selection

### 5.2.1.1 Selection of the service state after power-on

Same as clause 4.2.1.1 of GSM 04.08 [22].

### 5.2.1.2 Other cases

Same as clause 4.2.1.2 of GSM 04.08 [22].

## 5.2.2 Detailed description of MES behavior in MM idle state

Same as clause 4.2.2 of GSM 04.08 [22].

### 5.2.2.1 Service state, normal service

Same as clause 4.2.2.1 of GSM 04.08 [22].

### 5.2.2.2 Service state, attempting to update

Same as clause 4.2.2.2 of GSM 04.08 [22].

### 5.2.2.3 Service state, limited service

Same as clause 4.2.2.3 of GSM 04.08 [22].

### 5.2.2.4 Service state, no IMSI

Same as clause 4.2.2.4 of GSM 04.08 [22].

### 5.2.2.5 Service state, search for PLMN, normal service

Same as clause 4.2.2.5 of GSM 04.08 [22].

### 5.2.2.6 Service state, search for PLMN

Same as clause 4.2.2.6 of GSM 04.08 [22].

### 5.2.2.7 Service state, high penetration alerting

When in state MM Idle and service state High Penetration Alerting, the MES shall:

- if timer T3211 expires, the timer is not restarted and no location update is performed. If the pending location update type is not periodic, the MES shall delete any LAI, TMSI, or CKSN stored in the SIM and set the update status to NOT UPDATED;
- if timer T3212 expires, perform a periodic location update when back in the Normal Service state. A response to a high-penetration alert shall take precedence over a pending periodic location update;
- not perform IMSI detach if powered down;
- reject requests from CM entities for MM connections;
- indicate alerting messages received on the BACH to the user;

- maintain synchronization with the BACH channel;
- not perform cell reselection.

#### 5.2.2.8 Service state, invalid position

When in state MM Idle and service state Invalid Position, the MES shall:

- if timer T3212 expires, perform a periodic location update;
- support requests from the CM layer For non-emergency calls, a location update is attempted first. The non-emergency service request is honored only if the location update is successful; otherwise, the request is rejected;
- respond to page messages, provided that either position reporting is not required or the position that is available for reporting is considered to be current (see clause 4.3.1.3). Otherwise, the MES shall not respond to pages.

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

When returning to MM IDLE, e.g., after a location updating procedure or CM Service Request, the MES selects the cell as specified in GMR-1 03.022 [5].

If this return to the idle state is not subsequent to a location updating procedure terminated with reception of cause "Roaming not allowed in this location area" the service state depends on the result of the cell selection procedure, on the update status of the MES, on the location data stored in the MES, on the presence so the SIM, and on a possible IMMEDIATE ASSIGNMENT REJECT Reject Cause value.

- If no cell has been found, the state is NO CELL AVAILABLE, until a cell is found.
- If the signal level drops to the high-penetration signal level range:
- If an Optimal Routing location update procedure of clause 5.5.1.8 was not performed, and the update status is UPDATED, and the state would not be INVALID POSITION if there were sufficient signal strength, then the state is HIGH PENETRATION ALERTING.
- Otherwise, the state is NO CELL until after the MES has executed a location update on the cell, irrespective of update status.
- If no SIM is present, or if the inserted SIM is considered Invalid by the MES, the state is NO IMSI.
- If the selected cell is in the location area where the MES is registered, then the state is NORMAL SERVICE; it shall be noted that this also includes an abnormal case described in clause 5.4.4.9.
- If the selected cell is in a location area where the mobile earth station is not registered but in which the MES is allowed to attempt a location update, then the state is LOCATION UPDATE NEEDED.
- If the selected cell is in a location area where the MES is not allowed to attempt a location update, then the state is 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 GMR-1 03.022 [5]), 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.

### 5.2.4 Service state after position verification

MM shall enter the LOCATION UPDATE NEEDED state and initiate the location updating procedure at the conclusion to the "Position Verification" procedure (see clause 4.2.1.2) if both of the following conditions are met:

- the MES receives either a Position Verification Notify message or an Immediate Assignment Reject message with the Reject Cause REPORTED POSITION ACCEPTABLE;
- the MM IDLE service state is INVALID POSITION.

## 5.3 MM common procedures

### 5.3.1 TMSI reallocation procedure

Same as clause 4.3.1 of GSM 04.08 [22].

### 5.3.2 Authentication procedure

Same as clause 4.3.2 of GSM 04.08 [22].

#### 5.3.2.1 Authentication request by network

Same as clause 4.3.2.1 of GSM 04.08 [22].

#### 5.3.2.2 Authentication response by the mobile earth station

Same as clause 4.3.2.2 of GSM 04.08 [22].

#### 5.3.2.3 Authentication processing in the network

Same as clause 4.3.2.3 of GSM 04.08 [22].

#### 5.3.2.4 Ciphering key sequence number

Same as clause 4.3.2.4 of GSM 04.08 [22], except that the CM REESTABLISHMENT REQUEST message is not supported and thus the MES cannot report the sequence number using this message.

#### 5.3.2.5 Unsuccessful authentication

Same as clause 4.3.2.5 of GSM 04.08 [22].

#### 5.3.2.6 Abnormal cases

Same as clause 4.3.2.6 of GSM 04.08 [22].

### 5.3.3 Identification procedure

Same as clause 4.3.3 of GSM 04.08 [22].

### 5.3.4 IMSI detach procedure

Same as clause 4.3.4 of GSM 04.08 [22].

### 5.3.5 Abort procedure

Same as clause 4.3.5 of GSM 04.08 [22].

## 5.4 MM specific procedures

Same as clause 4.4 of GSM 04.08 [22].

### 5.4.1 Location updating procedure

Same as clause 4.4.1 of GSM 04.08 [22], except that if the LOCATION UPDATE REJECT message is received with the cause "roaming not allowed in this location area" or with the cause "location area not allowed" and the location updating procedure was performed at the beginning of an optimally routed call (see clause 5.5.1.8), then the MES shall not add the LAI to any of the forbidden lists.

### 5.4.2 Periodic updating

Same as clause 4.4.2 of GSM 04.08 [22], except for the following modifications:

- The service state INVALID POSITION is added to the list of MM IDLE substates for which the timer T3212 is started, if not already running.
- The service state HIGH-PENETRATION ALERTING is added to the list of MM IDLE substates for which, when the timer T3212 expires, the location updating procedure is delayed until the service state is left.

### 5.4.3 IMSI attach procedure

Same as clause 4.4.3 of GSM 04.08 [22].

### 5.4.4 Generic location updating procedure

Same as clause 4.4.4 of GSM 04.08 [22].

#### 5.4.4.1 Location updating initiation by the mobile earth station

Same as clause 4.4.4.1 of GSM 04.08 [22].

##### 5.4.4.1.1 Network request for additional MES capability information

Same as clause 4.4.4.1a of GSM 04.08 [22].

#### 5.4.4.2 Identification request from network

Same as clause 4.4.4.2 of GSM 04.08 [22].

### 5.4.4.3 Authentication from network

Same as clause 4.4.4.3 of GSM 04.08 [22].

### 5.4.4.4 Ciphering mode setting by network

Same as clause 4.4.4.4 of GSM 04.08 [22].

### 5.4.4.5 Attempt counter

Same as clause 4.4.4.5 of GSM 04.08 [22].

### 5.4.4.6 Location updating accepted by network

Same as clause 4.4.4.6 of GSM 04.08 [22].

### 5.4.4.7 Location updating not accepted by network

Same as clause 4.4.4.7 of GSM 04.08 [22], except that if the location update procedure was performed at the beginning of an optimally routed call (see clause 5.5.1.8), the MES shall not store the LAI or the PLMN identity in any forbidden list and shall not perform a PLMN selection instead of a cell selection when back in the MM IDLE state.

### 5.4.4.8 Release of RR connection after location updating

Same as clause 4.4.4.8 of GSM 04.08 [22].

### 5.4.4.9 Abnormal cases on the network side

Same as clause 4.4.4.10 of GSM 04.08 [22].

### 5.4.4.10 Abnormal cases on the mobile side

Same as clause 4.4.4.9 of GSM 04.08 [22], except for the following changes.

- This clause shall not apply for location updates for optimal routing (those location updates that are initiated in compliance with clause 5.5.1.8).
- Cases (b) and (c) are replaced with the cases below.
- Cases (h), (i), and (j) are added.

a) Same as clause 4.4.4.9, case a) of GSM 04.08 [22].

b) The answer to random access is an IMMEDIATE ASSIGNMENT REJECT message with Reject Cause, "lack of resources".

   The location updating is not started. The MES stays in the chosen cell and applies the normal cell selection process. The waiting timer T3122 is reset when a cell change occurs. The procedure is started as soon as possible after T3122 timeout if still necessary.

c) Random access failure

   Each time a random access failure occurs, the MES shall repeat spot beam selection. The MES shall make new BCCH measurements for the spot beam selection, as described in GMR-1 05.008 [19]. For each value of the attempt counter, the MES shall inhibit the selection of a spot beam in which a random access procedure has already been attempted, provided that there is another suitable spot beam.

   Upon the third successive random access failure for location updating, the MES shall proceed as specified below. Otherwise, the LU procedure shall be attempted again after spot beam selection.

d) Same as clause 4.4.4.9, case d) of GSM 04.08 [22].

e) Same as clause 4.4.4.9, case e) of GSM 04.08 [22].

f) Same as clause 4.4.4.9, case f) of GSM 04.08 [22].

g) Void.

h) The answer to random access is an IMMEDIATE ASSIGNMENT REJECT message 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 MES shall enter the MM IDLE substate INVALID POSITION when the RR connection is released.

i) The answer to random access is an IMMEDIATE ASSIGNMENT REJECT message with Reject Cause either "Invalid position for this spot beam", or "Invalid position for this LAI" and there is another LAI available.

   All RR and MM timers are stopped and the attempt counter is reset. Upon selection of a new LAI, the location updating procedure is restarted.

NOTE: As specified in GMR-1 03.022 [5], either of these conditions initiates a spot beam reselection or an LAI selection which will result in a change of LAI and therefore location updating.

j) The answer to random access is an IMMEDIATE ASSIGNMENT REJECT message with Reject Cause, "Position too old".

   If it was a periodic location update, the MES shall take no further action with respect to update status or MM IDLE state. If the location update was for any other reason, the MES shall delete any LAI, TMSI, or CKSN stored in the SIM, set the update status to NOT UPDATED, and enter the MM IDLE state INVALID POSITION when the RR connection is released.

# 5.5 Connection management sublayer service provision

Same as clause 4.5 of GSM 04.08 [22].

## 5.5.1 MM connection establishment

### 5.5.1.1 MM connection establishment initiated by the Mobile Earth Station

Upon request of a CM entity to establish an MM connection, the MM sublayer first decides whether to accept, delay, or reject this request.

An MM connection establishment may only be initiated by the MES when the following conditions are fulfilled.

- Either the update status is UPDATED, or its update status is NOT UPDATED and MM is in the ATTEMPTING TO UPDATE or INVALID POSITION substate of MM IDLE.
- The MM sublayer is in one of the states MM IDLE or MM connection active.

An exception from this general rule exists for emergency calls (see clause 5.5.1.5).

To establish an MM connection, the MES proceeds as follows:

a) If no RR connection exists, the MM sublayer requests the RR sublayer to establish an RR connection and enters the MM sublayer state WAIT FOR RR CONNECTION (MM CONNECTION). In all cases, the establishment cause shall match the CM SERVICE REQUEST.

   - If the status is UPDATED, this request contains an establishment cause and a CM SERVICE REQUEST message. If the establishment cause is mobile-originated call, it also contains the dialled digits. If the establishment of an RR connection is indicated by the RR sublayer and a further registration is not required, the MM sublayer of the MES starts timer T3230, gives an indication to the CM entity that requested the MM connection establishment, and enters the MM sublayer state WAIT FOR OUTGOING MM CONNECTION. If the RR sublayer indicates that a registration is required along with the establishment of the RR sublayer, MM first conducts a location update as described in clause 5.5.1.8.

   - If the status is NOT UPDATED or MM is in the idle substate LOCATION UPDATE NEEDED, the MES shall first execute a location update and delay the service request until the location updating procedure is completed. The RR request contains an establishment cause and a LOCATION UPDATE REQUEST with the "follow on request" indication. If the establishment cause is mobile-originated call, it also contains the dialled digits. When the location updating procedure is completed, the MES may be given the opportunity by the network to use the RR connection; see clause 5.4.4.6. If allowed by the network, the MES sends the CM SERVICE REQUEST. The MM sublayer starts timer T3230, gives an indication to the CM entity that requested the MM connection establishment, and enters the MM sublayer state WAIT FOR OUTGOING MM CONNECTION.

b) If an RR connection is available, the MM sublayer shall examine the CM service type of the request from the CM entity. If the service type is mobile originated call establishment, the request shall either be rejected or delayed, depending on implementation, until all MM-specific procedures are finished and the RR connection is released, unless at least one pre-existing MM connection is also for a call establishment. If an MM specific procedure is running at the time of the request and the LOCATION UPDATING REQUEST message has not been sent, the MES shall not include a "follow on request" indicator in the message. The MES shall then delay or reject the CM request, depending upon implementation, until the MM specific procedure is completed and the RR session is released.

   The MM sublayer of the MES sends a CM SERVICE REQUEST message to the network, starts timer T3230, gives an indication to the CM entity that requested the MM connection establishment, and enters

   - MM sublayer state WAIT FOR OUTGOING MM CONNECTION, if no MM connection is active,

   - MM sublayer state WAIT FOR ADDITIONAL OUTGOING MM CONNECTION, if at least one MM connection is active,

- If an RR connection exists but the MES is in the state WAIT FOR NETWORK COMMAND then any requests from the CM layer that are received will either be rejected or delayed until this state is left.

The rest of the clause is the same as clause 5.5.1.1 of GSM 04.08 [22], beginning with the description of content of the CM SERVICE REQUEST message.

### 5.5.1.2 Abnormal cases

Same as clause 4.5.1.2 of GSM 04.08 [22].

### 5.5.1.3 MM connection establishment initiated by the network

Same as clause 4.5.1.3 of GSM 04.08 [22].

### 5.5.1.4 Abnormal cases

Same as clause 4.5.1.4 of GSM 04.08 [22].

### 5.5.1.5 MM connection establishment for emergency calls

Same as clause 4.5.1.5 of GSM 04.08 [22].

#### 5.5.1.6 Call reestablishment

This procedure is not supported.

#### 5.5.1.7 Forced release during MO MM connection establishment

Same as clause 4.5.1.7 of GSM 04.08 [22].

#### 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:

- 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 AT shall proceed as normal (see clause 5.4.4.7). After release of the RR connection, the AT 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 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 AT shall delete the TMSI and LAI and shall set the SIM status to NOT UPDATED. If the location update fails, the AT 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. The AT shall camp on the previous idle mode camped-on channels and shall initiate a normal location update (see clause 5.4.4.1).
- Upon release of the RR connection, and after a location update if so required, the AT may try to service the pending CM request again. If so, the AT shall indicate to the network that the optimal routing attempt for the request failed the previous time (see clause 4.3.1.3).

NOTE: 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 4.5.2 of GSM 04.08 [22].

### 5.5.3 MM connection release

Same as clause 4.5.3 of GSM 04.08 [22].

## 5.6 Receiving an MM STATUS message by an MM entity

Same as clause 4.6 of GSM 04.08 [22].

# 6 Elementary procedures for circuit-switched call control

## 6.1 Overview

Same as clause 5.1 of GSM 04.08 [22].

## 6.2 Call establishment procedures

Call establishment is initiated at the request of the upper layer in either the MES or the network; it consists of the following:

- Establishment of a CC connection between the MES and the network.
- Activation of the codec or interworking function.

When it is specified in the present document that the MES shall attach the user connection, this means that the MES shall activate the codec or interworking function as soon as an appropriate channel is available. At that time, it shall also stop a possible Call in Progress (CIP) tone. The MES shall deactivate the codec or interworking function whenever an appropriate channel is no longer available. As soon as an appropriate channel is (again) available, the codec or interworking function shall be reactivated. A new order to attach the user connection shall supersede the previous one.

A channel shall be considered appropriate if it is consistent with the possibly negotiated bearer capability applicable for the actual phase of the call and one of the following conditions persists:

- The user connection shall be attached but no appropriate channel is available for a contiguous time of 30 seconds.
- The codec or interworking function is deactivated for a contiguous time of 30 seconds, then the MES may initiate call clearing.

Upon request of upper layers to establish a call, restricting conditions for the establishment of the call are examined. These restricting conditions concern the states of parallel CC entities and are defined elsewhere. If these conditions are fulfilled, call establishment is rejected. Otherwise, a CC entity in state U0, "null", is selected to establish the call. It initiates the establishment by requesting the MM sublayer to establish an MM connection.

### 6.2.1 Mobile-originating call establishment

The call control entity of the MES initiates establishment of a CC connection by requesting the MM sublayer to establish a mobile originating MM connection and entering the "MM connection pending" state. There are two types of mobile-originating calls: basic and emergency. The request to establish an MM connection will contain a parameter to specify whether the call is a basic or an emergency call. This information may lead to specific qualities of services to be provided by the MM sublayers. In case of a basic call, the CC sublayer also passes the dialled digits along with the request to the MM sublayer for the establishment of mobile-originated MM connection. Timer T303 is started when the CM SERVICE REQUEST message is sent.

While in the "MM connection pending" state, the call entity of the MES may cancel the call prior to sending the first CALL CONTROL message.

#### 6.2.1.1 Call initiation

Same as clause 5.2.1.1 of GSM 04.08 [22].

### 6.2.1.2 Receipt of a setup message

Same as clause 5.2.1.2 of GSM 04.08 [22].

### 6.2.1.3 Receipt of a call proceeding message

Same as clause 5.2.1.3 of GSM 04.08 [22].

### 6.2.1.4 Notification of progressing mobile originated call

Same as clause 5.2.1.4 of GSM 04.08 [22].

#### 6.2.1.4.1 Notification of interworking in connection with mobile originated call establishment

Same as clause 5.2.1.4.1 of GSM 04.08 [22].

#### 6.2.1.4.2 Call progress in the PLMN/ISDN environment

Same as clause 5.2.1.4.2 of GSM 04.08 [22].

#### 6.2.1.4.3 Delay in response at the called interface

To inform the MES that the call is delayed at the called interface, the network may send a Progress Indicator IE to the calling MES in one of the following ways:

- an appropriate CALL CONTROL message, if a state change is required (e.g., alerting);
- the PROGRESS message, if no state change is appropriate.

This Progress Indicator IE will contain progress description value #10 "delay in response at the called interface". The MES will apply a CIP tone upon receipt of this value.

### 6.2.1.5 Alerting

Having entered the "mobile originating call proceeding" state, upon receiving an indication that user alerting has been initiated at the called address, the call control entity of the network shall send an alerting message to its peer entity at the calling MES and enter the "call delivered" state.

When the call control entity of the MES in the "call initiated" state or "mobile originated call proceeding" state receives an alerting message, then the call control entity of the mobile earth station shall stop timers T303 and T310 (if running) and shall enter the "call delivered" state. In this state, for speech calls:

- An alerting indication should be given to the user. If the MES has not attached the user connection, it shall internally generate an alerting indication. If the MES has attached the user connection, the network is responsible for generating the alerting indication and the MES need not generate one.
- If a call-in-progress tone was being sent to the user by the MES because of an earlier Progress Indicator IE, the MES should stop the tone. The network shall ensure that the terminal is not attached at this point.

Abnormal cases:

On the MES side, if timer T310 expires, the call control entity of the MES shall initiate the call. See figure 6.1.

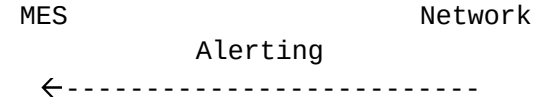


**Figure 6.1: Call confirmation at mobile originating – call establishment**

#### 6.2.1.6 Call connected

Same as clause 5.2.1.6 of GSM 04.08 [22]. In the case of a terminal-to-terminal call, the ringback tone to the user will be stopped, and the voice path will be connected.

#### 6.2.1.7 Call rejection

Same as clause 5.2.1.7 of GSM 04.08 [22].

#### 6.2.1.8 Transit network selection

#### 6.2.1.9 Traffic channel assignment at mobile originating call establishment

Same as clause 5.2.1.9 of GSM 04.08 [22].

#### 6.2.1.10 Call queuing at mobile originating call establishment

Same as clause 5.2.1.10 of GSM 04.08 [22].

### 6.2.2 Mobile terminating call establishment

Same as clause 5.2.2 of GSM 04.08 [22].

## 6.3 Signalling procedures during the "active" state

Same as clause 5.3 of GSM 04.08 [22].

### 6.3.1 User notification procedure

Same as clause 5.3.1 of GSM 04.08 [22].

### 6.3.2 Call rearrangements

Same as clause 5.3.2 of GSM 04.08 [22].

### 6.3.3 Void

### 6.3.4 Support of dual services

The MES is not obliged to support the network originated in-call modification procedure. In that case, the MES, when receiving a modify message, treats the message as unknown and reacts. If the MES is already prepared to support the procedure in both directions, it shall act as described in this clause.

a) this enum not used;

b) this enum not used;

c) alternate Speech/Group 3 fax (Teleservice 61 according to GSM 02.03 [21]).

#### 6.3.4.1 Service description

Same as clause 5.3.4.1 of GSM 04.08 [22], except that the reference to the handover procedure should be ignored.

#### 6.3.4.2 Call establishment

Same as clause 5.3.4.2 of GSM 04.08 [22].

#### 6.3.4.3 Changing the call mode

Same as clause 5.3.4.3 of GSM 04.08 [22].

##### 6.3.4.3.1 Initiation of in-call modification

Same as clause 5.3.4.3.1 of GSM 04.08 [22].

##### 6.3.4.3.2 Successful completion of in-call modification

Same as clause 5.3.4.3.2 of GSM 04.08 [22] except that the reference to alternate speech/data should be ignored.

##### 6.3.4.3.3 Change of the channel configuration

Same as clause 5.3.4.3.3 of GSM 04.08 [22].

##### 6.3.4.3.4 Failure of in-call modification

Same as clause 5.3.4.3.4 of GSM 04.08 [22].

#### 6.3.4.4 Abnormal procedures

Same as clause 5.3.4.4 of GSM 04.08 [22].

## 6.4 Call clearing

Same as clause 5.4 of GSM 04.08 [22].

## 6.5 Miscellaneous procedures

### 6.5.1 In-band tones and announcements

When the network wants to make the MES attach the user connection (e.g., to provide in-band tones/announcement) before the MES has reached the "active" state of a call, the network may include a Progress Indicator IE indicating user attachment in a suitable CC message:

- it includes the IE in a setup, call proceeding, alerting, or connect message that is sent during call establishment, or
- it sends a progress message containing the IE.

A Progress Indicator IE indicates user attachment if it specifies a progress description in the set {1, 2, 3} or in the set {6, 7, 8,…, 20}. The exception to this set is the value 10. If the value of 10 in Progress Indicator IE is received by the mobile, then the mobile should begin generating the call-in-progress tone toward the user, irrespective of whether a user attachment is already done.

Upon reception of a SETUP, CALL PROCEEDING, ALERTING, CONNECT, or PROGRESS message, the MES will proceed as specified elsewhere in clause 5. If the Progress Indicator IE indicated user attachment and a speech mode traffic channel is appropriate for the call, the MES will, in addition, attach the user connection for the speech as soon as an appropriate channel in speech is available. (If a new order to attach the user connection is received before the attachment has been performed, it will supersede the previous one.)

NOTE: This allows the use of Progress Indicator IE independently of the channel modes appropriate for the call.

### 6.5.2 Call collisions

Same as clause 5.5.2 of GSM 04.08 [22].

### 6.5.3 Status procedures

Same as clause 5.5.3 of GSM 04.08 [22].

### 6.5.4 Call reestablishment, Mobile Earth Station side

Same as clause 5.5.4 of GSM 04.08 [22].

### 6.5.5 Call reestablishment, network side

Same as clause 5.5.5 of GSM 04.08 [22].

### 6.5.6 Progress

Same as clause 5.5.6 of GSM 04.08 [22].

### 6.5.7 DTMF protocol control procedure

DTMF is transported from the MES to the network using the DTRS service, which is part of the RR sublayer. The procedure for handling is described in GMR-1 04.007 [15] and the present document. This also applies to the DTMF signalling procedure for MES-MES calls over the TtT channel. In the GMR-1 system, DTMF is transported from the network to the MES in-band, and hence does not require messages/procedures at the CC sublayer.

# 7 Support of packet services

Same as clause 6 of GSM 04.08 [22].

# 8 Examples of structured procedures

Same as clause 7 of GSM 04.08 [22].

## 8.1 General

This clause contains examples of how the network may group the elementary procedures in order to provide normal service.

Layer 3 signalling at the radio interface may be divided into structured procedures that consist of specific combinations of elementary procedures. Examples of structured procedures are provided. A structured procedure consists of some of the components shown in figure 8.1. These components are characterized by their use in structured procedures and their message flow.

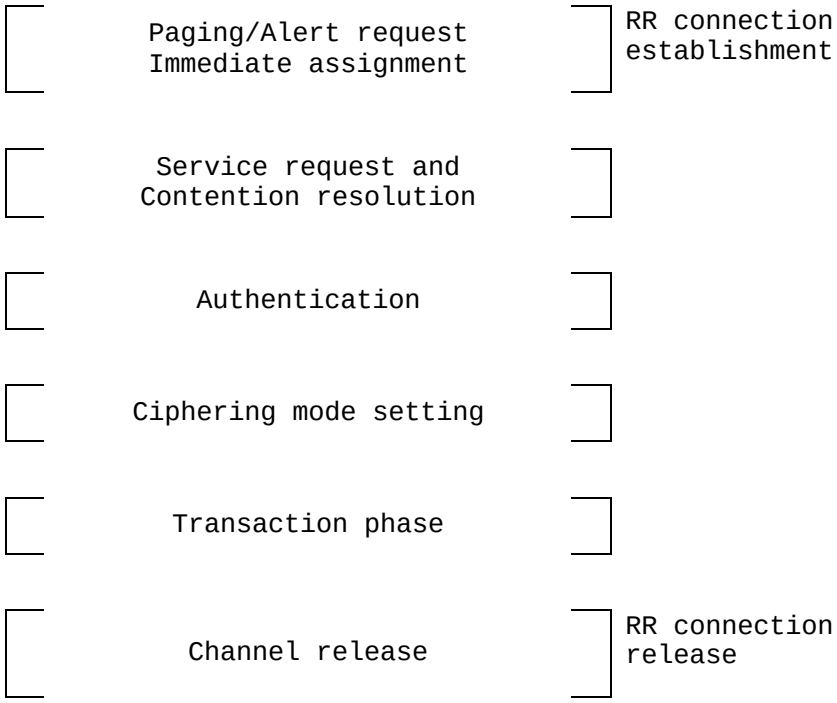


**Figure 8.1: Components of structured procedures**

## 8.1.1 Paging and alert request

### 8.1.1.1 Paging request

Same as clause 7.1.1 of GSM 04.08 [22].

### 8.1.1.2 Alert request

The alerting procedure is used to locate an MES that cannot listen to paging, to which a connection needs to be established.

Upon receipt of an ALERT REQUEST message, the addressed MES indicates the user to change the user environment so that the MES can decode the BCCH. The MES then initiates the immediate assignment procedure. The alert request procedure is shown below in figure 8.2.

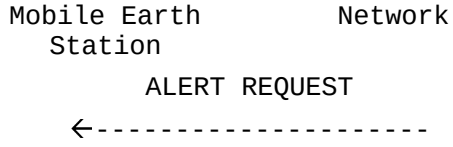


**Figure 8.2: Alert sequence**

### 8.1.2 Immediate assignment

The immediate assignment procedure is always initiated by the MES. It may be triggered by a paging request, an alert request, or a mobile originating service request.

The MES sends a CHANNEL REQUEST message on the random access channel. The network responds with an IMMEDIATE ASSIGNMENT message that causes the MES to seize the indicated dedicated channel. The immediate assignment procedure is shown below in figure 8.3.

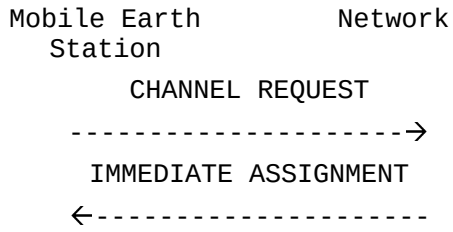


**Figure 8.3: Immediate assignment**

### 8.1.3 Service request and contention resolution

Same as clause 7.1.3 of GSM 04.08 [22], except for the following differences.

If the complete SERVICE REQUEST message cannot be accommodated in the L2 SABM frame, the Contention Resolution parameter is used to perform contention resolution. The information field in UA is compared against the Information field sent in SABM. If the Contention Resolution parameter is sent in SABM, the SERVICE REQUEST message is transmitted in I frames once UA is received. The information field in SABM/UA should be unique across all MESs in the spot beam in order to provide contention resolution. Refer to GMR-1 04.006 [14] for details.

Also, the CM REESTABLISHMENT REQUEST message is not supported, so it cannot be the initial SERVICE REQUEST message transmitted by the MES.

### 8.1.4 Authentication

Same as clause 7.1.4 of GSM 04.08 [22].

### 8.1.5 Ciphering mode setting

Same as clause 7.1.5 of GSM 04.08 [22].

### 8.1.6 Transaction phase

Same as clause 7.1.6 of GSM 04.08 [22].

### 8.1.7 Channel release

Same as clause 7.1.7 of GSM 04.08 [22].

## 8.2 Abnormal cases

Same as clause 7.2 of GSM 04.08 [22].

## 8.3 Selected examples

The following examples are considered:

- location updating;

- mobile originating call establishment;
- without Off-Air Call Setup (OACSU) (early assignment);
- with very early assignment;
- with location update (optimal routing);
- mobile terminating call establishment;
- without OACSU (early assignment);
- call clearing;
- network initiated;
- mobile initiated in-call modification;
- handover;
- mobile-to-mobile call (single satellite hop).

### 8.3.1 Location updating

Same as clause 7.3.1 of GSM 04.08 [22].

### 8.3.2 Mobile originating call establishment

The MES initiates an immediate assignment service request using the CM SERVICE REQUEST message and contention resolution. The network may initiate authentication and may start the ciphering mode setting.

After sending the CIPHERING MODE COMPLETE message, the MES initiates call establishment by sending the SETUP message to the network. The network answers with a CALL PROCEEDING message.

a) Without the OACSU option (early assignment)

With this option the network allocates a traffic channel to the MES before it initiates call establishment in the fixed network.

If call queuing is applied, it may cause variable delay in the traffic channel assignment.

When user alerting has been initiated at the called side, an alerting message is sent to the MES. The network may optionally instruct the MES to attach the user connection at this stage of the call by means of the Progress Indicator IE set to the value #1 or #8 (if the ringing tone will be sent by the remote end) in the alerting message. In this case, an alerting ringing tone must be generated by the network.

NOTE: The speech codec is transparent for supervisory tones.

A CONNECT message and its acknowledgment CONNECT ACKNOWLEDGE complete the call establishment when the called party has answered.

The mobile originating call setup with early assignment is in figure 8.4.

b) Very early assignment

The network assigns the traffic channel at the earliest possible moment (i.e., in the immediate assignment procedure). The mode of the traffic channel is changed from signalling only to the mode necessary for the call by means of the channel mode change procedure. An appropriate time for that change is after the network has sent the CALL PROCEEDING message when the call is established toward the called user.

With this option, call queuing is never applied.

The further establishment of the call is as in a).

The mobile originating call setup with very early assignment is shown in figure 8.5.

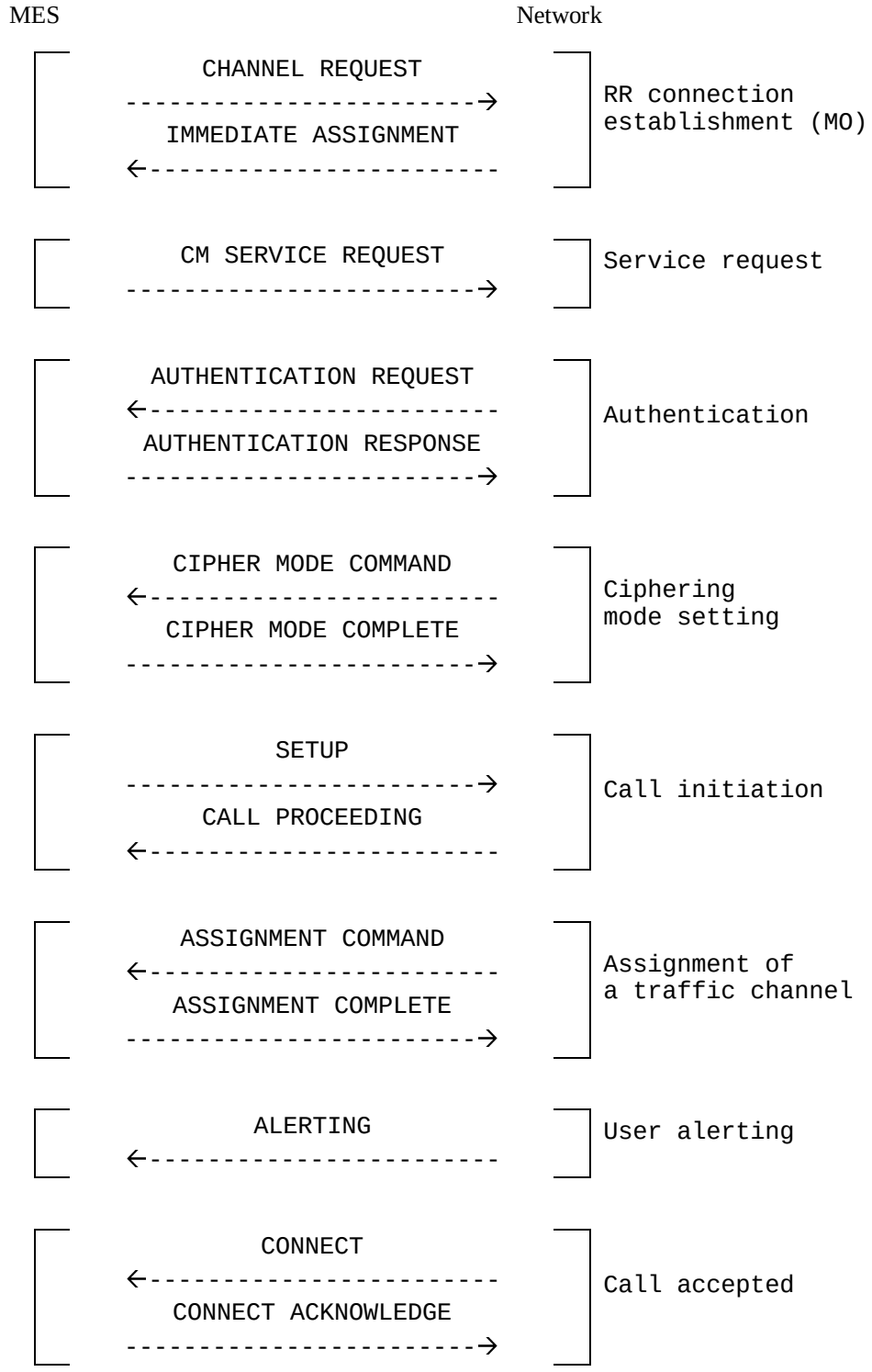


**Figure 8.4: Mobile originating call establishment without OACSU (early assignment)**

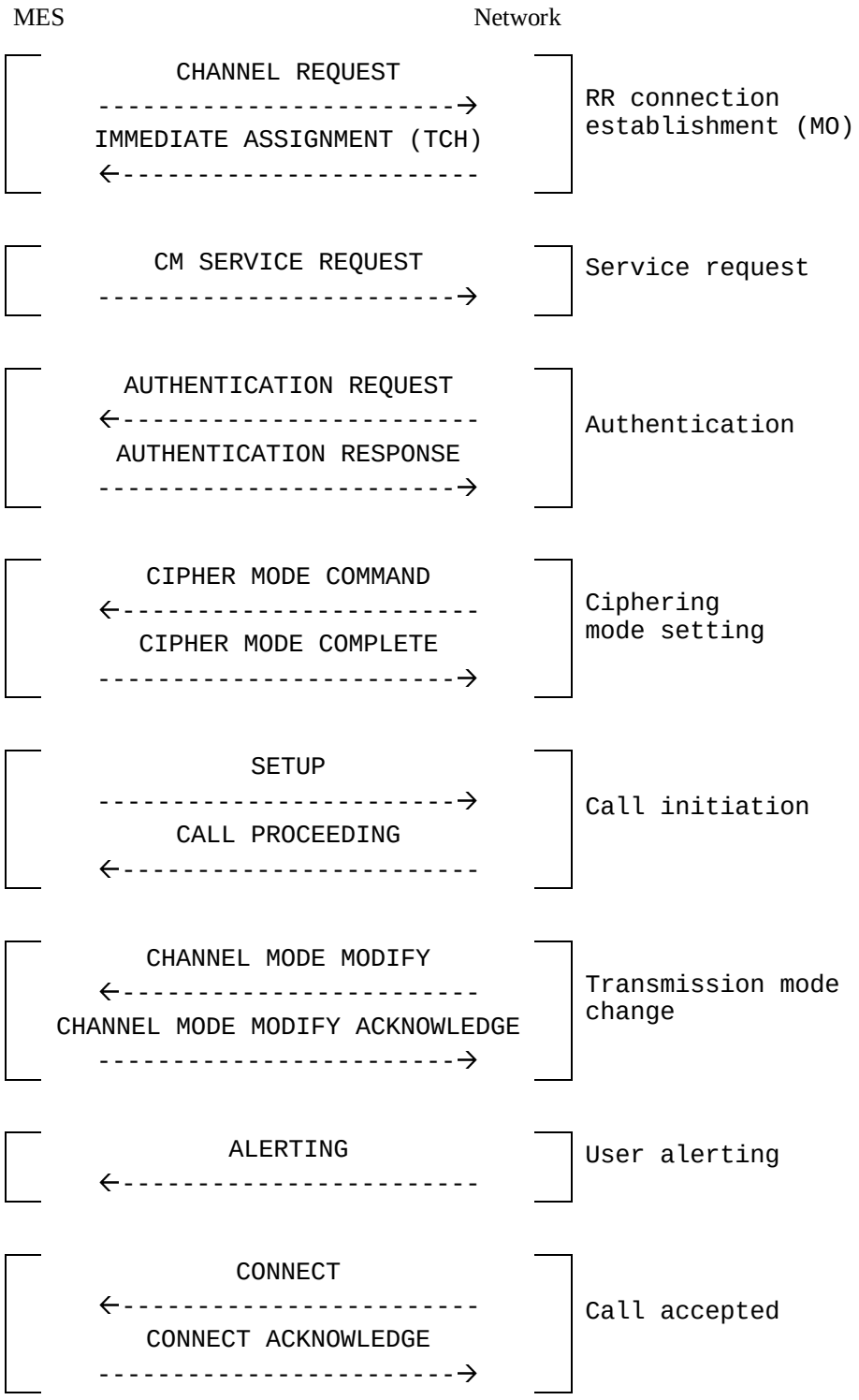


**Figure 8.5: Mobile Originating Call Establishment with Very Early Assignment**

c) Location Update

Independent of the kind of assignment as discussed in a) orb) above, for the purpose of optimal routing, the MES may be instructed by the network to do a location update before the call can be established. The MES then sends a LOCATION UPDATE REQUEST message with a "follow on proceed" indicator. The network completes the LU procedure and responds with a TMSI REALLOCATION COMPLETE message. The call then proceeds as in a) or b) depending on the kind of assignment.

The mobile originating call setup with location update (with very early assignment) is shown in figure 8.6.

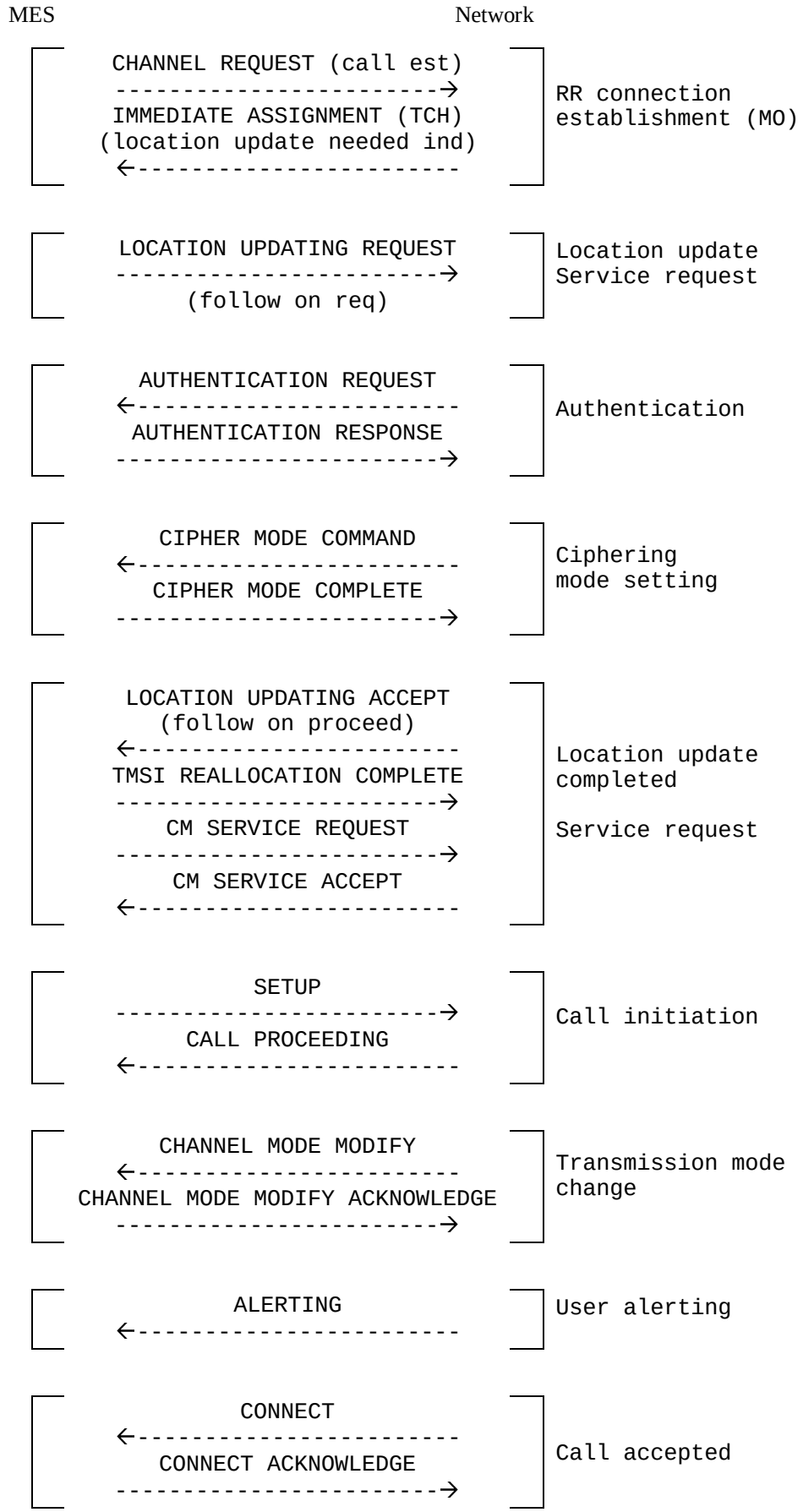


**Figure 8.6: Mobile originating call establishment with location update**

## 8.3.3 Mobile terminating call establishment

Same as clause 7.3.3 of GSM 04.08 [22], except that the OACSU option (late assignment) is not used.

## 8.3.4 Call clearing

Same as clause 7.3.4 of GSM 04.08 [22].

## 8.3.5 DTMF protocol control

This function is not currently supported in GMR-1.

## 8.3.6 Handover

Figure 8.7 shows the structured procedure for a handover.

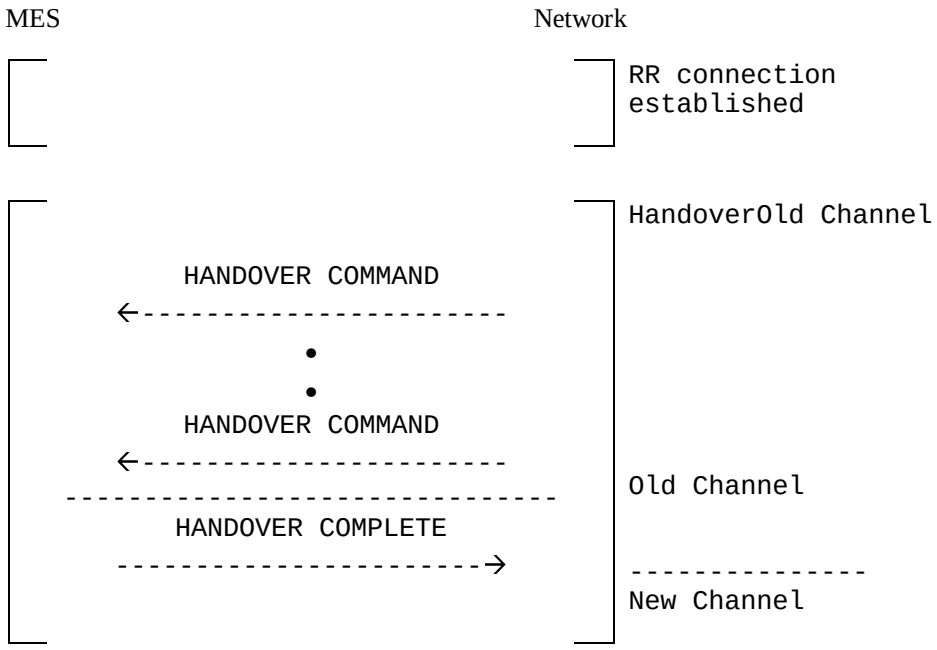


**Figure 8.7: Handover**

## 8.3.7 In-call modification

Same as clause 7.3.7 of GSM 04.08 [22].

## 8.3.8 Call reestablishment

This function is not currently supported in GMR-1.

## 8.3.9 Mobile-to-mobile call establishment

See GMR-1 03.296 [6].

## 8.3.10 Multisatellite optimal routing for call establishment

See GMR-1 03.297 [7].

# 9 Handling of unknown, unforeseen, and erroneous protocol data

Same as clause 8 of GSM 04.08 [22].

# 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 GMR-1 04.007 [15], 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, cf. GMR-1 04.007 [15]). 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 the present document 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, describing the value part of the IE;

   4) the presence requirement indication (M, C, or O) for the IE as defined in GMR-1 04.007 [15];

   5) the format of the IE (T, V, TV, LV, TLV) as defined in GMR-1 04.007 [15];

   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 GEM 04.10. This indication is non normative.

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 (cf. GMR-1 04.007 [15]).

# 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 |
| **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 SIGNALLING 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 |
| 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 |
| **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

This function is not currently supported in GMR-1.

## 10.1.2 Assignment command 1 and assignment command 2

### 10.1.2.1 Assignment command 1

This message is sent on the main DCCH by the network to the MES to change the channel configuration to another independent dedicated channel configuration during an MES Public Switched Telephone Network (PSTN) call. See table 10.3.

Message type: ASSIGNMENT COMMAND 1

Significance: dual

Direction: network to MES

**Table 10.3: ASSIGNMENT COMMAND 1 message content**

| IEI | Information Element | Type/Reference | Presence | Format | Length |
|---|---|---|---|---|---|
| | RR Management Protocol Discriminator | Protocol Discriminator 11.2 | M | V | ½ |
| | Skip Indicator | Skip Indicator 11.3.1 | M | V | ½ |
| | Assignment Command 1 Message Type | Message Type 11.4 | M | V | 1 |
| | Channel Description | Channel Description 11.5.2.5 | M | V | 4 |
| 7D | Timing Offset | Timing Offset 11.5.2.40 | O | TV | 3 |
| 7F | Frequency Offset | Frequency Offset 11.5.2.49 | O | TV | 3 |
| 63 | Channel Mode | Channel Mode 11.5.2.6 | O | TV | 2 |
| 71 | Power Control Parameters | Power Control Parameters 11.5.2.60 | O | TV | 6 |
| 9- | Cipher Mode Setting | Cipher Mode Setting 11.5.2.9 | O | TV | 1 |

#### 10.1.2.1.1 Channel mode

If this IE is not present, the channel mode of the previously allocated channel is assumed.

#### 10.1.2.1.2 Cipher mode setting

This IE appears when the ciphering mode is changed after the MES has switched to the assigned channel.

If this IE is omitted, the mode of ciphering is not changed after the MES has switched to the assigned channel.

#### 10.1.2.2 Assignment command 2

This message is sent on the main signalling link by the network to the MESs during a MES-to-MES call to transfer TtT Configuration parameters such as new channel, common ciphering key, etc. See table 10.4.

Message type: ASSIGNMENT COMMAND 2

Significance: dual

Direction: network to MES

**Table 10.4: ASSIGNMENT COMMAND 2 message content**

| IEI | Information Element | Type/Reference | Presence | Format | Length |
|---|---|---|---|---|---|
| | RR Management Protocol Discriminator | Protocol Discriminator 11.2 | M | V | ½ |
| | Skip Indicator | Skip Indicator 11.3.1 | M | V | ½ |
| | Assignment Command 2 Message Type | Message Type 11.4 | M | V | 1 |
| | Channel Description | Channel Description 11.5.2.5 | M | V | 4 |
| | TTCH Channel Description | TTCH Channel Description 11.5.2.45 | M | V | 3 |
| | MES Configuration | MES Configuration 11.5.2.46 | M | V | 1 |
| | TtT Common Cipher Key (Ktt) | TtT Common Cipher Key (Ktt) 11.5.2.47 | M | V | 8 |
| 71 | Power Control Parameters | Power Control Parameters 11.5.2.60 | O | TV | 6 |
| 7D | Timing Offset | Timing Offset 11.5.2.40 | O | TV | 3 |
| 7F | Frequency Offset | Frequency Offset 11.5.2.49 | O | TV | 3 |
| 63 | Channel Mode | Channel Mode 11.5.2.6 | O | TV | 2 |
| 9- | Cipher Mode Setting | Cipher Mode Setting 11.5.2.9 | O | TV | 1 |

##### 10.1.2.2.1 Channel mode

If this IE is not present, the channel mode of the previously allocated channel is assumed.

##### 10.1.2.2.2 Cipher mode setting

This IE appears when the ciphering mode is changed after the MES has switched to the assigned channel.

If this IE is omitted, the mode of ciphering is not changed after the MES has switched to the assigned channel.

### 10.1.3 Assignment complete

Same as clause 9.1.3 of GSM 04.08 [22].

### 10.1.4 Assignment failure

Same as clause 9.1.4 of GSM 04.08 [22].

### 10.1.5 Channel mode modify

Same as clause 9.1.5 of GSM 04.08 [22].

## 10.1.6 Channel mode modify acknowledge

Same as clause 9.1.6 of GSM 04.08 [22].

## 10.1.7 Channel release

This message is sent on the main DCCH from the network to the MES to initiate deactivation of the dedicated channel used. See table 10.5.

Message type: CHANNEL RELEASE

Significance: dual

Direction: network to MES

**Table 10.5: CHANNEL RELEASE message content**

| IEI | Information Element | Type/Reference | Presence | Format | Length |
|---|---|---|---|---|---|
| | RR Management Protocol Discriminator | Protocol Discriminator 11.2 | M | V | ½ |
| | Skip Indicator | Skip Indicator 11.3.1 | M | V | ½ |
| | Channel Release Message Type | Message Type 11.4 | M | V | 1 |
| | RR Cause | RR Cause 11.5.2.31 | M | V | 1 |

## 10.1.8 Channel request

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 GMR-1 05.003 [17]). See table 10.6.

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

Message type: CHANNEL REQUEST

Significance: dual

Direction: MES to network

**Table 10.6: CHANNEL REQUEST message content**

| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
|---|---|---|---|---|---|---|---|---|
| Retry Counter | | Est. Cause/Numbering Plan | | | | | P | octet 1 |
| Precorrection Indication | | Random Reference | | | | | | octet 2 |
| MES Power Class | | | | SP/HPLMN ID | | | | octet 3 |
| SP/HPLMN ID | | | | | | | | octet 4 |
| SP/HPLMN ID | | | | | | | | octet 5 |
| PD | | Number digits 1,2,3/MSC ID | | | | | | octet 6 |
| Number Digits 1,2,3/GPS Timestamp | | | | Number Digits 4,5,6/GPS Timestamp | | | | octet 7 |
| Number Digits 4,5,6/Spare | | | | | | Dig. 7,8,9/GPS Time | | octet 8 |
| Number Digits 7,8,9/Spare | | | | | | | | octet 9 |
| Number Digits 10,11,12/Spare | | | | | | | | octet 10 |
| Num. Digits 10,11,12 | | Number digits 13,14,15/Spare | | | | | | octet 11 |
| Number Digits 13,14,15/Spare | | | | | O | R | GCI | 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 |
| Type of Number | | | | | | | | octet 18 |

```
Priority (P) (octet 1)
Indicates the priority of the terminal. This value should be
taken out of the nonvolatile 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  MO Call – bits 5-2 represent Numbering Plan
           Identification
0 0 0 x x  In Response to Paging (bits 3-2 represent Channel
           Needed echoed from Paging Request)
0 0 1 0 0  In Response to Alerting
0 1 0 0 0  Location Update
0 1 0 0 1  IMSI Detach
0 1 0 1 0  Supplementary Services
0 1 0 1 1  Short Message Services
0 1 1 1 1  Emergency Call
0 1 1 0 0  Position Verification
All other values are reserved
```

Numbering Plan Identification (octet 1)
Bits
5 4 3 2
0 0 0 0 Unknown
0 0 0 1 ISDN E.164/E.163
0 0 1 0 Not Used
0 0 1 1 X.121
0 1 0 0 Telex F.69
1 0 0 0 National Numbering Plan
1 0 0 1 Private Numbering Plan
1 1 1 1 Reserved for Extension
All other values are reserved

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

Precorrection Indication (octet 2)
This is the timing correction applied to RACH while sending this message (see GMR-1 05.010 [20] 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 5-1)
A random number of 5 bits

MES Power Class (octet 3, bits 8-5)
See Extended Power Class IE for a description of this 4-bit field

HPLMN ID/SP-ID (octets 3,4,5)
Octet 3, bits 1-4 represent the highest bits, octet 4 represents the middle bits, and octet 5 represents the lowest bits of the SP/HPLMN ID field

The HPLMN ID shall be sent in this field when it is different from the 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 1-6 of the IMSI. This value shall be represented as a 20-bit binary number

The SP ID shall consist of digits 6-9 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

A string of 1s shall represent the SP/HPLMN ID with null value. The MES shall use this value when it does not have knowledge of its HPLMN at the time of access (e.g., making an emergency call without a SIM card)

PD (Protocol Discriminator) (octet 6, bits 8-7)
Set to '00' for the current version of the protocol

Number Digits/MSC ID and GPS Timestamp (octets 6-12)
Contain the called party number digits if the Establishment Cause indicates an MO call (provided the MES is not accessing the second satellite on redirection). Contain the MSC ID and GPS Timestamp followed by a zero-coded spare field for other types of calls

Number Digits are represented in 51 bits as follows: The digits(numbered 1 to 12) are coded as triplets of 3 digits represented by 10 bits binary. The last 3 digits (numbered 13 to 15) are represented by 11 bits Unused digits are put as zeros before converting to binary. Digit 1 is the most significant digit of the called party number. Each 10/11 bit binary value is mapped across two octets with the order of the bit values within each octet progressively decreasing as the octet number increases. In that part of the field contained in a given octet, the lowest bit number represents the lowest order value. If called party digits are more than 15, the 15 most significant digits are included

The number of valid digits is indicated by special patterns. The end of digits is indicated by special flags (1023-1021) following the last meaningful digits
All groups beyond the end of digits shall be 0s
1023: All digits in the preceding group are valid
1022: First two digits in the preceding group are valid, and the third digit (i.e., 0) is padding
1021: First digit in the preceding group is valid, and the second and third 0s are padding
If there are 13 or more digits, the final 11-bit group shall be coded as
0-999: Last 3 digits (numbered 13 to 15)
11TF: Last 2 digits (numbered 13 to 14)in T & F respectively
120T: Last digit (numbered 13) in T

MSC ID. (octet 6, bits 6-1) Range: 0 - 63.
This shall be present in the case of non-MO calls. If the Establishment Cause is In Response to Paging, this value shall be the MSC ID received in the PAGING REQUEST message. Otherwise this value shall be coded as ‘111111’. This field shall also be present for MO calls that have been redirected to another satellite. The value shall be the MSC ID received in the IMMEDIATE ASSIGNMENT REJECT or EXTENDED IMMEDIATE ASSIGNMENT REJECT

GPS Timestamp (octet 7,8)
See GPS Timestamp IE in 10.5.2.57 for the description of this 16-bit field

R bit: This bit shall ordinarily be set to 0. It shall be set to 1 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 1 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 1 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) (octet 6)
Bit
7
0  MES is not GPS capable
1  MES is GPS capable

GPS Position (octets 13-17)
GPS Position octet 13 (highest bits) to octet 17 (lowest
bits) maps to value part of GPS position IE as described in
10.5.2.53(i.e., IEI part is not included) (Format V)

Type of Number (octet 18)
This is coded as follows for an MO Call or '111'
Bits
3 2 1
0 0 0  Unknown
0 0 1  International Number*
0 1 0  National Number*
0 1 1  Network-specific Number (operator access)
1 0 0  Dedicated Access short code
All other values reserved
* prefix/escape digits not present

Spare bits shall be coded with ‘0’
```

### 10.1.8.1 Extended channel request

This message is sent on the DCCH for a mobile-originated call, upon request by the network. See table 10.7.

Message type: EXTENDED CHANNEL REQUEST

Significance: dual

Direction: MES to network

**Table 10.7: EXTENDED CHANNEL REQUEST message content**

| IEI | Information Element | Type/Reference | Presence | Format | Length |
|---|---|---|---|---|---|
| | RR Management Protocol Discriminator | Protocol Discriminator 10.2 | M | V | ½ |
| | Skip Indicator | Skip Indicator 11.3.1 | M | V | ½ |
| | Extended Channel Request Message Type | Message Type 11.4 | M | V | 1 |
| | Access Information | Access Information 10.5.2.48 | M | V | 5 |
| | GPS Position | GPS Position 11.5.2.53 | M | V | 5 |
| | Timestamp | GPS Timestamp 11.5.2.57 | M | V | 2 |
| 5E | Called Party Number | Called Party BCD Number 11.5.4.7 | C | TLV | 3-13 |

#### 10.1.8.1.1 Called party number

Called Party Number is present if indicated in C bit of Access Information.

## 10.1.9 Ciphering mode command

This message is sent on the main DCCH from the network to the MES to indicate that the network has started deciphering and that enciphering and deciphering shall be started in the MES, or to indicate that ciphering will not be performed. Optionally, it carries the country/region position information to be displayed on the MES. See table 10.8.

Message type: CIPHERING MODE COMMAND

Significance: dual

Direction: network to MES

**Table 10.8: CIPHERING MODE COMMAND message content**

| IEI | Information Element | Type/Reference | Presence | Format | Length |
|---|---|---|---|---|---|
| | RR Management Protocol Discriminator | Protocol Discriminator 11.2 | M | V | ½ |
| | Skip Indicator | Skip Indicator 11.3.1 | M | V | ½ |
| | Ciphering Mode Command Message Type | Message Type 11.4 | M | V | 1 |
| | Cipher Mode Setting | Cipher Mode Setting 11.5.2.9 | M | V | ½ |
| | Ciphering Response | Cipher Response 11.5.2.10 | M | V | ½ |
| | Position Display Information | Position Display 11.5.2.52 | O | TV | 12 |

### 10.1.9.1 Position display

If present it contains the string to be displayed at the MES for the country/region name corresponding to the position reported by the MES. The MES shall display the information to the user. If the information is not present, the MES may continue to use the previously available information. In the absence of any information, the MES may choose to provide a generic message, based upon its implementation.

## 10.1.10 Ciphering mode complete

This message is sent on the main DCCH from the MES to the network to indicate that enciphering and deciphering has been started in the MES. Optionally, it carries the timestamp of the position reported by the MES in its initial access request. See table 10.9.

Message type: CIPHERING MODE COMPLETE

Significance: dual

Direction: MES to network

**Table 10.9: CIPHERING MODE COMPLETE message content**

| IEI | Information Element | Type/Reference | Presence | Format | Length |
|---|---|---|---|---|---|
| | RR Management Protocol Discriminator | Protocol Discriminator 11.2 | M | V | ½ |
| | Skip Indicator | Skip Indicator 11.3.1 | M | V | ½ |
| | Ciphering Mode Complete Message Type | Message Type 11.4 | M | V | 1 |
| 17 | Mobile Equipment Identity | Mobile Identity 11.5.1.4 | O | TLV | 3-11 |
| 76 | Timestamp | GPS Timestamp 11.5.2.57 | O | TV | 3 |

## 10.1.11 Classmark change

This message is sent on the main DCCH by the MES to the network to indicate a classmark change or as a response to a classmark enquiry. See table 10.10.

Message type: CLASSMARK CHANGE

Significance: dual

Direction: MES to network

**Table 10.10: CLASSMARK CHANGE message content**

| IEI | Information Element | Type/Reference | Presence | Format | Length |
|---|---|---|---|---|---|
| | RR Management Protocol Discriminator | Protocol Discriminator 11.2 | M | V | ½ |
| | Skip Indicator | Skip Indicator 11.3.1 | M | V | ½ |
| | Classmark Change Message Type | Message Type 11.4 | M | V | 1 |
| | Extended Power Class | Extended Power Class 11.5.2.50 | M | V | ½ |
| | Spare Half Octet | Spare Half Octet 11.5.1.8 | M | V | ½ |
| | MES Classmark | MES Classmark 2 11.5.1.6 | M | LV | 4 |
| 20 | Additional MES Classmark Information | MES Classmark 3 11.5.1.7 | C | TLV | 14 |

### 10.1.11.1 Additional Mobile Earth Station classmark information

Same as clause 9.1.11.1 of GSM 04.08 [22].

### 10.1.11.2 Mobile Earth Station classmark

Same as clause 9.1.11.2 of GSM 04.08 [22].

## 10.1.12 Classmark enquiry

Same as clause 9.1.12 of GSM 04.08 [22].

## 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

This message is sent on the main DCCH by the network to the MES to change the dedicated channel configuration. See table 10.11.

Message type: HANDOVER COMMAND

Significance: dual

Direction: network to MES

**Table 10.11: HANDOVER COMMAND message content**

| IEI | Information Element | Type/Reference | Presence | Format | Length |
|---|---|---|---|---|---|
| | RR Management Protocol Discriminator | Protocol Discriminator 10.2 | M | V | ½ |
| | Skip Indicator | Skip Indicator 11.3.1 | M | V | ½ |
| | Handover Command Message Type | Message Type 11.4 | M | V | 1 |
| | Handover Parameter | Handover Parameter11.5.2.92 | M | V | 5 |

## 10.1.16 Handover complete

This message is sent on the main DCCH from the MES to the network to indicate that the MES has established the new channel successfully. See table 10.12.

Message Type: HANDOVER COMPLETE

Significance: Dual

Direction: MES to network

**Table 10.12: HANDOVER COMPLETE message content**

| IEI | Information Element | Type/Reference | Presence | Format | Length |
|---|---|---|---|---|---|
| | RR Management Protocol Discriminator | Protocol Discriminator 11.2 | M | V | ½ |
| | Skip Indicator | Skip Indicator 11.3.1 | M | V | ½ |
| | Handover Complete Message Type | Message Type 11.4 | M | V | 1 |
| | RR cause | RR Cause 11.5.2.31 | M | V | 1 |

## 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

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 10.13.

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

Significance: dual

Direction: network to MES

**Table 10.13: IMMEDIATE ASSIGNMENT message content**

| IEI | Information Element | Type/Reference | Presence | Format | Length |
|---|---|---|---|---|---|
| | L2 Pseudo Length | L2 Pseudo Length 11.5.2.19 | M | V | 1 |
| | RR Management Protocol Discriminator | Protocol Discriminator 11.2 | M | V | 1/2 |
| | Skip Indicator | Skip Indicator 11.3.1 | M | V | 1/2 |
| | Immediate Assignment Message Type | Message Type 11.4 | M | V | 1 |
| | MES Information Flag | MES Information Flag 11.5.2.44 | M | V | 1 |
| | Request Reference 1 (MES1) | Request Reference 11.5.2.30 | M | V | 2 |
| | GPS Discriminator | GPS Discriminator 11.5.2.101 | C | V | 2 |
| | Channel Description | Channel Description 11.5.2.5 | C | V | 4 |
| | Timing Offset | Timing Offset 11.5.2.40 | C | V | 2 |
| | Frequency Offset | Frequency Offset 11.5.2.49 | C | V | 2 |
| | Idle Mode Position Update Information | Position Update Information 11.5.2.54 | C | V | 2 |
| | Dedicated Mode Position Update Information | Position Update Information 11.5.2.54 | C | V | 2 |
| | Request Reference 2 (MES2) | Request Reference 11.5.2.30 | C | V | 2 |
| | Request Reference 3 (MES3) | Request Reference 11.5.2.30 | C | V | 2 |
| | Request Reference 4 (MES4) | Request Reference 11.5.2.30 | C | V | 2 |
| | IA Rest Octets | IA Rest Octets 11.5.2.16 | M | V | 0-18 |

NOTE: All the conditional Ies cannot be accommodated as the Immediate Assignment message has a fixed size of 24 octets.

#### 10.1.18.1.1 Request reference

The Request References for MES2, MES3 and MES4 are valid if indicated by the MES Information flag. If the bits of the MES Information IE in the message indicate MES2 or MES3 or MES4 information is not present, the MES shall interpret that the respective Request Reference 2 IE, Request Reference 3 IE or Request Reference 4 IE is not present in the message. The MES shall select the IMMEDIATE ASSIGNMENT message by matching the Request Reference only. No GPS discriminator shall be present for MES2, MES3, or MES4.

#### 10.1.18.1.2 GPS discriminator

The GPS Discriminator IE is for MES1 and shall be present if the extended procedure is not indicated for MES1.

#### 10.1.18.1.3 Channel description

The Channel Description IE is for MES1 and shall be present if the pause timer is not indicated for the MES1.

#### 10.1.18.1.4 Timing offset

The Timing Offset IE is for the MES1 and shall be present if the pause timer is not indicated for MES1. The Timing Offset applies to the channel given in the Channel Description.

#### 10.1.18.1.5 Frequency offset

The Frequency Offset IE is for the MES1 and shall be present if the pause timer is not indicated for MES1. The Frequency Offset applies to the channel given in the Channel Description.

#### 10.1.18.1.6 Idle mode position update information

The Idle Mode Position Update Information IE is present if the "I" bit in the MES Information flag, is set to 1. If the IE is present the MES shall use the new values of the position update parameters for the idle mode position reporting.

#### 10.1.18.1.7 Dedicated mode position update information

The Dedicated Mode Position Update Information IE is present if the "D" bit in the MES Information flag is set to 1. If the IE is absent, the MES shall not report its position during the call, even if it is a vehicular terminal.

The Dedicated Mode Position Update Information IE shall apply whenever a nonvehicular MES undergoes a Classmark Change during a call and becomes a vehicular terminal.

#### 10.1.18.1.8 IA rest octets

The sum of the length of this IE and the value of the L2 Pseudo Length of the message shall equal 23.

### 10.1.18.2 Extended immediate assignment

This message is sent on the main signalling link by the network to the MES in response to an EXTENDED CHANNEL REQUEST message by the MES. See table 10.14.

Message type: EXTENDED IMMEDIATE ASSIGNMENT

Significance: dual

Direction: network to MES

**Table 10.14: EXTENDED IMMEDIATE ASSIGNMENT message content**

| IEI | Information Element | Type/Reference | Presence | Format | Length |
|---|---|---|---|---|---|
| | RR Management Protocol Discriminator | Protocol Discriminator 11.2 | M | V | ½ |
| | Skip Indicator | Skip Indicator 11.3.1 | M | V | ½ |
| | Extended Imm Assignment Message Type | Message Type 11.4 | M | V | 1 |
| | MES Information 2 Flag | MES Information 2 Flag 11.5.2.59 | M | V | 1 |
| 6C | Channel Description | Channel Description 11.5.2.5 | C | TV | 5 |
| 7D | Timing Offset | Timing Offset 11.5.2.40 | C | TV | 3 |
| 74 | Frequency Offset | Frequency Offset 11.5.2.49 | C | TV | 3 |
| 78 | Idle Mode Position Update Information | Idle Mode Position Update Information 11.5.2.54 | O | TV | 3 |
| 7A | Dedicated Mode Position Update Information | Dedicated Mode Position Update Information 11.5.2.54 | O | TV | 3 |

#### 10.1.18.2.1 Channel description

The Channel Description IE shall be present if the "C" bit of the MES Information 2 flag is set to 1.

#### 10.1.18.2.2 Timing offset

The Timing Offset IE shall be present if the "C" bit of the MES Information 2 flag is set to 1. The Timing Offset applies to the new channel given in the Channel Description.

#### 10.1.18.2.3 Frequency offset

The Frequency Offset IE is present if the "C" bit of the MES Information 2 Flag IE is set to 1. The Frequency Offset, if present, applies to the new channel given in the Channel Description.

#### 10.1.18.2.4 Idle mode position update information

If the Idle Mode Position Update Information IE is present, the MES shall use the new values of the position update parameters for the idle mode position reporting.

#### 10.1.18.2.5 Dedicated mode position update information

If the Dedicated Mode Position Update Information IE is absent, the MES shall not report its position during the call, even if it is a VT.

The Dedicated Mode Position Update Information IE shall apply whenever a nonvehicular MES undergoes a Classmark Change during a call and becomes a VT.

## 10.1.19 Immediate assignment extended

This function is not currently supported in GMR-1.

## 10.1.20 Immediate assignment reject

### 10.1.20.1 Immediate assignment reject type 1

This message may be sent by the network on the CCCH for up to four MESs to indicate that no channel is available for assignment or that the MES cannot be allowed access. See table 10.15. The L2 Pseudo Length of this message shall be the sum of all Ies present in the message, except for the IAR Rest Octets and L2 Pseudo Length Ies.

Message type: IMMEDIATE ASSIGNMENT REJECT TYPE 1

Significance: dual

Direction: network to MES

**Table 10.15: IMMEDIATE ASSIGNMENT REJECT TYPE 1 message content**

| IEI | Information Element | Type/Reference | Presence | Format | Length |
|---|---|---|---|---|---|
| | L2 Pseudo Length | L2 Pseudo Length 11.5.2.19 | M | V | 1 |
| | RR Management Protocol Discriminator | Protocol Discriminator 11.2 | M | V | ½ |
| | Skip Indicator | Skip Indicator 11.3.1 | M | V | ½ |
| | Immediate Assignment Reject Message Type | Message Type 11.4 | M | V | 1 |
| | Request Reference 1 (MES1) | Request Reference 11.5.2.30 | M | V | 2 |
| | GPS Discriminator | GPS Discriminator 11.5.2.101 | M | V | 2 |
| | Reject Cause | Reject Cause 11.5.2.56 | M | V | 1 |
| | Wait Indication 1 (MES1) | Wait Indication 11.5.2.43 | C | V | 1 |
| | Request Reference 2 (MES2) | Request Reference 11.5.2.30 | M | V | 2 |
| | Wait Indication 2 (MES2) | Wait Indication 11.5.2.43 | M | V | 1 |
| | Request Reference 3 (MES3) | Request Reference 11.5.2.30 | M | V | 2 |
| | Wait Indication 3 (MES3) | Wait Indication 11.5.2.43 | M | V | 1 |
| | Request Reference 4 (MES4) | Request Reference 11.5.2.30 | M | V | 2 |
| | Wait Indication 4 (MES4) | Wait Indication 11.5.2.43 | M | V | 1 |
| | Idle Mode Position Update Information | Idle Mode Position Update Information 11.5.2.54 | M | V | 2 |
| | BCCH Carrier | BCCH Carrier Specification 11.5.2.55 | C | V | 2 |
| | MSC ID | MSC ID 11.5.2.100 | C | V | 1 |
| | IAR Rest Octets | IAR Rest Octets 11.5.2.17 | M | V | 1-4 |

NOTE: Index 1 refers to the first MES, index 2 refers to the second MES, and so on.

#### 10.1.20.1.1 Use of the indices

The Indices identify the MESs for which the CHANNEL REQUEST is to be rejected. A Request Reference IE and the following Wait Indication IE refer to the same MES, so it is possible to reject up to four CHANNEL REQUESTS with this message.

#### 10.1.20.1.2 Filling the message

Same as clause 9.1.20.2 of GSM 04.08 [22].

#### 10.1.20.1.3 Reject cause

This parameter shall be interpreted only by the MES corresponding to Request Reference 1. The other MESs shall use the default value of Reject Cause.

#### 10.1.20.1.4 Wait indication

The Wait Indication Ies are associated with the Request References and are identified with indices. The Wait Indication 1 IE shall be present only if the reject cause for MES1 indicates "lack of resources". The Wait Indication 2,3,4 Ies are applicable to the MES2, MES3, MES4 respectively.

#### 10.1.20.1.5 Idle mode position update information

This parameter shall be interpreted only by the MES corresponding to Request Reference 1.

#### 10.1.20.1.6 BCCH carrier

This parameter shall be interpreted only by the MES corresponding to Request Reference 1. It is present if the network wishes to command the MES to access another BCCH and its presence is indicated in Reject Cause IE.

#### 10.1.20.1.7 MSC ID

The MSC ID IE identifies the optimal GS for completing the call through the new satellite by specifying the corresponding MSC ID. This is used only if the Reject Cause IE is Redirect to New Satellite.

#### 10.1.20.1.8 IAR rest octets

The sum of the length of this IE and the L2 Pseudo Length of the message shall be 23.

### 10.1.20.2 Immediate assignment reject type 2

This message may be sent to the MES by the network on the CCCH to indicate that no channel is available for assignment or that the MES cannot be allowed access. Additionally the message provides the country/region information to the MES. See table 10.16. 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 2

Significance: dual

Direction: network to MES

**Table 10.16: IMMEDIATE ASSIGNMENT REJECT TYPE 2 message content**

| IEI | Information Element | Type/Reference | Presence | Format | Length |
|---|---|---|---|---|---|
| | L2 Pseudo Length | L2 Pseudo Length<br>11.5.2.19 | M | V | 1 |
| | RR Management Protocol Discriminator | Protocol Discriminator<br>11.2 | M | V | 1/2 |
| | Skip Indicator | Skip Indicator<br>11.3.1 | M | V | 1/2 |
| | Immediate Assignment Reject Type 2 Message Type | Message Type<br>11.4 | M | V | 1 |
| | Request Reference | Request Reference<br>11.5.2.30 | M | V | 2 |
| | GPS Discriminator | GPS Discriminator<br>11.5.2.101 | M | V | 2 |
| | Reject Cause | Reject Cause<br>11.5.2.56 | M | V | 1 |
| | Idle Mode Position Update Information | Idle Mode Position Update Information<br>11.5.2.54 | M | V | 2 |
| | Position Display | Position Display<br>11.5.2.52 | M | V | 11 |
| | IAR Rest Octets | IAR Rest Octets<br>11.5.2.17 | M | V | 3 |

### 10.1.20.3 Extended immediate assignment reject

This message is sent by the network on the DCCH to indicate that no channel is available for assignment or that the MES cannot be allowed access. See table 10.17.

Message type: EXTENDED IMMEDIATE ASSIGNMENT REJECT

Significance: dual

Direction: network to MES

**Table 10.17: EXTENDED IMMEDIATE ASSIGNMENT REJECT message content**

| IEI | Information Element | Type/Reference | Presence | Format | Length |
|---|---|---|---|---|---|
| | RR Management Protocol Discriminator | Protocol Discriminator 11.2 | M | V | ½ |
| | Skip Indicator | Skip Indicator 11.3.1 | M | V | ½ |
| | Extended Imm Assignment Reject Message Type | Message Type 11.4 | M | V | 1 |
| | Wait Indication | Wait Indication 11.5.2.43 | M | V | 1 |
| | Reject Cause | Reject Cause 11.5.2.56 | M | V | 1 |
| | Idle Mode Position Update Information | Idle Mode Position Update Information 11.5.2.54 | M | V | 2 |
| 79 | BCCH Carrier | BCCH Carrier 11.5.2.55 | C | TV | 3 |
| 7B | MSC ID | MSC ID 11.5.2.100 | C | TV | 2 |
| 75 | Position Display | Position Display 11.5.2.52 | O | TV | 12 |

#### 10.1.20.3.1 BCCH carrier

This parameter shall be present if the network wishes to command the MES to access another BCCH. Its presence shall be indicated in Reject Cause IE.

#### 10.1.20.3.2 MSC ID

The MSC ID IE provides the ID of the MSC to which the MES shall be routed. This is only used if the reject cause is "redirect to new satellite".

#### 10.1.20.3.3 Position display

If present it contains the string to be displayed at the MES for the country and region name corresponding to the position reported by the MES.

### 10.1.20.4 Position verification notify

This message may be sent on the CCCH by the network to the MES to indicate that the current MES position is serviced by the GS. See table 10.18.

Message type: POSITION VERIFICATION NOTIFY

Significance: dual

Direction: network to MES

**Table 10.18: POSITION VERIFICATION NOTIFY message content**

| IEI | Information Element | Type/Reference | Presence | Format | Length |
|---|---|---|---|---|---|
| | L2 Pseudo Length | L2 Pseudo Length 11.5.2.19 | M | V | 1 |
| | RR Management Protocol Discriminator | Protocol Discriminator 11.2 | M | V | ½ |
| | Skip Indicator | Skip Indicator 11.3.1 | M | V | ½ |
| | Position Verification Notify Message Type | Message Type 11.4 | M | V | 1 |
| | Request Reference | Request Reference 11.5.2.30 | M | V | 2 |
| | GPS Discriminator | GPS Discriminator 11.5.2.101 | M | V | 2 |
| | Position Display | Position Display Information 11.5.2.52 | M | V | 11 |
| 78 | Idle Mode Position Update Information | Idle Mode Position Update Information 11.5.2.54 | O | TV | 3 |
| | IAR Rest Octets | IAR Rest Octets 11.5.2.17 | M | V | 3-6 |

#### 10.1.20.4.1 Idle mode position update information

Absence of this field indicates that the MES shall continue to use the currently applied values for these parameters.

#### 10.1.20.4.2 IAR rest octets

The sum of the length of this IE and the L2 Pseudo Length of the message shall be 23.

### 10.1.21 Measurement report

This function is not currently supported in GMR-1.

### 10.1.22 Paging request type 1

This message is sent on the PCH by the network, up to two MESs, to trigger channel access by them. The MESs are identified by their TMSI or IMSI. See table 10.19.

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: PAGING REQUEST TYPE 1

Significance: dual

Direction: network to MES

**Table 10.19: PAGING REQUEST TYPE 1 message content**

| IEI | Information Element | Type/Reference | Presence | Format | Length |
|---|---|---|---|---|---|
| | L2 Pseudo Length | L2 Pseudo Length 11.5.2.19 | M | V | 1 |
| | RR Management Protocol Discriminator | Protocol Discriminator 11.2 | M | V | ½ |
| | Skip Indicator | Skip Indicator 11.3.1 | M | V | ½ |
| | Paging Request Type 1 Message Type | Message Type 11.4 | M | V | 1 |
| | Page Mode | Page Mode 11.5.2.26 | M | V | ½ |
| | Spare Half Octet | Spare Half Octet 11.5.1.8 | M | V | ½ |
| | Mobile Identity 1 | Mobile Identity 11.5.1.4 | M | LV | 2-9 |
| | Mobile Identity 2 | Mobile Identity 11.5.1.4 | M | LV | 2-9 |
| | Paging Information 1 | Paging Information 11.5.2.51 | M | V | 1 |
| | Paging Information 2 | Paging Information 11.5.2.51 | M | V | 1 |
| | P1 Rest Octets | P1 Rest Octets 11.5.2.23 | M | V | 0-14 |

### 10.1.22.1 Unnecessary IE

Same as clause 9.1.22.1 of GSM 04.08 [22].

### 10.1.22.2 Mobile identities

Same as clause 9.1.22.3 of GSM 04.08 [22].

### 10.1.22.3 P1 rest octets

The sum of the length of this IE and the L2 Pseudo Length of the message is 23.

### 10.1.22.4 Paging information 1 and 2

These indicate the MSC ID and the channel needed for each MES.

## 10.1.23 Paging request type 2

This message is sent on the PCH by the network to three MESs to trigger channel access by them. Two of the MESs are identified by their TMSI, while the third is identified by its TMSI or IMSI. See table 10.20.

The L2 Pseudo Length of this message is the sum of the lengths of all the Ies present in the message except the P2 rest octets and L2 Pseudo Length Ies.

Message type: PAGING REQUEST TYPE 2

Significance: dual

Direction: network to MES

**Table 10.20: PAGING REQUEST TYPE 2 message content**

| IEI | Information Element | Type/Reference | Presence | Format | Length |
|---|---|---|---|---|---|
| | L2 Pseudo Length | L2 Pseudo Length 11.5.2.19 | M | V | 1 |
| | RR Management Protocol Discriminator | Protocol Discriminator 11.2 | M | V | ½ |
| | Skip Indicator | Skip Indicator 11.3.1 | M | V | ½ |
| | Paging Request Type 2 Message Type | Message Type 11.4 | M | V | 1 |
| | Page Mode | Page Mode 11.5.2.26 | M | V | ½ |
| | TMSI Availability Mask | TMSI Availability Mask 11.5.2.62 | M | V | ½ |
| | Mobile Identity 1 | TMSI 11.5.2.42 | C | V | 4 |
| | GPS Almanac Data 1 | GPS Almanac Data 11.5.2.63 | C | V | 5 |
| | Mobile Identity 2 | TMSI 11.5.2.42 | C | V | 4 |
| | GPS Almanac Data 2 | GPS Almanac Data 11.5.1.63 | C | V | 5 |
| | Mobile Identity 3 | Mobile Identity 11.5.1.4 | M | LV | 2-9 |
| | Paging Information 1 | Paging Information 11.5.2.51 | C | V | 1 |
| | Paging Information 2 | Paging Information 11.5.2.51 | C | V | 1 |
| | Paging Information 3 | Paging Information 11.5.2.51 | M | V | 1 |
| | P2 Rest Octets | P2 Rest Octets 11.5.2.24 | M | V | 0-7 |

### 10.1.23.1 Mobile identity 3

Same as clause 9.1.23.2 of GSM 04.08 [22].

### 10.1.23.2 P2 rest octets

The sum of the length of this IE and the L2 Pseudo Length of the message is 23.

### 10.1.23.3 Paging information 1, 2, and 3

These indicate the MSC ID and the channel needed for each MES.

Note that the Mobile Identity 1/Paging Information 1 pair of Ies and GPS Almanac Data 1 Ies are mutually exclusive. The presence of one automatically indicates the absence of the other. Similarly, the Mobile Identity/Paging Information 2 and GPS Almanac Data 2 Ies are mutually exclusive. Information as to which one is present is provided in the TMSI Availability Mask IE.

## 10.1.24 Paging request type 3

This message is sent on the PCH by the network to four MESs to trigger channel access by them. The MESs are identified by their TMSIs. See table 10.21. The L2 Pseudo Length of this message is the sum of the lengths of all the Ies present in the message, except the L2 Pseudo Length IE.

Message type: PAGING REQUEST TYPE 3

Significance: dual

Direction: network to MES

**Table 10.21: PAGING REQUEST TYPE 3 message content**

| IEI | Information Element | Type/Reference | Presence | Format | Length |
|---|---|---|---|---|---|
| | L2 Pseudo Length | L2 Pseudo Length 11.5.2.19 | M | V | 1 |
| | RR Management Protocol Discriminator | Protocol Discriminator 11.2 | M | V | ½ |
| | Skip Indicator | Skip Indicator 11.3.1 | M | V | ½ |
| | Paging Request Type 3 Message Type | Message Type 11.4 | M | V | 1 |
| | Page Mode | Page Mode 11.5.2.26 | M | V | ½ |
| | TMSI Availability Mask | TMSI Availability Mask 11.5.2.62 | M | V | ½ |
| | Mobile Identity 1 | TMSI 11.5.2.42 | C | V | 4 |
| | GPS Almanac Data 1 | GPS Almanac Data 11.5.2.63 | C | V | 5 |
| | Mobile Identity 2 | TMSI 11.5.2.42 | C | V | 4 |
| | GPS Almanac Data 2 | GPS Almanac Data 11.5.2.63 | C | V | 5 |
| | Mobile Identity 3 | TMSI 11.5.2.42 | C | V | 4 |
| | GPS Almanac Data 3 | GPS Almanac Data 11.5.2.63 | C | V | 5 |
| | Mobile Identity 4 | TMSI 11.5.2.42 | C | V | 4 |
| | GPS Almanac Data 4 | GPS Almanac Data 11.5.2.63 | C | V | 5 |
| | Paging Information 1 | Paging Information 11.5.2.51 | C | V | 1 |
| | Paging Information 2 | Paging Information 11.5.2.51 | C | V | 1 |
| | Paging Information 3 | Paging Information 11.5.2.51 | C | V | 1 |
| | Paging Information 4 | Paging Information 11.5.2.51 | C | V | 1 |

#### 10.1.24.1 Paging information 1, 2, 3, and 4

These indicate the MSC ID and the channel needed for each MES.

Note that the Mobile Identity 1/Paging Identity 1 pair of Ies and GPS Almanac Data 1 Ies are mutually exclusive. The presence of one automatically indicates the absence of the other. Similarly, the Mobile Identity/Paging Identity 2-4 and GPS Almanac Data 2-4 Ies are mutually exclusive. Information as to which one is present is provided in the TMSI Availability Mask IE.

### 10.1.25 Paging response

Same as clause 9.1.25 of GSM 04.08 [22].

### 10.1.26 Partial release

This function is not currently supported in GMR-1.

### 10.1.27 Partial release complete

This function is not currently supported in GMR-1.

## 10.1.28 Physical information

This function is not currently supported in GMR-1.

## 10.1.29 RR status

Same as clause 9.1.29 of GSM 04.08 [22].

## 10.1.30 Synchronization channel information

This function is not currently supported in GMR-1.

## 10.1.31 System information type 1

SI Type 1 is sent in the BCCH by the network to all MESs within the spot beam.

Messages sent on the BCCH are sent in unacknowledged mode and have no link layer header. They have a fixed length of 192 bits. A description of the messages is done according to the compact notation described in annex B of GMR-1 04.007 [15].

<System Information Type 1>::=

<Block Header: bitstring(8)>

<Segment 1A: bitstring(64)>

{<Segment 4A: bitstring(120)>|

<Segment 4B: bitstring(120)>|

<Segment 4C: bitstring(120)>|

<Segment 4D: bitstring(120)>|

<Segment 4E: bitstring(120)>|

<Segment 4F: bitstring(120)>|

<Segment 3A: bitstring(120)>|

<Segment 3F: bitstring(120)>|

<Segment 3C: bitstring(120)>|

<Segment 3H: bitstring(120)>|

<Segment 3D: bitstring(120)>|

<Segment 3I: bitstring(120)>|

<Segment 2A*bis*: bitstring(120)>|

<Segment 3B*bis*: bitstring(120)>|

<Segment 3G*bis*: bitstring(120)>|

<Segment 2B*bis*: bitstring(120)>|

<Segment 3Ebis: bitstring(120)>|

<Segment 3Jbis: bitstring(120)>}

NOTE: The bis type segment listed above are paired with the 1A segment while their normal counterparts are not paired.

<Block Header>::=

<Protocol version: "0000">

<Block Type: bit> – Set to "1". Marks the block as containing Class 1 information bits.

<Randomization period: bitstring(2)> – Randomization Period <m>, in frames, over which to randomize a CHANNEL REQUEST message transmission, following this System Information Block.

00: <m> = 7

01: <m> = 15

10: <m> = 23

11: <m> = 31

<Spare: bit>;

## 10.1.32 System information type 2

SI Type 2 is sent in the BCCH by the network to all MESs within the spot beam.

Messages sent on the BCCH are sent in unacknowledged mode and have no link layer header. They have a fixed length of 192 bits. The description of the messages is done according to the compact notation described in annex B of GMR-1 04.007 [15].

<System Information Type 2>::=

<Block Header: bitstring(8)>

{<Segment 2A: bitstring(184)>|

<Segment 3B: bitstring(184)>|

<Segment 3G: bitstring(184)>|

<Segment 2B: bitstring(184)>|

<Segment 3E: bitstring(184)>|

<Segment 3J: bitstring(184)>};

<Block Header>::=

<Protocol version: "0000">

<Block Type: bit> – Set to "0" Marks the block as not containing Class 1 information bits.

<Spare: bitstring(3)>;

## 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

This message is sent on the BACH by the network to an MES that is out of normal penetration coverage area to trigger channel access once the MES can decode the BCCH. The MES is identified by its TMSI. It does not follow the basic format, and the length of this message is 36 bits. See table 10.22.

Message type: ALERT REQUEST

Significance: dual

Direction: network to MES

**Table 10.22: ALERT REQUEST message content**

| IEI | Information Element | Type/Reference | Presence | Format | Length |
|---|---|---|---|---|---|
| | Mobile Identity | TMSI<br>11.5.2.42 | M | V | 4 |
| | Alerting Information | Alerting Information<br>11.5.2.65 | M | V | ½ |

## 10.1.44 Position update request

This message is sent by the MES to convey its updated position to the network on the SACCH (SAPI = 0) in UI mode. See table 10.23.

Message type: POSITION UPDATE REQUEST

Significance: dual

Direction: MES to network

**Table 10.23: POSITION UPDATE REQUEST message content**

| IEI | Information Element | Type/Reference | Presence | Format | Length |
|---|---|---|---|---|---|
| | RR Management Protocol Discriminator | Protocol Discriminator 11.2 | M | V | ½ |
| | Skip Indicator | Skip Indicator 11.3.1 | M | V | ½ |
| | Position Update Request Message Type | Message Type 11.4 | M | V | 1 |
| | GPS Position | GPS Position 11.5.2.53 | M | V | 5 |

## 10.1.45 Position update accept

This message is sent by the network to acknowledge the position information request to the MES on the SACCH (SAPI = 0) in UI mode. See table 10.24.

Message type: POSITION UPDATE ACCEPT

Significance: dual

Direction: network to MES

**Table 10.24: POSITION UPDATE ACCEPT message content**

| IEI | Information Element | Type/Reference | Presence | Format | Length |
|---|---|---|---|---|---|
| | RR Management Protocol Discriminator | Protocol Discriminator 11.2 | M | V | ½ |
| | Skip Indicator | Skip Indicator 11.3.1 | M | V | ½ |
| | Position Update Accept Message Type | Message Type 11.4 | M | V | 1 |
| | Position Update Information | Position Update Information 11.5.2.54 | M | V | 2 |
| | Disconnection Indication | Disconnection Indication 11.5.2.91 | M | V | 1 |

## 10.1.46 GBCH information

GBCH Information Messages shall be transmitted in the GBCH.

The description of the messages uses the compact notation described in annex B of GMR-1 04.007 [15].

<GBCH Information Message> ::=

<GBCH Message Header>

{<GBCH Information Type 1>|

<GBCH Information Type 2>|

<GBCH Information Type 3>|

<GBCH Information Type 4>|

<GBCH Information Type 5>|

<GBCH Information Type 6>|

<GBCH Information Type 7>|

<GBCH Information Type 8>|

<GBCH Information Type 9>}

<GBCH Message Header> ::=

<Protocol Escape: bit>

– This bit shall be set to 0 for GBCH Information Messages. The MES shall verify that this bit is 0 and shall discard the message if the bit is not 0

<GBCH Sequence Number: bitstring(2)>

– All messages with a common value of the GBCH Version Number may be used as a group

<Message Number: bitstring(5)>

– Message number as defined in table 3.4

<GBCH Information Type 1> ::=

<GPS Time: bitstring(40) >

– The time, in the centre of the spot beam at the earth's surface, at the time tick defined by the Frame Number parameter (below). The time is a GPS time of week in GPS time coordinates. (see GPS-ICD-200 [25] specification for definition). First 20 bits are GPS time of week in integer seconds. The last 20 bits are GPS time of week in fractional seconds. There is an implied decimal point between the first 20 bits and the second 20 bits

<Curve Fit Time: bitstring(40) >

– Time that is associated with the $2^{nd}$ degree curve fits . The time is a GPS time of week in GPS time coordinates. (see GPS-ICD-200 [25] specification for definition). First 20 bits are GPS time of week in integer seconds. The last 20 bits are GPS time of week in fractional seconds. There is an implied decimal point between the first 20 bits and the second 20 bits

<Spare: bit >

– Not used

<Frame Number: bitstring (19)>

– The arrival of leading edge of the frame with this frame number defines a time tick. The time contained in the GPS Time parameter is precisely correct at this time tick, if located at the centre of spot beam on the earth's surface. For the definition of Frame Number refer to GMR-1 05.002 [16]

<GBCH Information Type 2> ::=

<Visibility List, Part 1: bitstring (60)>

– 6-bit SV Ids of satellites 1-10 of the 12 being broadcast. An ID with a value of "0" indicates "no satellite".

<Dopplers, Part 1: bitstring (40)

– 8-bit Doppler estimates for satellites 1-5 of the 12 being broadcast. LSB scale factor of 40 Hz

<GBCH Information Type 3> ::=

<Visibility List Repetition, Part 1: bitstring (60)>

– 6-bit SV Ids of satellites 7-12, 1-4 (in that order) of the 12 being broadcast. An ID with a value of "0" indicates "no satellite"

<Dopplers Repetition, Part 1: bitstring (40)

– 8-bit Doppler estimates for satellites 7-11 of the 12 being broadcast. LSB scale factor of 40 Hz

<GBCH Information Type 4> ::=

<Dopplers, Part 2: bitstring (56)>

– 8-bit Doppler estimates for satellites 6-12 of the 12 being broadcast. LSB scale factor of 40 Hz.

<Code Phases, Part 1: bitstring (44)>

– 22-bit estimated code phase offsets for satellites 1-2 of the 12 satellites being broadcast. LSB scale factor of 2-28 seconds

<GBCH Information Type 5> ::=

<Visibility List, Part 2: bitstring (12)>

– 6-bit SV Ids of satellites 11-12 of the 12 being broadcast. An ID with a value of "0" indicates "no satellite"

<Code Phases, Part 2>: bitstring (88)>

– 22-bit estimated code phase offsets for satellites 3-6 of the 12 satellites being broadcast. LSB scale factor of 2-28 seconds

<GBCH Information Type 6> ::=

<Dopplers Repetition, Part 2: bitstring (56)>

– 8-bit Doppler estimates for satellites 12, 1-6 (in that order) of the 12 being broadcast. LSB scale factor of 40 Hz

<Code Phases, Part 3: bitstring (44)>

– 22-bit estimated code phase offsets for satellites 7-8 of the 12 satellites being broadcast. LSB scale factor of 2-28 seconds

<GBCH Information Type 7> ::=

<Visibility List Repetition, Part 2: bitstring (12)>

– 6-bit SV Ids of satellites 5-6 of the 12 being broadcast. An ID with a value of "0" indicates "no satellite"

<Code Phases, Part 4>: bitstring (88)>

– 22-bit estimated code phase offsets for satellites 9-12 of the 12 satellites being broadcast. LSB scale factor of 2-28 seconds

<GBCH Information Type 8> ::=

<$X_0$: bitstring (24)>

– x(t)≅X0+VX0t+(1/2)VX1t2+(1/3)VX2t3 for this satellite. LSB scale factor of 22 m

<$V_{X0}$: bitstring (18)>

– x(t)≅X0+VX0t+(1/2)VX1t2+(1/3)VX2t3 for this satellite. LSB scale factor of 2-5 m/s

<$V_{X2}$: bitstring (8)>

– x(t)≅X0+VX0t+(1/2)VX1t2+(1/3)VX2t3 for this satellite. LSB scale factor of 2-19 m/s3

<$Y_0$: bitstring (24)>

– y(t)≅Y0+VY0t+(1/2)VY1t2+(1/3)VY2t3 for this satellite. LSB scale factor of 22 m

<$V_{Y0}$: bitstring (18)>

– y(t)≅Y0+VY0t+(1/2)VY1t2+(1/3)VY2t3 for this satellite. LSB scale factor of 2-5 m/s

<$V_{Y2}$: bitstring (8)>

– y(t)≅Y0+VY0t+(1/2)VY1t2+(1/3)VY2t3 for this satellite. LSB scale factor of 2-19 m/s3

<GBCH Information Type 9> ::=

<$V_{X1}$: bitstring (13)>

– x(t)≅X0+VX0t+(1/2)VX1t2+(1/3)VX2t3 for this satellite. LSB scale factor of 2-12 m/s2

<$V_{Y1}$: bitstring (13)>

– y(t)≅Y0+VY0t+(1/2)VY1t2+(1/3)VY2t3 for this satellite. LSB scale factor of 2-12 m/s2

<$Z_0$: bitstring (24)>

– z(t)≅Z0+VZ0t+(1/2)VZ1t2+(1/3)VZ2t3 for this satellite. LSB scale factor of 22 m

<$V_{Z0}$: bitstring (18)>

– z(t)≅Z0+VZ0t+(1/2)VZ1t2+(1/3)VZ2t3 for this satellite. LSB scale factor of 2-5 m/s

<$V_{Z1}$: bitstring (13)>

– z(t)≅Z0+VZ0t+(1/2)VZ1t2+(1/3)VZ2t3 for this satellite. LSB scale factor of 2-12 m/s2

<$V_{Z2}$: bitstring (8)>

– z(t)≅Z0+VZ0t+(1/2)VZ1t2+(1/3)VZ2t3 for this satellite. LSB scale factor of 2-19 m/s3

<$a_{f1}$: bitstring (11)>

– af1 is a 16-bit clock correction term broadcast by this GPS satellite. Here rounded to 11 bits

## 10.1.47 Guard time violation

This message is sent by the MES to the network to report the guard period violation between its receive burst and its transmit burst. See table 10.25.

Message type: GUARD TIME VIOLATION

Significance: dual

Direction: MES to network

**Table 10.25: GUARD TIME VIOLATION message content**

| IEI | Information Element | Type/Reference | Presence | Format | Length |
|---|---|---|---|---|---|
| | RR Management Protocol Discriminator | Protocol Discriminator 11.2 | M | V | ½ |
| | Skip Indicator | Skip Indicator 11.3.1 | M | V | ½ |
| | Guard Time Violation Message Type | Message Type 11.4 | M | V | 1 |
| | Current Timing Offset | Current Timing Offset 11.5.2.102 | M | V | 2 |

## 10.1.48 Link correction

This message is sent to the MES by the network for corrections in the transmit frequency and transmit timing. See table 10.26.

Message type: LINK CORRECTION

Significance: dual

Direction: network to MES

**Table 10.26: LINK CORRECTION message content**

| IEI | Information Element | Type/Reference | Presence | Format | Length |
|---|---|---|---|---|---|
| | RR Management Protocol Discriminator | Protocol Discriminator 11.2 | M | V | ½ |
| | Skip Indicator | Skip Indicator 11.3.1 | M | V | ½ |
| | Link Correction Message Type | Message Type 11.4 | M | V | 1 |
| | Frequency Correction | Frequency Correction 11.5.2.64 | M | V | 2 |
| | Timing Correction | Timing Correction 11.5.2.58 | M | V | 1 |

## 10.1.49 Power control parameters update

This message is sent by the network to the MES to update the Power Control parameters there. See table 10.27.

Message type: POWER CONTROL PARAMETER UPDATE

Significance: dual

Direction: network to MES

**Table 10.27: POWER CONTROL PARAMETERS UPDATE message content**

| IEI | Information Element | Type/Reference | Presence | Format | Length |
|---|---|---|---|---|---|
| | RR Management Protocol Discriminator | Protocol Discriminator 11.2 | M | V | ½ |
| | Skip Indicator | Skip Indicator 11.3.1 | M | V | ½ |
| | Power Control Parameters Update Message Type | Message Type 11.4 | M | V | 1 |
| | Power Control Parameters | Power Control Parameters 11.5.2.60 | M | V | 5 |

## 10.1.50 TtT signalling link failure

This message is sent on the main signalling link from the MES to the network to indicate to the network that the TtT signalling link has failed in a single-hop TtT call. See table 10.28.

Message type: TtT SIGNALLING LINK FAILURE

Significance: dual

Direction: MES to network

**Table 10.28: TtT SIGNALLING LINK FAILURE message content**

| IEI | Information Element | Type/Reference | Presence | Format | Length |
|---|---|---|---|---|---|
| | RR Management Protocol Discriminator | Protocol Discriminator 11.2 | M | V | ½ |
| | Skip Indicator | Skip Indicator 11.3.1 | M | V | ½ |
| | TtT Signalling Link Failure Message Type | Message Type 11.4 | M | V | 1 |

## 10.1.51 Information request

This message is sent on the main DCCH from the network to the MES to request specific debugging information from the network. See table 10.29.

Message type: INFORMATION REQUEST

Significance: dual

Direction: network to MES

**Table 10.29: INFORMATION REQUEST message content**

| IEI | Information Element | Type/Reference | Presence | Format | Length |
|---|---|---|---|---|---|
| | RR Management Protocol Discriminator | Protocol Discriminator 11.2 | M | V | 1/2 |
| | Skip Indicator | Skip Indicator 11.3.1 | M | V | 1/2 |
| | Information Request Message Type | Message Type 11.4 | M | V | 1 |
| | Request Code 1 | Information Request Code 11.5.2.93 | M | V | 1 |
| | Request Code 2 | Information Request Code 11.5.2.93 | M | V | 1 |
| | Vendor Specific Subcommand | Vendor Specific Subcommand 11.5.2.99 | C | V | 3 |

### 10.1.51.1 Vendor specific subcommand

The Vendor Specific Subcommand field shall be present only when one of the Request Codes is Vendor Specific.

## 10.1.52 Information response version

This message is sent by the MES to the network in response to an INFORMATION REQUEST message asking for the version that the MES is using. See table 10.30.

Message type: INFORMATION RESPONSE VERSION

Significance: dual

Direction: MES to network

**Table 10.30: INFORMATION RESPONSE VERSION message content**

| IEI | Information Element | Type/Reference | Presence | Format | Length |
|---|---|---|---|---|---|
| | RR Management Protocol Discriminator | Protocol Discriminator 11.2 | M | V | ½ |
| | Skip Indicator | Skip Indicator 11.3.1 | M | V | ½ |
| | Information Response Version Message Type | Message Type 11.4 | M | V | 1 |
| | Version Information | Version Information 11.5.2.97 | M | V | 5 |

## 10.1.53 Information response spot beam selection

This message is sent by the MES to the network in response to an INFORMATION REQUEST message asking for spot beam information. This message contains the information for up to seven spot beams. See table 10.31.

Message type: INFORMATION RESPONSE SPOT BEAM SELECTION

Significance: dual

Direction: MES to network

**Table 10.31: INFORMATION RESPONSE SPOT BEAM SELECTION message content**

| IEI | Information Element | Type/Reference | Presence | Format | Length |
|---|---|---|---|---|---|
| | RR Management Protocol Discriminator | Protocol Discriminator 11.2 | M | V | ½ |
| | Skip Indicator | Skip Indicator 11.3.1 | M | V | ½ |
| | Information Response Spot Beam Selection Message Type | Message Type 11.4 | M | V | 1 |
| | Last Spot Beams Information | Last Spot Beams Information 11.5.2.94 | M | V | 5 |

## 10.1.54 Information response current beam

This message is sent by the MES to the network in response to an INFORMATION REQUEST message asking for spot beam information about the MES's current spot beam. This message contains the information for the spot beam on which the MES is camped. See table 10.32.

Message type: INFORMATION RESPONSE CURRENT BEAM

Significance: dual

Direction: MES to network

**Table 10.32: INFORMATION RESPONSE CURRENT BEAM message content**

| IEI | Information Element | Type/Reference | Presence | Format | Length |
|---|---|---|---|---|---|
| | RR Management Protocol Discriminator | Protocol Discriminator 11.2 | M | V | ½ |
| | Skip Indicator | Skip Indicator 11.3.1 | M | V | ½ |
| | Information Response Current Beam Message Type | Message Type 11.4 | M | V | 1 |
| | Timestamp | GPS Timestamp 11.5.2.57 | M | V | 2 |
| | Current Spot Beam Information | Current Spot Beam Information 11.5.2.95 | M | V | 1 |

### 10.1.54.1 Timestamp

This field refers to the GPS position within an INFORMATION RESPONSE POSITION message being sent in response to the other request code in the same INFORMATION REQUEST message. Otherwise the MES shall set this field to the N/A value.

## 10.1.55 Information response power control

This message is sent by the MES to the network in response to an INFORMATION REQUEST message asking for call statistics related to power control. See table 10.33.

Message type: INFORMATION RESPONSE POWER CONTROL

Significance: dual

Direction: MES to network

**Table 10.33: INFORMATION RESPONSE POWER CONTROL message content**

| IEI | Information Element | Type/Reference | Presence | Format | Length |
|---|---|---|---|---|---|
| | RR Management Protocol Discriminator | Protocol Discriminator 11.2 | M | V | ½ |
| | Skip Indicator | Skip Indicator 11.3.1 | M | V | ½ |
| | Information Response Power Control Message Type | Message Type 11.4 | M | V | 1 |
| | Extended Power Class | Extended Power Class 11.5.2.50 | M | V | 1 |
| | Timestamp | GPS Timestamp 11.5.2.57 | M | V | 2 |
| | Power Parameter Type | Power Control Information 11.5.2.96 | M | V | 2 |

### 10.1.55.1 Timestamp

This field refers to the GPS position within an INFORMATION RESPONSE POSITION message being sent in response to the other request code in the same INFORMATION REQUEST message. Otherwise the MES shall set this field to the N/A value.

## 10.1.56 Information response position

This message is sent by the MES to the network in response to an INFORMATION REQUEST message, asking for spot beam information or power control information. It shall be sent before sending the message describing spot beams signal strengths or call statistics related to power control. See table 10.34.

Message type: INFORMATION RESPONSE POSITION

Significance: dual

Direction: MES to network

**Table 10.34: INFORMATION RESPONSE POSITION message content**

| IEI | Information Element | Type/Reference | Presence | Format | Length |
|---|---|---|---|---|---|
| | RR Management Protocol Discriminator | Protocol Discriminator 11.2 | M | V | ½ |
| | Skip Indicator | Skip Indicator 11.3.1 | M | V | ½ |
| | Information Response Position Message Type | Message Type 11.4 | M | V | 1 |
| | Measurement Position | GPS Position 11.5.2.53 | M | V | 5 |

## 10.1.57 Information response vendor specific

This message is sent by the MES to the network in response to an INFORMATION REQUEST message asking for vendor specific information. The contents of the Vendor Specific Information IE are undefined and left to the MES vendor to define as per their requirements. See table 10.35.

Message type: INFORMATION RESPONSE VENDOR SPECIFIC

Significance: dual

Direction: MES to network

**Table 10.35: INFORMATION RESPONSE VENDOR SPECIFIC message content**

| IEI | Information Element | Type/Reference | Presence | Format | Length |
|---|---|---|---|---|---|
| | RR Management Protocol Discriminator | Protocol Discriminator 11.2 | M | V | ½ |
| | Skip Indicator | Skip Indicator 11.3.1 | M | V | ½ |
| | Information Response Vendor Specific Message Type | Message Type 11.4 | M | V | 1 |
| | Vendor Specific Information | Undefined. | M | V | |

## 10.1.58 Information response error

This message is sent by the MES to the network in response to an INFORMATION REQUEST message that it cannot process. See table 10.36.

Message type: INFORMATION RESPONSE ERROR

Significance: dual

Direction: MES to network

**Table 10.36: INFORMATION RESPONSE ERROR message content**

| IEI | Information Element | Type/Reference | Presence | Format | Length |
|---|---|---|---|---|---|
| | RR Management Protocol Discriminator | Protocol Discriminator 11.2 | M | V | ½ |
| | Skip Indicator | Skip Indicator 11.3.1 | M | V | ½ |
| | Information Response Error Message Type | Message Type 11.4 | M | V | 1 |
| | Information Request Code | Information Request Code 11.5.2.93 | M | V | 1 |
| | Error Code | Information Response Error Code 11.5.2.98 | M | V | 1 |

## 10.1.59 DTMF tone generate request

This message is transmitted by an MES to the peer network entities to generate tones corresponding to the DTMF digits that the local user has generated using the keypad. This message is sent on TtT signalling link (SAPI = 2) if available, otherwise, it is sent on the main signalling link. See table 10.37.

Message type: DTMF TONE GENERATE REQUEST

Significance: dual

Direction: MES to network/peer MES

**Table 10.37: DTMF TONE GENERATE REQUEST message content**

| IEI | Information Element | Type/Reference | Presence | Format | Length |
|---|---|---|---|---|---|
| | DTRS Protocol Discriminator | Protocol Discriminator 11.2 | M | V | 1 |
| | DTMF Tone Generate Request Message Type | Message Type 11.4 | M | V | 1 |
| | DTMF Digits | DTMF Digits 11.5.2.61 | M | LV | 3-249 |

## 10.1.60 DTMF tone generate acknowledge

This message is transmitted by an MES or a GS to the MES that has requested the generation of the DTMF tone. It acknowledges the successful receipt of the DTMF digit information sent by the peer entity (MES, whose user has dialled the number). The GS acknowledges the DTMF digit information only if it receives the DTMF Tone Generate Req over the SAPI = 0 link. See table 10.38.

Message type: DTMF TONE GENERATE ACKNOWLEDGE

Significance: dual

Direction: peer MES/network to MES

**Table 10.38: DTMF TONE GENERATE ACK message content**

| IEI | Information Element | Type/Reference | Presence | Format | Length |
|---|---|---|---|---|---|
| | DTRS Protocol Discriminator | Protocol Discriminator 11.2 | M | V | 1 |
| | DTMF Tone Generate Acknowledge Message Type | Message Type 11.4 | M | V | 1 |

## 10.2 Messages for mobility management

Same as clause 9.2 of GSM 04.08 [22], except that CM RE-ESTABLISHMENT REQUEST message (clause 9.2.4 of GSM 04.08 [22]) is not to be supported.

## 10.3 Messages for circuit-switched call control

Same as clause 9.3 of GSM 04.08 [22]. The following messages are not supported:

START DTMF

START DTMF ACKNOWLEDGE

START DTMF REJECT

STOP DTMF

STOP DTMF ACKNOWLEDGE

The following clauses from GSM 04.08 [22] are void: 9.3.24, 9.3.25, 9.3.26, 9.3.29, 9.3.30.

# 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. Most of these are borrowed from the GSM system; only the deviations are mentioned here.

## 11.1 Overview

Within the L3 protocols defined in the present document, every message, with the exception of the messages sent on the BCCH, downlink CCCH, BACH, and RACH, is a standard L3 message as defined in GMR-1 04.007 [15]. This means that the message consists of the following parts:

a) Protocol discriminator

b) Transaction identifier/skip identifier

c) Message type

d) Other Ies, as required.

Unless otherwise specified in the message descriptions of clause 10, a particular IE shall not be present more than once in a given message.

The term "default" implies that the value defined shall be used in the absence of any assignment, or that this value allows negotiation of alternative values in between the two peer entities.

When a field extends over more than one octet, the order of bit values progressively decreases as the octet number increases. The least significant bit of the field is represented by the lowest numbered bit of the highest numbered octet of the field.

## 11.2 Protocol discriminator

Same as clause 10.2 of GSM 04.08 [22].

An additional protocol discriminator (PD) for the DTMF transmission and reception service is defined. This protocol discriminator for DTRS is defined with bits 1 to 4 set to the escape value of "1110", with the extended PD value (bits 8 to 5) being set to 0001.

## 11.3 Skip indicator and transaction identifier

### 11.3.1 Skip indicator

Same as clause 10.3.1 of GSM 04.08 [22] except that the following RR messages do not have a skip indicator: DTMF TONE GENERATE REQUEST and DTMF TONE GENERATE ACKNOWLEDGE.

### 11.3.2 Transaction identifier

Same as clause 10.3.2 of GSM 04.08 [22].

## 11.4 Message type

The Message Type IE and its use are defined in GMR-1 04.007 [15], which also defines the value part of the Message Type IE used in the RR management protocol. Table 11.2 defines the value part of the Message Type IE used in the DTRS 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

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 SIGNALLING 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


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

Table 11.2 gives DTRS message types.

**Table 11.2: Message types for DTMF transmission and reception service**

| 8 7 6 5 4 3 2 1 |
|---|
| 0 0 0 1 1 - - - DTMF-related messages<br>0 0 1 DTMF TONE GENERATE REQUEST<br>0 1 0 DTMF TONE GENERATE ACKNOWLEDGE |

Bit 8 is reserved for possible future use as an extension bit (see GMR-1 04.007 [15]).

Message type definitions for MM messages and for CC and call-related SS messages are the same as in GSM 04.08 [22]. However, the DTMF messages as described in GSM are not supported. Also, the CM REESTABLISHMENT REQUEST message is not supported as part of the MM sublayer-related messages.

## 11.5 Other information elements

Same as clause 10.5 of GSM 04.08 [22].

### 11.5.1 Common information elements

#### 11.5.1.1 Cell identity

The purpose of the Cell Identity IE is to identify a cell within a location area. This IE is coded as shown in figure 11.1 and table 11.3. Cell Identity (CI) is a Type 3 IE, 3 octets in length.

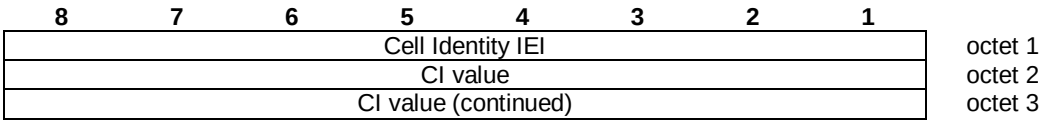


**Figure 11.1: Cell identity IE**

**Table 11.3: Cell identity IE**

| CI value, Cell Identity Value (octets 2 and 3) |
|---|
| In the CI Value field, bit 8 of octet 2 is the most significant bit and bit 1 of octet 3 is the least significant bit<br><br>The coding of the CI is the responsibility of each administration. Coding using full hexadecimal representation may be used. The CI consists of 2 octets |

#### 11.5.1.2 Ciphering key sequence number

Same as clause 10.5.1.2 of GSM 04.08 [22].

### 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 (Mobile Country Code) (octets 2 and 3)
The MCC field is coded as in annex A of ITU-T Recommendation E.212 [27]

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 (Mobile Network Code) (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'

NOTE: GMR-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.

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 (Location Area Code) (octets 5 and 6)
Same as the Location Area Code described in clause 10.5.1.3 of GSM 04.08 [22] except that the field shall be subdivided into an MSC ID and a Spot Beam ID. The MSC ID shall be bits 8-3 in octet 5. The Spot Beam ID shall be bits 2-1 in octet 5 and all of octet 6

### 11.5.1.4 Mobile identity

Same as clause 10.5.1.4 of GSM 04.08 [22].

### 11.5.1.5 Mobile Earth Station 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 and table 11.5.

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 classmark 2

The purpose of the Mobile Earth Station Classmark 2 IE is to provide the network with information concerning aspects of both high and low priority of the MES equipment. This affects the manner in which the network handles the operation of the MES. The Mobile Earth Station Classmark IE indicates general MES characteristics; it shall, except for fields explicitly indicated, be independent of the frequency band of the channel on which it is sent.

This IE is coded as shown in figure 11.4 and table 11.6. The Mobile Earth Station Classmark 2 is a Type 4 IE, 5 octets in length.

| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
|---|---|---|---|---|---|---|---|---|
| Mobile Earth Station Classmark 2 IEI | | | | | | | | octet 1 |
| Length of Mobile Earth Station Classmark 2 contents | | | | | | | | octet 2 |
| 0 spare | Revision Level | | ES IND | A5/1 | MES Terminal Type | | | octet 3 |
| 0 0 spare | | SS Screening Indicator | | SM capa-bility | 0 0 spare | | FC | octet 4 |
| CM3 | 0 0 0 0 0 spare | | | | | A5/3 | A5/2 GMR-1 | octet 5 |

**Figure 11.4: Mobile Earth Station classmark 2 IE**

NOTE 1: Owing to backward compatibility problems, bit 8 of octet 4 should not be used unless it is also checked that bits 8, 7, and 6 of octet 3 are not "000".

**Table 11.6: Mobile Earth Station classmark 2 IE**

| |
|---|
| Revision level (octet 3)<br>Bits<br>7 6<br>0 0 Reserved for Phase 1<br>0 1 Used by Phase 2 MESs<br>All other values are reserved for future use<br>ES IND (octet 3, bit 5) "Controlled Early Classmark Sending" option implementation<br>0 "Controlled Early Classmark Sending" option is not implemented<br>1 "Controlled Early Classmark Sending" option is implemented<br>A5/1 algorithm supported (octet 3, bit 4)<br>0 Encryption algorithm A5/1 available<br>1 Encryption algorithm A5/1 not available<br>MES Terminal Type:<br>Bits<br>3 2 1<br>0 0 0 Class 1 Reserved<br>0 0 1 Class 2 Used by all fixed GMR-1 terminals<br>0 1 0 Class 3 Used by all vehicular GMR-1 terminals<br>0 1 1 Class 4 Used by all handheld GMR-1 terminals<br>All other values are reserved.<br>SS Screening Indicator (octet 4)<br>Bits<br>6 5<br>0 0 Defined in GSM 04.08 [22]<br>0 1 Defined in GSM 04.08 [22]<br>1 0 Defined in GSM 04.08 [22]<br>1 1 Defined in GSM 04.08 [22]<br>SM capability (MT SMS pt to pt capability) (octet 4)<br>Bit 4<br>0 MES does not support mobile terminated point-to-point SMS<br>1 MES supports mobile terminated point-to-point SMS<br>FC (Frequency Capability) (octet 4)<br>Bit 1<br>Used in GSM to indicate support for extension band G1 in addition to the primary band<br>Not used in GMR-1<br>Classmark 3 (octet 5, bit 8)<br>0 No additional MES capability information available<br>1 Additional MES capabilities are described in the Classmark 3 IE<br>A5/3 algorithm supported (octet 5, bit 2)<br>0 Encryption algorithm A5/3 not available<br>1 Encryption algorithm A5/3 available<br>GMR-1 A5/2 algorithm supported (octet 5, bit 1)<br>0 Encryption algorithm GMR-1 A5/2 not available<br>1 Encryption algorithm GMR-1 A5/2 available |

NOTE 2: Additional MES capability information might be obtained by invoking the classmark interrogation procedure.

### 11.5.1.7 Mobile Earth Station classmark 3

The purpose of the Mobile Earth Station Classmark 3 IE is to provide the network with information concerning aspects of the MES. The contents might affect the manner in which the network handles the operation of the MES. The MES Classmark information indicates general MES characteristics and it shall, except for fields explicitly indicated, be independent of the frequency band of the channel on which it is sent. This IE is coded as shown in figure 11.5 and table 11.7. MES Classmark 3 is a Type 4 IE, a maximum of 14 octets in length.

NOTE The 14-octet limit is so that the CLASSMARK CHANGE message will fit in one L2 frame.

| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
|---|---|---|---|---|---|---|---|---|
| | MES Classmark 3 IEI | | | | | | | octet 1 |
| Length of MES Classmark 3 contents | | | | | | | | octet 2 |
| 0 Spare | 0 Spare | 0 Spare | 0 Spare | A5/7 | A5/6 | A5/5 | A5/4 | octet 3 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | octets 4 to 14 |
| Spare | | | | | | | | |

**Figure 11.5: Mobile Earth Station classmark 3 IE**

Octets 4 to 14 are for future applications. The bits inside these octets are spare and these octets may be omitted. However, if octet n is present, then octet m shall also be present, where m<n.

**Table 11.7: Mobile Earth Station classmark 3 IE**

```
A5/4 algorithm supported (octet 3, bit 1)
0  Encryption algorithm A5/4 not available
1  Encryption algorithm A5/4 available

A5/5 algorithm supported (octet 3, bit 2)
0  Encryption algorithm A5/5 not available
1  Encryption algorithm A5/5 available

A5/6 algorithm supported (octet 3, bit 3)
0  Encryption algorithm A5/6 not available
1  Encryption algorithm A5/6 available

A5/7 algorithm supported (octet 3, bit 4)
0  Encryption algorithm A5/7 not available
1  Encryption algorithm A5/7 available
```

### 11.5.1.8 Spare half octet

Same as clause 10.5.1.8 of GSM 04.08 [22].

## 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

The Channel Description IE describes the radio channel allocated to an MES. This IE is coded as shown in figure 11.6 and table 11.8. Channel Description is a Type 3 IE, 5 octets in length.

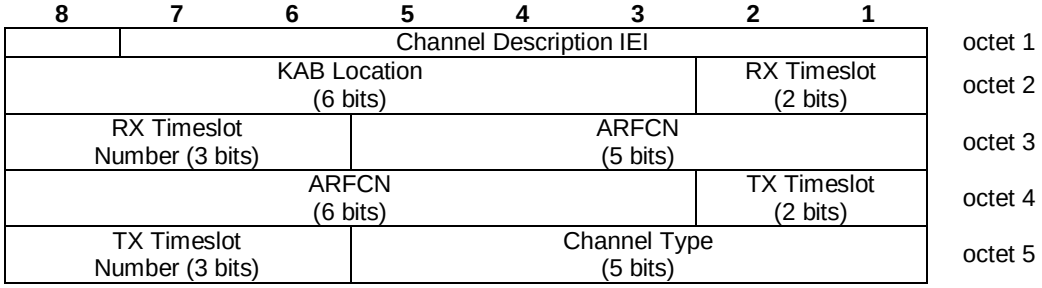


**Figure 11.6: Channel description IE**

**Table 11.8: Channel description IE**

8 7 6 5 4 3 (6 bits, octet 2)
KAB Location

KAB Location has a valid value only for TCH3. The number of half symbol periods that are present before the first of the dual KAB bursts is 5+2*(KAB Location). Valid ranges are 1 - 21 and 32 - 47. The KAB location is the same in both directions (i.e., while the MES is transmitting and while it is receiving). (See GMR-1 05.002 [16]/GMR-1 05.008 [19] for further details)

Timeslot number (octet 2, 3, 4, and 5)
Binary representation of receive timeslot number
Range: 0 - 23

ARFCN (octets 3 and 4). Range: 1 - 1 087
Binary representation of absolute RF channel number

The TX and RX frequency pair shall be calculated from the ARFCN as given in GMR-1 05.005 [18]

2 1 (octet 2)
RX timeslot number (high-order bits)
8 7 6 (octet 3)
RX timeslot number (low-order bits)

Bits
5 4 3 2 1 (octet 3)
ARFCN (high order bits)
8 7 6 5 4 3 (octet 4)
ARFCN (lower order bits)

2 1 (octet 4)
TX timeslot number (high-order bits)
8 7 6 (octet 5)
TX timeslot number (low-order bits)

**Table 11.8: Channel description IE**

```
Channel Type (octet 5)
5 4 3 2 1
0 0 0 0 1 TCH3 No offset
0 0 0 1 1 TCH3 ½ symbol offset
0 0 1 1 0 TCH6 No offset
0 0 1 1 1 TCH6 ½ symbol offset
0 0 1 0 0 TCH9 No offset
0 0 1 0 1 TCH9 ½ symbol offset
0 1 1 0 1 SDCCH frames xx00
0 1 1 1 0 SDCCH frames xx01
0 1 1 1 1 SDCCH frames xx10
1 0 0 0 0 SDCCH frames xx11

No offset – the same timing as the BCCH

½ symbol offset – ½ symbol offset relative to the timing of
the BCCH (See GMR-1 05.010 [20])

Other values are reserved for future use
```

### 11.5.2.6 Channel mode

The Channel Mode IE gives information about the mode on coding/decoding and transcoding. The exact mode is determined by the contents of this IE and the channel type. This IE is coded as shown in figure 11.7 and table 11.9**.** Channel Mode is a Type 3 IE, 2 octets in length.

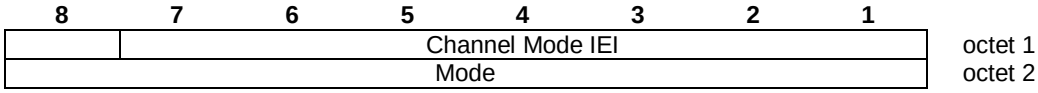


**Figure 11.7: Channel mode IE**

**Table 11.9: Channel mode IE**

```
The mode field is encoded as follows:
(octet 2)
Bits
8 7 6 5 4 3 2 1
0 0 0 0 0 0 0 0  Signalling only
0 0 0 0 0 0 0 1  Speech
0 0 0 0 0 0 1 1  Data, 12,0 kbps radio I/F rate
0 0 0 0 1 0 1 1  Data, 6,0 kbps radio I/F rate
0 0 0 1 0 0 1 1  Data, 3,6 kbps radio I/F rate

Other values are reserved for future use
```

### 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 10.5.2.9 of GSM 04.08 [22].

### 11.5.2.10 Cipher response

Same as clause 10.5.2.10 of GSM 04.08 [22].

### 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, 1-5 octets in length.

| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
|---|---|---|---|---|---|---|---|---|
| | IAR Rest Octets IEI | | | | | | | octet 1 |
| 0<br>Spare | 0<br>Spare | 1<br>Spare | 0<br>Spare | 1<br>Spare | 0<br>Spare | 1<br>Spare | 1<br>Spare | octet 2 |
| 0<br>Spare | 0<br>Spare | 1<br>Spare | 0<br>Spare | 1<br>Spare | 0<br>Spare | 1<br>Spare | 1<br>Spare | • |
| 0<br>Spare | 0<br>Spare | 1<br>Spare | 0<br>Spare | 1<br>Spare | 0<br>Spare | 1<br>Spare | 1<br>Spare | • |
| 0<br>Spare | 0<br>Spare | 1<br>Spare | 0<br>Spare | 1<br>Spare | 0<br>Spare | 1<br>Spare | 1<br>Spare | octet 5 |

**Figure 11.8: IAR 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, 1-5 octets in length.

| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
|---|---|---|---|---|---|---|---|---|
| | IAR Rest Octets IEI | | | | | | | octet 1 |
| 0<br>Spare | 0<br>Spare | 1<br>Spare | 0<br>Spare | 1<br>Spare | 0<br>Spare | 1<br>Spare | 1<br>Spare | octet 2 |
| 0<br>Spare | 0<br>Spare | 1<br>Spare | 0<br>Spare | 1<br>Spare | 0<br>Spare | 1<br>Spare | 1<br>Spare | • |
| 0<br>Spare | 0<br>Spare | 1<br>Spare | 0<br>Spare | 1<br>Spare | 0<br>Spare | 1<br>Spare | 1<br>Spare | • |
| 0<br>Spare | 0<br>Spare | 1<br>Spare | 0<br>Spare | 1<br>Spare | 0<br>Spare | 1<br>Spare | 1<br>Spare | octet 5 |

**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

The L2 Pseudo Length IE indicates the number of octets following it in the message that are to be interpreted in the standard L3 message format. This IE is coded as shown in figure 11.10 and table 11.10. This IE is used on the downlink AGCH, PCH, and BCCH channels, and it is the first octet of the messages that are sent on these channels. The L2 Pseudo Length IE is an element, 2 octets in length.

| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
|---|---|---|---|---|---|---|---|---|
| | L2 Pseudo Length IEI | | | | | | | octet 1 |
| L2 Pseudo Length value | | | | | | 0 | 1 | octet 2 |

**Figure 11.10: L2 pseudo length IE**

**Table 11.10: L2 pseudo length IE**

| |
|---|
| L2 Pseudo Length value (octet 2)<br><br>The coding of the L2 Pseudo Length Value field is the binary representation of the L2 Pseudo Length of the message in which the L2 Pseudo Length IE occurs |

NOTE: Bits 1 and 2 are not spare.

### 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

The P1 Rest Octets IE contains only spare bits. This IE is coded as shown in figure 11.11. The P1 Rest Octets IE is a Type 5 IE, 1-15 octets in length.

| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
|---|---|---|---|---|---|---|---|---|
| | P1 Rest Octets IEI | | | | | | | octet 1 |
| 0<br>Spare | 0<br>Spare | 1<br>Spare | 0<br>Spare | 1<br>Spare | 0<br>Spare | 1<br>Spare | 1<br>Spare | octet 2* |
| 0<br>Spare | 0<br>Spare | 1<br>Spare | 0<br>Spare | 1<br>Spare | 0<br>Spare | 1<br>Spare | 1<br>Spare | octet 3* |
| 0<br>Spare | 0<br>Spare | 1<br>Spare | 0<br>Spare | 1<br>Spare | 0<br>Spare | 1<br>Spare | 1<br>Spare | octet n* |

**Figure 11.11: P1 rest octets IE**

### 11.5.2.24 P2 rest octets

The P2 Rest Octets IE contains only spare bits. This IE is coded as shown in figure 11.12. P2 Rest Octets IE is a Type 5 IE, 1-8 octets in length.

| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
|---|---|---|---|---|---|---|---|---|
| | P2 Rest Octets IEI | | | | | | | octet 1 |
| 0<br>Spare | 0<br>Spare | 1<br>Spare | 0<br>Spare | 1<br>Spare | 0<br>Spare | 1<br>Spare | 1<br>Spare | octet 2* |
| 0<br>Spare | 0<br>Spare | 1<br>Spare | 0<br>Spare | 1<br>Spare | 0<br>Spare | 1<br>Spare | 1<br>Spare | octet 3* |
| 0<br>Spare | 0<br>Spare | 1<br>Spare | 0<br>Spare | 1<br>Spare | 0<br>Spare | 1<br>Spare | 1<br>Spare | octet n* |

**Figure 11.12: P2 rest octets IE**

### 11.5.2.25 P3 rest octets

This function is not currently supported in GMR-1.

### 11.5.2.26 Page mode

The purpose of the Page Mode IE is to control the action of the MES belonging to the paging subgroup corresponding to the paging subchannel. This IE is coded as shown in figure 11.13, GMR-1 4.008 and table 11.11, GMR-1 04.008. Page Mode is a Type 1 IE.

| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|
| | Page Mode IEI | | | 0<br>Spare | 0<br>Spare | PM | |

**Figure 11.13: page mode IE**

**Table 11.11: page mode IE**

```
PM (octet 1)
Bits
2  1
0  0  Normal Paging
0  1  Reserved (Changed from Extended Paging in GSM)
1  0  Paging Reorganization
1  1  Same as before

NOTE: The value "same as before" has been defined instead of
"reserved" to allow the use of this coding in an upward
compatible way in later phases of the GMR-1 system
```

### 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

The purpose of the RACH Control Parameters IE is to provide parameters to control RACH utilization.
See figure 11.14 and table 11.12. RACH Control Parameters is a Type 3 IE, 4 octets in length.

| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
|---|---|---|---|---|---|---|---|---|
| | RACH Control Parameters IEI | | | | | | | octet 1 |
| Max retrans | | Spare | | | | CELL BAR ACCESS | Spare | octet 2 |
| AC C15 | AC C14 | AC C13 | AC C12 | AC C11 | AC C10 | AC C09 | AC C08 | octet 3 |
| AC C07 | AC C06 | AC C05 | AC C04 | AC C03 | AC C02 | AC C01 | AC C00 | octet 4 |

**Figure 11.14: RACH control parameter IE**

**Table 11.12: RACH control parameter IE**

```
Max retrans, Maximum number of retransmissions
(octet 2)

Bits
8  7
0  0  Maximum 0 retransmission
0  1  Maximum 1 retransmissions
1  0  Maximum 2 retransmissions
1  1  Maximum 3 retransmissions

The spare bits shall be coded as 0s

CELL_BAR_ACCESS, Cell Barred for Access (octet 2)

Bit
2
0  The cell is not barred, see GMR-1 03.022 [5]
1  The cell is barred, see GMR-1 03.022 [5]

EC Emergency Call allowed (octet 3 bit 3)
Bit
3
0  Emergency call allowed in the cell to all MESs
1  Emergency call not allowed in the cell except for the MESs
that belong to one of the classes between 11 to 15

AC CN (Access Control Class N) (octet 3, except bit 3, and
octet 4)
For a mobile earth station with AC C = N access is not barred
if  the AC CN bit is coded with a "0;" N = 0, 1, .. 9,11, ..,
15
```

## 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.

| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
|---|---|---|---|---|---|---|---|---|
| | Request Reference IEI | | | | | | | octet 1 |
| Establishment cause group ID | | | Random Access Information | | | | | octet 2 |
| Frame Number | | | | | | | | octet 3 |

**Figure 11.15: request reference IE**

**Table 11.13: request reference IE**

```
Random Access Information (octet 2, bits 5-1)
Random Reference in CHANNEL REQUEST message

Establishment Cause group identifier(octet 2, bits 8-6)
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         Reserved

Frame Number (octet 3)
Lower 8 bits of the frame number
```

## 11.5.2.31 RR cause

The purpose of the RR Cause IE is to provide the reason for release or error. This IE is coded as shown in figure 11.16 and table 11.14. RR Cause is a Type 3 IE, 2 octets in length.

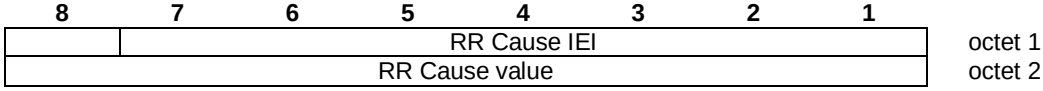


**Figure 11.16: Request reference cause IE**

**Table 11.14: Request reference cause IE**

```
RR Cause value (octet 2)
Bits
8 7 6 5 4 3 2 1
0 0 0 0 0 0 0 0  Normal event
0 0 0 0 0 0 0 1  Abnormal release, unspecified
0 0 0 0 0 0 1 0  Abnormal release, channel unacceptable
0 0 0 0 0 0 1 1  Abnormal release, timer expired
0 0 0 0 0 1 0 0  Abnormal release, no activity on the radio
path
0 0 0 0 0 1 0 1  Preemptive release
0 0 0 0 1 0 0 1  Channel mode unacceptable
0 0 0 0 1 0 1 0  Frequency not implemented
0 0 0 0 1 0 1 1  Position unacceptable
0 1 0 0 0 0 0 1  Call already cleared
0 1 0 1 1 1 1 1  Semantically incorrect message
0 1 1 0 0 0 0 0  Invalid mandatory information
0 1 1 0 0 0 0 1  Message type nonexistent or not implemented
0 1 1 0 0 0 1 0  Message type not compatible with protocol
state
0 1 1 0 1 1 1 1  Protocol error unspecified

All other cause values shall be treated as ‘0000 0000’,
"normal event"
The listed RR cause values are defined in annex F
```

### 11.5.2.32 SI 1 Rest octets

This function is not currently supported in GMR-1.

### 11.5.2.33 SI 2bis 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

The Timing Offset IE is used in messages that assign a new channel to the MES. The MES shall apply this timing offset to the transmission of the first and subsequent bursts of the new channel. The entire offset shall be applied all at one time. See figure 11.17 and table 11.15. Timing offset is a Type 3 IE, 3 octets in length.

| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
|---|---|---|---|---|---|---|---|---|
| 0 | Timing Offset IEI | | | | | | | octet 1 |
| TI | Timing Offset (Higher order bits) | | | | | | | octet 2 |
| Timing Offset (Lower order bits) | | | | | | | | octet 3 |

**Figure 11.17: Timing offset IE**

**Table 11.15: Timing offset IE**

| |
|---|
| TI (bit 8, octet 2) indicates whether this IE contains a valid timing offset value<br>bit 8, octet 2<br><br>0 The timing offset parameter in this IE to be ignored. MES keeps on applying the current transmit timing. The value of the timing offset parameter shall be set to 0<br><br>1 The timing offset parameter has a valid value<br><br>The timing offset information is a 15-bit signed value. The timing offset is specified in a 2's complement form, coded in binary. The valid range for the timing offset values are from –15 912 to +15 912. The offset value are specified in Ts/40 resolution unit, where Ts is a symbol period, i.e., (5/234*2) msec |

### 11.5.2.41 Time difference

This function is not currently supported in GMR-1.

### 11.5.2.42 TMSI

Same as clause 10.5.2.42 of GSM 04.08 [22].

### 11.5.2.43 Wait indication

Same as clause 10.5.2.43 of GSM 04.08 [22].

### 11.5.2.44 MES information flag

The purpose of the MES Information Flag is to provide the additional information related to registration, extended procedure and presence indication for other Ies. Its coding is shown in figure 11.18. The various components of the element are described in table 11.16.

| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
|---|---|---|---|---|---|---|---|---|
| 0 | MES Information Flag IEI | | | | | | | octet 1 |
| PV | MES4 Info. | MES3 Info. | MES2 Info. | MES1 Info. | | | | octet 2 |

**Figure 11.18: MES information flag IE**

**Table 11.16: MES information flag IE**

```
Information Flags MES1, MES2, MES3, MES4  (octet 2)
Bits
8  7  6  5  4  3  2  1
PV          D  I  a  b   For coding of these bits, see below
         0            There is no MES2
         1            Pause Timer Ind for MES2
      0               There is no MES3
      1               Pause Timer Ind for MES3
   0                  There is no MES4
   1                  Pause Timer Ind for MES4

The MES Information Flag is used in immediate assignment. The
a and b bits are to be interpreted as follows:
a b
0 0  Chan. Assigned: MES1 registered at selected GS
0 1  Chan. Assigned: MES1 requires registration at selected
GS
1 0  Chan. Assigned;  MES 1 Extended Channel Req. Reqd
1 1  Pause Timer Indication

The I (octet 2, bit 3): Idle Mode Position Update parameter
indicator
If the bit is set to 1, the Idle Mode Position Update
Information IE is present
If the bit is set to 0, the Idle Mode Position Update
Information IE is absent

The D (octet 2, bit 4): Dedicated Mode Position Update
parameter indicator
If the bit is set to 1, the Dedicated Mode Position Update
Information IE is present

If the bit is set to 0, the Dedicated Mode Position Update
Information IE is absent

The I or D bit shall be ignored, and the Position Update IE
shall not be present, if a and b are set to either 10 or 11

If the Dedicated Mode Position Update Information IE is
absent, the MES shall not report its position during the
call, even if it is a VT



PV (octet 2, bit 8): Position Verification indicator. The PV
bit shall be interpreted as follows:

0  Position Verification not requested

1  MES1 shall send a Channel Request for Position
Verification following the completion of the upcoming call

If a and b are set to 10 or 11, MES1 shall ignore the value
of the PV bit

If, in accordance with another requirement, the MES performs
an LU following the call, no additional Position Verification
shall be required due to this bit
```

### 11.5.2.45 TTCH channel description

The purpose of the TTCH Channel Description IE is to provide the channel information for the TTCH channel in an MES-MES call. This IE is coded as shown in figure 11.19 and table 11.17. TTCH Channel Description is a Type 3 IE, 4 octets in length.

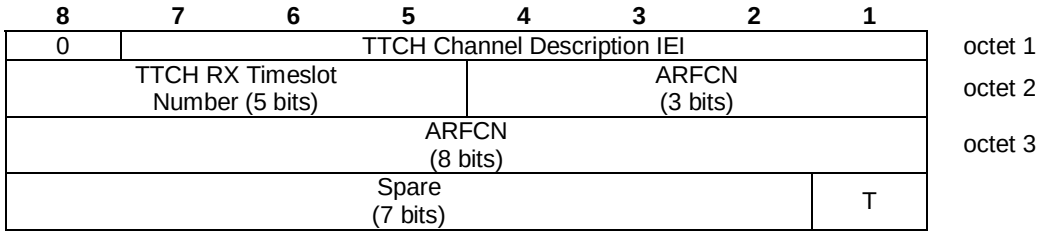


**Figure 11.19: TTCH channel description IE**

**Table 11.17: TTCH channel description IE**

```
Timeslot number (octet 2)
Binary representation of timeslot number. Range: 1 - 24
Bits
5 4 3 2 1 (octet 2)
TTCH TX timeslot number

ARFCN (octet 2 and 3). Range: 0 - 1 087
Binary representation of absolute RF channel number

T bit (octet 4)
TTCH subchannel number
0  TTCH/2  frames  xxx0
1  TTCH/2  frames  xxx1
```

### 11.5.2.46 MES configuration

The purpose of the MES Configuration IE is to provide the configuration of an MES in an MES-MES call. This IE is coded as shown in figure 11.20 and table 11.18. MES Configuration is a Type 3 IE, 2 octets in length.

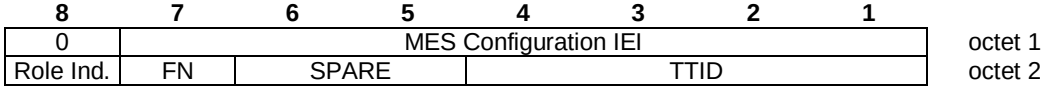


**Figure 11.20: MES configuration IE**

**Table 11.18: MES configuration IE**

| |
|---|
| Role Indicator (octet 2)<br>Bit<br>8<br>0 MES shall act in a network mode<br>1 MES shall act in a terminal mode<br><br>FN (Frame Number Modification) (octet 2)<br>Bit<br>7<br>0 MES not to perform any operation on FN<br>1 MES to decrement the current RX FN by one when deciphering the received messages<br><br>TTID (octet 2)<br>Bits<br>4 3 2 1<br>Binary representation of TTID. Range: 0 - 15 |

## 11.5.2.47 TtT common cipher key

The purpose of the TtT Common Cipher Key IE is to provide the Common Cipher Key in an MES-MES call. This IE is coded as shown in figure 11.21 and table 11.21. The TtT Common Cipher Key is a Type 3 IE, 9 octets in length.

| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
|---|---|---|---|---|---|---|---|---|
| 0 | TtT Common Cipher Key IEI | | | | | | | octet 1 |
| Ktt | | | | | | | | octets 2-9 |

**Figure 11.21: TtT common cipher key IE**

**Table 11.19: TtT common cipher key IE**

| |
|---|
| Ktt (octets 2-9)<br>Contains the 64-bit Common Cipher Key value |

## 11.5.2.48 Access information

The purpose of the Access Information IE is to provide information relating to a channel request. This IE is coded as shown in figure 11.22 and in table 11.20. The Access Information IE is a Type 3 IE, 6 octets in length.

| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
|---|---|---|---|---|---|---|---|---|
| 0 | Access Information IEI | | | | | | | octet 1 |
| Spare | O | R | C | MES Power Class | | | | octet 2 |
| Est. Cause/ Numbering Plan | | | | | SP/HPLMN ID | | | octet 3 |
| SP/HPLMN ID (8 bits) | | | | | | | | octet 4 |
| SP/HPLMN ID (8 bits) | | | | | | | | octet 5 |
| SP/HP ID | GCI | MSC ID | | | | | | octet 6 |

**Figure 11.22: Access information IE**

**Table 11.20: Access information IE**

O bit (octet 2, bit 7)
Ordinarily set to zero. If this bit is set to 1, it indicates that the MES has already been optimally routed once for this same service request but that attempt had failed. The network should use this bit to decide how to setup the call, i.e., whether to optimally route the call or not

R bit (octet 2, bit 6)
If this bit is set, the MES should not be redirected to another satellite. This bit is set when the MES has been initially redirected from the other satellite

Called Party Number Indication (C) (octet 2)
Bit
5
0 Called Party Number not present
1 Called Party Number present

MES power class (octet 2, bits 4-1)
Bits 4 3 2 1
See clause 11.5.2.50 for description of this 4-bit field

Establishment Cause (octet 3)
Bits
8 7 6 5 4

1 x x x x MO Call – bits 7-4 represent Numbering Plan Identification

0 0 0 x x In response to Paging (bits 5-4 represent Channel Needed echoed from Paging Request

0 0 1 0 0 In response to Alerting

0 1 0 0 0 Location Update
0 1 0 0 1 IMSI Detach
0 1 0 1 0 Supplementary Services
0 1 0 1 1 Short Message Services
0 1 1 1 1 Emergency Call
0 1 1 0 0 Position Verification
All other values are reserved

Numbering Plan Identification (octet 3)
Bits
7 6 5 4
0 0 0 0 Unknown
0 0 0 1 ISDN E.164/E.163
0 0 1 0 Not Used
0 0 1 1 X.121
0 1 0 0 Telex F.69
1 0 0 0 National Numbering Plan
1 0 0 1 Private Number Plan
1 1 1 1 Reserved For Extension
All other values reserved

SP/HPLMN ID (octets 4,5, 6)

Octet 3, bits 3-1 represent the highest bits, octets 4 and 5 represent the middle bits, and octet 6 bit 8 represents the lowest bit of the SP/HPLMN ID field

The HPLMN ID shall be sent in this field when it is different from the PLMN ID of the network being accessed. The SP ID

**Table 11.20: Access information IE**

| |
|---|
| shall be sent when the MES is accessing its HPLMN<br><br>To accommodate SIMs with 3-digit MNCs, the value transmitted as the HPLMN ID shall consist of digits 1-6 of the IMSI. This value shall be represented as a 20-bit binary number<br><br>The SP ID shall consist of digits 6-9 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<br><br>A string of 1s shall represent the SP/HPLMN ID with null value. The MES shall use this value when it does not have knowledge of its HPLMN at the time of access (e.g., making an emergency call without a SIM card)<br><br>GPS Capability Indication (GCI) (octet 6)<br>Bit<br>7<br>0 MES is not GPS capable<br>1 MES is GPS capable<br><br>MSC ID (octet 6, bits 6-1): Range 0 - 63<br>Value of MSC ID received in the paging request in case an access attempt is due to response to page. In the case of MO calls that have been redirected to another satellite, the value shall be the MSC ID received in the redirecting IMMEDIATE ASSIGNMENT REJECT or EXTENDED IMMEDIATE ASSIGNMENT REJECT message<br>For all other cases this value is coded as ‘111111’<br><br>Spare bits shall be coded as "0" |

## 11.5.2.49 Frequency offset

The Frequency Offset IE is used in messages that assign a new channel to the MES. The MES shall apply this frequency offset to the transmission of the first and subsequent bursts of the new channel. The entire offset shall be applied all at one time. See figure 11.23 and table 11.21. Frequency Offset is a Type 3 IE, 3 octets in length.

| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
|---|---|---|---|---|---|---|---|---|
| 0 | Frequency Offset IEI | | | | | | | octet 1 |
| FI | Frequency offset (higher order bits) | | | | | | | octet 2 |
| Freq. Offset (lower bits) | | | | | Spare | | | octet 3 |

**Figure 11.23: Frequency offset IE**

**Table 11.21: Frequency offset IE**

| |
|---|
| FI (bit 8, octet 2) indicates whether this IE contains a valid frequency offset value bit 8, octet 2<br><br>0 The Frequency Offset parameter in this IE is to be ignored. The MES keeps applying the current offset. The value of the frequency offset parameter shall be set to 0<br><br>1 The Frequency Offset parameter has a valid value<br><br>The Frequency Offset information is a 12-bit signed value. The frequency offset is specified in a 2's complement form coded in binary. The valid range for the frequency offset values is from –1 500 to +1 500. The offset value is specified in 1 Hz resolution unit |

## 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.

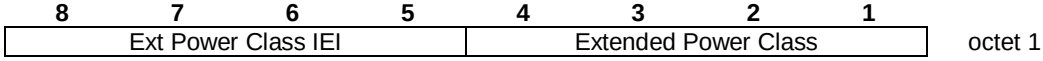


**Figure 11.24: Extended power class IE**

**Table 11.22: Extended power class IE**

| Extended Power Class<br>Bits<br>4 3 2 1 |
|---|
| 0 0 0 0 MES, handheld |
| 0 0 0 1 VT, no adjustable antenna |
| 0 0 1 0 Reserved |
| 0 0 1 1 VT, adjustable antenna |
| 0 1 0 0 Reserved |
| 0 1 0 1 Fixed terminal (high-gain class) |
| 0 1 1 0 Fixed terminal (low-gain class) |
| 0 1 1 1 Reserved |
| 1 0 0 0 Interface Station |
| 1 0 0 1 Reserved |
| 1 0 1 0 Marine terminal (high-gain class) |
| 1 0 1 1 Marine terminal (low-gain class) |
| 1 1 0 0 Reserved |
| 1 1 0 1 Aeronautical terminal |
| 1 1 1 0 Reserved |
| 1 1 1 1 Reserved |

## 11.5.2.51 Paging information

The Paging Information IE is used to indicate MSC 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.

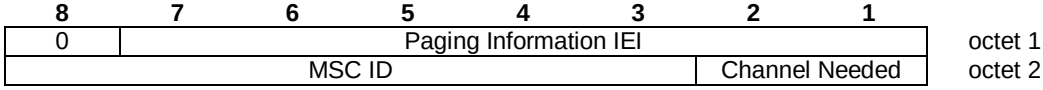


**Figure 11.25: Paging information IE**

**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  spare

Bits 3 to 8 of octet 2 contain the MSC ID to be used by the
mobile at immediate assignment procedure
```

### 11.5.2.52 Position display

The Position Display IE is used to transfer country and/or region name to the MES. This IE is coded as shown in figure 11.26 and table 11.24. Position Display IE is a Type 4 IE, 12 octets in length.

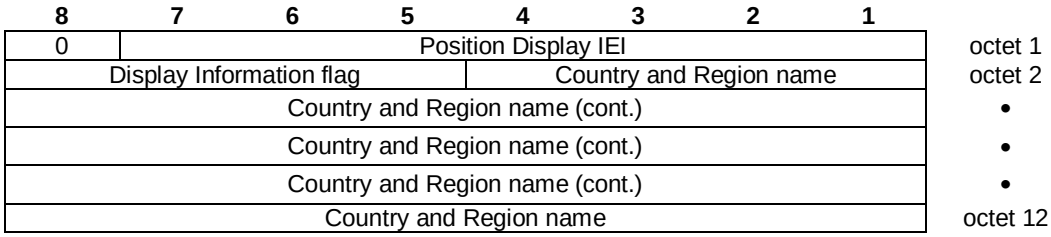


**Figure 11.26: Position display IE**

**Table 11.24: Position display IE**

```
Display Information Flag(octet 2)
Bits
8 7 6 5
0 0 0 0  Position not available, MES may continue to use old
position string
0 0 0 1  No position display service provided. MES should not
use the old position string
0 0 1 0  Use Default 7-Bit alphabet specified in clause 6 of
GSM 03.38 [26] to encode the country/region name string
* All other combinations are reserved

Country and region name – (bits 4-1 octet 2, octet 3 to
octet 12)
Country/region name contains 12 characters encoded in 84 bits
according to the packing scheme specified in clause 6 of
GSM 03.38 [26].
The packed bits are represented as follows:
Starting from MSB of the first octet of the 84 packed bits,
the bits are filled from higher order bit position toward the
lower order bit position, and so on, for other octets.
(Also see GMR-1 04.006 [14])
```

### 11.5.2.53 GPS position

The GPS Position IE is used to transfer GPS position to the network. It is coded as shown in figure 11.27 and table 11.25. The GPS Position IE is a Type 3 IE, 6 octets in length.

| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
|---|---|---|---|---|---|---|---|---|
| 0 | GPS Position IEI | | | | | | | octet 1 |
| CPI | GPS Position (Latitude) | | | | | | | octet 2 |
| GPS Position (Latitude) | | | | | | | | octet 3 |
| GPS Position (Latitude) | | | | GPS Position Long.) | | | | octet 4 |
| GPS Position (Longitude) | | | | | | | | octet 5 |
| GPS Position (Longitude) | | | | | | | | octet 6 |

**Figure 11.27: GPS position IE**

**Table 11.25: GPS position IE**

Current Position Indicator CPI (octet 2)
Bit
8
0 GPS position is old position
1 GPS position is current position

GPS position contains the most recently measured position of the MES in the following format.
A NULL GPS position shall mean that there is no GPS position data available in this IE

NOTE: The NULL GPS position shall have a NULL value in the latitude field and a random number in the longitude field. Once the random number is chosen it shall be reused throughout the life of the call whenever a NULL GPS position is needed.

GPS Position (Latitude) – (bits 7-1 octet 2, octet 3, bits 8-5 octet 4)

These 19 bits are coded as:
Take latitude in degrees (with minutes and seconds converted to decimal), multiply by 2 912,70000, round to nearest integral number, and then represent the integral number in 2’s complement binary to fit in 19 bits. Valid range for the latitude is –90° north to +90° north is positive
Value –262 144 (i.e., 1 followed by 18 0s) is taken as NULL value (i.e., there is no value of the GPS position)

GPS Position (Longitude) – (bits 4-1 octet 4, octet 5, octet 6)

These 20 bits are coded as:
Take longitude in degrees (with minutes and seconds converted to decimal), multiply by 2 912,70555, round to nearest integral number, and then represent the integral number in 2’s complement binary to fit in 20 bits. Valid range for the longitude is –180° west to +180° west is positive
For a NULL GPS position, a 20-bit random number shall be used for the longitude field

Order of bit values within each octet progressively decreases as the octet number increases. In that part of the field contained in a given octet, the lowest bit number represents the lower order value

### 11.5.2.54 Idle or dedicated mode position update information

The Idle Mode (IM) or Dedicated Mode (DM) Position Update Information IE is used to transfer GPS Update Timer and Distance Timer to the MES. This IE is coded as shown in figure 11.28 and for table 11.26. The Position Update Information IE is a Type 3 IE, 3 octets in length.

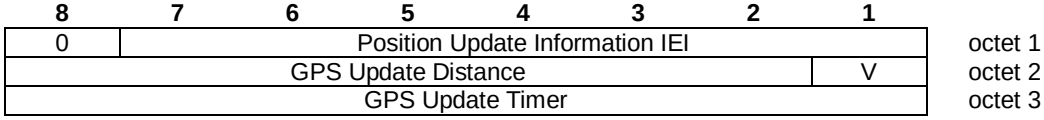


**Figure 11.28: Position update information IE**

**Table 11.26: Position update information IE**

```
Valid (V) (octet 2)
Bit
1
0  Information in this message is valid
1  Information is invalid. No change in values

GPS Update Distance (octet 2)
Range: 0 - 127 km
Bits
8 7 6 5 4 3 2
If the value of this parameter is set to zero, no position
reporting shall be initiated by the MES based on distance
between current position and last reported position. The
effect will be as if this value were set to some infinitely
high figure

GPS Update Timer (octet 3)
Range: 0 - 255 minutes
If the value of this parameter is set to zero, no position
reporting shall be initiated by the MES based on time elapsed
between time of last reporting of position to the network and
current time. The effect will be as if this value were set to
some infinitely high figure
```

### 11.5.2.55 BCCH carrier

The BCCH Carrier IE is used when the network wants the MES to access another BCCH carrier. This IE is coded as shown in figure 11.29 and table 11.27. BCCH Carrier IE is a Type 3 IE, 4 octets in length.

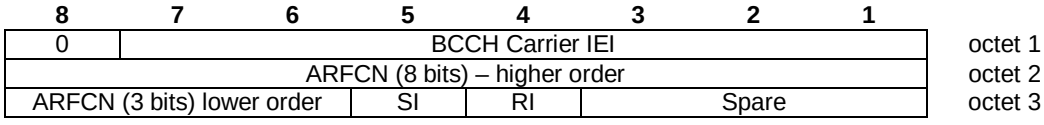


**Figure 11.29: BCCH carrier IE**

**Table 11.27: BCCH carrier IE**

| |
|---|
| ARFCN (octet 2 and octet 3, bits 8-6). Range: 1 - 1 087<br>Binary representation of absolute RF channel number of the BCCH. Octet 2 is the most significant bits<br><br>SI: Satellite Indication bit (bit 5, octet 3)<br>0 BCCH carrier is on the same satellite<br>1 BCCH carrier is on a different satellite<br><br>RI: Reselection Indication bit (bit 4, octet 3)<br>0 spot beam reselection not needed; use the spot beam with given BCCH<br>1 spot beam reselection needed; use the BCCH for spot beam reselection |

## 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.

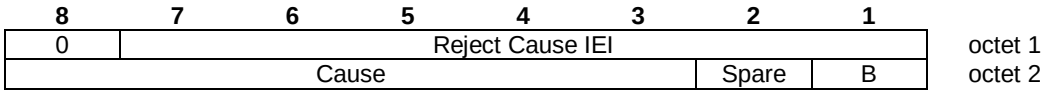


**Figure 11.30: Reject cause IE**

**Table 11.28: Reject cause IE**

| |
|---|
| BCCH carrier (B) (octet 2)<br>Bit<br>1<br>0 BCCH carrier information absent<br>1 BCCH carrier information present<br><br>Cause (octet 2)<br>Bits<br>8 7 6 5 4 3<br>0 0 0 0 0 0 Lack of resources (default)<br>0 1 0 0 0 1 Invalid position for selected LAI<br>0 1 0 0 1 0 Invalid position for selected spot beam<br>0 1 0 0 1 1 Invalid position<br>0 1 0 1 0 1 Position too old<br>0 1 0 1 1 0 Invalid position for service provider<br>0 1 0 1 1 1 Redirect to new satellite<br>1 1 1 1 1 1 Reported position acceptable<br><br>All other values reserved |

### 11.5.2.57 GPS timestamp

The GPS Timestamp IE is used to convey the time at which the reported GPS position was calculated. It is coded as shown in figure 11.31 and table 11.29. Timestamp IE is a Type 3 IE, 3 octets in length.

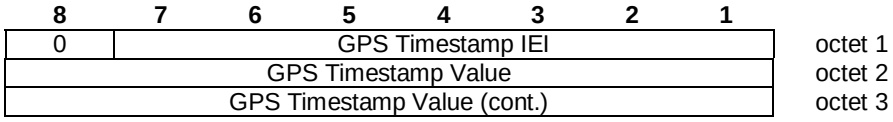


**Figure 11.31: GPS timestamp IE**

**Table 11.29: GPS timestamp IE**

| |
|---|
| GPS Timestamp Value (octets 2-3)<br>2-byte binary value represents minutes, rounded down to the nearest integer, since the measurement of the reported GPS position<br>FFFF indicates values greater than or equal to 65 535, or N/A. Octet 2 is the most significant byte and octet 3 is the least significant byte |

### 11.5.2.58 Timing correction

The Timing Correction IE is used to convey the correction that the MES shall apply to its burst transmit timing. The correction is applied gradually, as described in GMR-1 05.010 [20]. This correction is defined as a differential change from its current transmit timing. See figure 11.32 and table 11.30. The Timing Correction IE is a Type 3 IE, 2 octets in length.

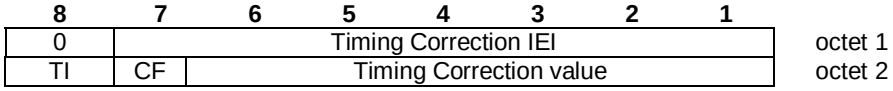


**Figure 11.32: Timing correction IE**

**Table 11.30: Timing correction IE**

| |
|---|
| TI (bit 8, octet 2) indicates whether this IE contains a valid timing correction value bit 8, octet 2<br>0 The Timing Correction parameter in this IE is to be ignored. MES keeps applying the current transmit timing<br>1 The Timing Correction parameter has a valid value<br><br>The timing correction information is a 6-bit signed value. The timing correction is specified in a 2's complement form coded in binary. The valid range for the timing correction values is from –32 to +31. The correction value is specified in Ts/40 resolution unit, where Ts is a symbol period (i.e., (2 * 5/234) msec)<br>CF (bit 7, octet 2) Control flag indicating whether previously commanded, but yet unapplied, corrections shall continue to be applied in addition to this correction, or be discontinued in favor of this correction<br><br>0 The offset defined in this message shall be added to the remaining adjustments from previous corrections<br>1 The offset defined in this message shall be applied, while any remaining adjustments from previous corrections are discarded |

### 11.5.2.59 MES information 2 flag

The purpose of the MES Information 2 flag is to indicate the MES registration status at the gateway selected by the network during the extended channel assignment procedure. Its coding is shown in figure 11.33. The various components of the element are described in table 11.31.

| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
|---|---|---|---|---|---|---|---|---|
| 0 | MES Information 2 Flag IEI | | | | | | | octet 1 |
| C | PV | L | Spare | | | | | octet 2 |

**Figure 11.33: MES information 2 flag IE**

**Table 11.31: MES information 2 flag IE**

C (octet 2, bit 8): Change of Channel Indicator
The C bit shall be interpreted as follows:
0 MES shall continue using old channel
1 MES shall change to new channel

PV (octet 2, bit 7): Position Verification Indicator
The PV bit shall be interpreted as follows:
0 Position Verification not requested
1 MES shall send a Channel Request for Position Verification following the completion of the upcoming call
If, in accordance with requirement, the MES performs an LU following the call, no additional Position Verification shall be required due to this bit

L (octet 2, bit 6): Location Update Indicator
The L bit shall be interpreted as follows:
0 MES already registered at the selected GW
1 MES requires registration at the selected GW

Spare bits shall be coded as 0

### 11.5.2.60 Power control parameters

The purpose of the Power Control Parameters IE is to provide a list of Power Control parameters whose values the MES shall update. See figure 11.34 and table 11.32. Power Control Parameters is a Type 3 IE, 6 octets in length.

| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
|---|---|---|---|---|---|---|---|---|
| | Power Control Parameters IEI | | | | | | | octet 1 |
| Parameters | | | | | | | | octet 2 |
| Parameters (cont.) | | | | | | | | octet 3 |
| Parameters (cont.) | | | | | | | | octet 4 |
| Parameters (cont.) | | | | | | | | octet 5 |
| Parameters (cont.) | | | | | | | | octet 6 |

**Figure 11.34: Power control parameters IE**

**Table 11.32: Power control parameters IE**

Parameters (octet 2 – octet 6)
These are the parameter identifiers with the associated values that need to be updated. This field is described according to the compact notation defined in annex B, GMR-1 04.007 [15]
<Parameters>::=
{0 – No SQT value present
{1<SQT value: bitstring(7)>}} – SQT value present
<Re-init-bit> – flag for reinitialization

{<param-id><param-value>}* – Maximum number of parameters present is limited by the length of the IE

<spare bits>; – The field is padded with all 0s to complete the total length required for the IE

<Re-int-bit> ::= – Flag to reinitialize the power control algorithm

0 | Reinitialization not needed
1 ; Reinitialization needed

<param-id> ::= – Different param-ids are defined in 11.5.2.60.1 |

{{< bitstring (2) except 00}<bitstring (2)>} | –4-bit length

{00 {<bitstring (2)>except 00}<bit> } | –5-bit length

{0000 <bitstring (2)>except 00 } ; –6-bit length

<param-value> ::=

<bit>* ; – Depending upon the param-id, the number of bits in the string is determined according to clause 11.5.2.60.1

NOTE: Six consecutive zeros(‘000000’ b) indicate that the rest of this field is coded with spare bits to complete the total length required for the IE.

### 11.5.2.60.1 Power control parameters identifiers

Following is a list of the different Power Control parameters that are updated by the network to the MES. Reserved parameters are not currently used, and the MES should ignore the parameter value while receiving them. Also indicated is the number of bits required for the parameter value. Refer to GMR-1 05.008 [19] for detailed definitions of these parameters.

| Parameter Name | Param-id | No. of bits for the param-value |
|---|---|---|
| PANinit | 0100 | 6 |
| PANmin | 0101 | 6 |
| PANmax | 0110 | 6 |
| RESERVED | 0111 | 6 |
| GainUp | 1000 | 5 |
| GainDn | 1001 | 5 |
| Olthresh | 1010 | 5 |
| RESERVED | 1011 | 6 |
| RESERVED | 1100 | 6 |
| RESERVED | 1101 | 6 |
| RESERVED | 1110 | 6 |
| RESERVED | 1111 | 6 |
| OlupGain | 00010 | 5 |
| OldnGain | 00011 | 5 |
| VarUp | 00100 | 5 |
| VarDn | 00101 | 5 |
| SQIfactor | 00110 | 5 |
| RESERVED | 00111 | 5 |
| Mestep | 000001 | 4 |
| LQI-n1 | 000010 | 4 |
| LQI-n2 | 000011 | 4 |

## 11.5.2.61 DTMF digits

The DTMF Digits IE contains information about the DTMF digits that are transferred by the MES to the other end (other end is MES in single-hop TtT call, GS otherwise) for generation of in-band tones. This IE is coded as shown in figure 11.35 and table 11.33.

The DTMF Digits IE is a Type 4 IE with a minimum of 2 octets and maximum of 2+2k octet length, with the limit of maximum octets of an L3 message permitted by the L2 (GMR-1 04.006 [14]) where k is the number of the DTMF Digit information passed in this IE with a numeric value of 0, 1, 2…

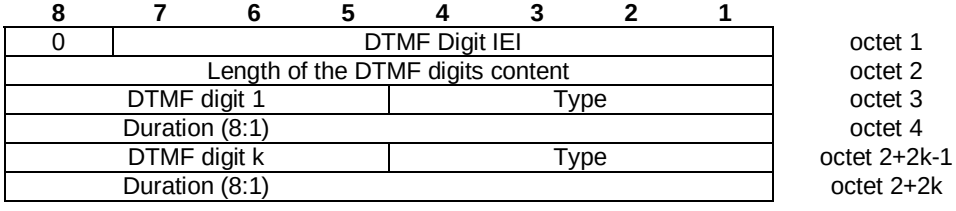


**Figure 11.35: DTMF digits IE**

**Table 11.33: DTMF digits IE**

```
DTMF digit (B) (octet 2+2k-1, bits 8 to 5)
This contains the value of the DTMF Digit dialed by the user.
The valid value is from ‘0000’ to ‘1111’. . The mapping of
DTMF digit to a binary value is given below

‘0’:0000        ‘4’:0100        ‘8’:1000        ‘C’:1100

‘1’:0001        ‘5’:0101        ‘9’:1001        ‘D’:1101

‘2’:0010        ‘6’:0110        ‘A’:1010        ‘*’:1110

‘3’:0011        ‘7’:0111        ‘B’:1011        ‘#’:1111

Type (octet 2+2k-1, bits 4 to 1)
This can take the following values:
01  Complete digit information and duration of the digit
specified
02  Start generate DTMF tone (ignore duration field)
03  Stop the currently generate tone (ignore digit field)

Duration (octet 2+2k)
This contains the length of the DTMF digits. The unit is
20 msec if the type is 01 and 100 msec if the type is 03
```

## 11.5.2.62 TMSI availability mask

The purpose of the TMSI Availability Mask IE is to indicate to the receiver whether the TMSI slots contain valid TMSI Ies or whether they contain data related to the GPS almanac being broadcast by the GS. It is coded as described in figure 11.36 and table 11.34. TMSI is a Type 1 IE.

| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|
| | TMSI Mask IEI | | | TMSI Mask 4 | TMSI Mask 3 | TMSI Mask 2 | TMSI Mask 1 |

**Figure 11.36: TMSI availability mask IE**

**Table 11.34: TMSI availability mask IE**

```
TMSI Mask 1 (octet 1, bit 1)
0  Does not contain TMSI, contains GPS almanac info
1  Contains valid TMSI

TMSI Mask 2 (octet 1, bit 2)
0  Does not contain TMSI, contains GPS almanac info
1  Contains valid TMSI

TMSI Mask 3 (octet 1, bit 3)
0  Does not contain TMSI, contains GPS almanac info
1  Contains valid TMSI

TMSI Mask 4 (octet 1, bit 4)
0  Does not contain TMSI, contains GPS almanac info
1  Contains valid TMSI
```

NOTE: The contents of TMSI Mask 3 and TMSI Mask 4 bits are to be interpreted only for PAGING REQUEST 3 message.

### 11.5.2.63 GPS almanac data

The GMR-1 system shall provide a means through which MESs may download a current GPS almanac. Almanac updating is done by extracting and storing the GPS almanac from the gateway's GPS receiver. A fresh almanac is downloaded and stored at the gateway once daily. This almanac is broadcast to all spot beams by replacing fill bits in unused TMSI/paging information positions in paging messages with GPS almanac data.

Specifically, the portions of the GPS almanac (as described in ICD-GPS-200 [25]) required for broadcast are:

- GPS Subframe 4 – pages 2, 3, 4, 5, 7, 8, 9, 10, 25, words 3-10 of each page;
- GPS Subframe 5 – pages 1-25, words 3-10 of each page.

A PCH paging burst may normally contain up to four mobile terminal identifiers. If less than four identifiers are required in a given burst, each unused TMSI (4 octets) and its corresponding paging information (1 octet) may be used to broadcast one of the aforementioned words from the GPS almanac. The almanac should be broadcast repeatedly, cycling through all valid 272 words before repeating. The rate at which the 272 words shall be broadcast varies depending on availability of spare TMSI/paging information slots.

This IE is a Type 3 IE. Its coding is as given in figure 11.37 and table 11.35.

| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
|---|---|---|---|---|---|---|---|---|
| | GPS Almanac Data IEI | | | | | | | octet 1 |
| Page number | | | | | Word Number | | | octet 2 |
| 8 MSB of GPS Almanac word (24-17) | | | | | | | | octet 3 |
| 8 bits of GPS Almanac word (16-9) | | | | | | | | octet 4 |
| 8 LSB of GPS Almanac word (8-1) | | | | | | | | octet 5 |
| SFN | CO | 0 | 0 | 0 | 0 | 0 | 0 | octet 6 |
| | | spare | | | | | | |

**Figure 11.37: GPS almanac data IE**

**Table 11.35: GPS almanac data IE**

```
Page number (octet 2)
Bits 8-4 – Range 1 - 25
The coding is described in clause 11.5.2.63.1

Word Number (octet 2)
Bits 3-1, Range 0 - 7
The coding is described in clause 11.5.2.63.2

GPS Almanac information (octet 3,4,5)

SFN (octet 6, bit 8)
Subframe number
0  frame 4
1  frame 5

CO bit (octet 5, bit 7)
Alternates between 0,1
Spare (octet 6, bits 6-1)
Filled with zeroes
```

#### 11.5.2.63.1 Page number

The GPS Almanac Page Number (as defined in ICD-GPS-200 [25]) of the GPS subframe referred to by Subframe Number (SFN), which contains the word being broadcast.

- If SFN is 4, valid page numbers are 2, 3, 4, 5, 7, 8, 9, 10, 25.
- If SFN is 5, valid page numbers are 1–25.

#### 11.5.2.63.2 Word number

The word number of GPS subframe SFN, and page number, being broadcast

- 0 – word 3
- 1 – word 4
- 2 – word 5
- 3 – word 6
- 4 – word 7
- 5 – word 8
- 6 – word 9
- 7 – word 10

#### 11.5.2.63.3 GPS almanac word

The GPS almanac word contained at the GPS subframe, given in octet 6 and page/word, given in octet 2.

#### 11.5.2.63.4 Subframe number

The GPS subframe (as defined in ICD-GPS-200 [25]) containing the word being broadcast.

- 0 – Subframe 4
- 1 – Subframe 5

#### 11.5.2.63.5 Cutover (CO)

Alternates 0/1 as version of almanac being broadcast is changed. The MES should monitor this bit and wait for transition to indicate that a new version of the almanac has started being transmitted.

### 11.5.2.64 Frequency correction

The Frequency Correction IE is used to convey the correction that the MES shall apply to its current burst transmit frequency. The correction is applied gradually, as described in GMR-1 05.010 [20]. See figure 11.38 and table 11.36. Frequency Correction is a Type 3 IE, 3 octets in length.

| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
|---|---|---|---|---|---|---|---|---|
| 0 | Frequency Correction IEI | | | | | | | octet 1 |
| FI | Frequency Correction (Higher order bits) | | | | | | | octet 2 |
| Freq. Correction (Lower bits) | | | | | CF | Spare | | octet 3 |

**Figure 11.38: Frequency correction IE**

**Table 11.36: Frequency correction IE**

| |
|---|
| FI (bit 8, octet 2) indicates whether this IE contains a valid frequency correction value bit 8, octet 2<br><br>0 The Frequency Correction parameter in this IE is to be ignored. MES keeps on applying the current offset<br>1 The Frequency Correction parameter has a valid value<br><br>The Frequency Correction information is a 12-bit signed value. The Frequency Correction is specified in a 2's complement form coded in binary. The valid range for the frequency correction values is from –2 048 to +2 047. The correction value is specified in 1 Hz resolution unit<br><br>CF (bit 3, octet 3) (Control Flag) indicating whether previously commanded, but yet unapplied, corrections shall continue to be applied in addition to this correction or be discontinued in favor of this correction<br><br>0 The offset defined in this message shall be added to remaining adjustments from previous corrections<br>1 The offset defined in this message shall be applied, while any remaining adjustments from previous corrections are discarded |

## 11.5.2.65 Alerting information

The purpose of the Alerting Information IE is to provide additional information related to alert messages on the BACH. The information provided in this IE may not pertain only to the mobile, which is addressed in the particular message but may pertain to all the mobiles monitoring the BACH for alerts. Its coding is shown in figure 11.39. The various components of the element are described in table 11.37.

Alerting Information is a Type 1 IE.

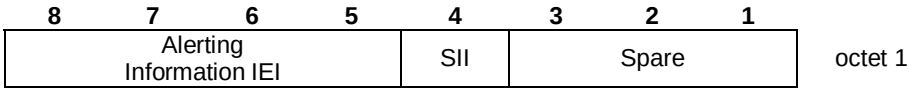


**Figure 11.39: Alerting information IE**

**Table 11.37: Alerting information IE**

| |
|---|
| SII (bit 4)<br><br>System Information Update Identifier<br>This bit indicates the identifier associated with current SI for BACH monitoring<br><br>The GS shall set spare bits to zero |

### 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 GMR-1 04.007 [15].

<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

<Spare: bitstring(12)>

<Synchronization Info Class 1>::=

<SB_FRAME_TS_OFFSET: bitstring(5)>
– Valid values 6 - 28; refer to GMR-1 05.010 [20]

<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 - 3

<Access Classes: bitstring(16)>
– AC and EC bits as described in clause 10.5.2.29 of GSM 04.08 [22]

<CELL_BAR_ACCESS: bitstring(1)>
– 0 indicates not barred for access
1 indicates barred for access

<Access Classes:>::=
– CAN corresponds to Access Control Class N (N=0-9 and 11-15)

<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>
– EC10 corresponds to Emergency Calls

<Misc. Info Class 1>::=

<SB_RESELECTION_HYSTERESIS: bitstring(4)> – Unit of 0,5 dB. Range: 0 – 6,0 dB

<SCAN_LIST_FLAG: bitstring(1)> – Indication to scan the entire BCCH_FULL_ LIST

– 0: do not scan the list

– 1: scan the full list

<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 GMR-1 04.007 [15].

<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)

<Spare: bitstring(64)> – 64 bits

<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 GMR-1 05.002 [16] for details

<SA_BCCH_STN: bitstring(5)> – Binary representation of starting timeslot number

– Range (0 - 23); refer GMR-1 05.002 [16] for details

<Superframe number: bitstring(13)> – Superframe number

<Multiframe number: bitstring(2)> – Multiframe number in a superframe

<MFFN: bit> – TDMA FN in a multiframe

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 GMR-1 05.002 [16]). 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 GMR-1 05.008 [19] for details

<C1: bitstring(5)>
– Threshold to camp-on system in units of 0,5 dB ranging from 0 - 15,5 dB

<Misc. Information Class 2>::=

<SB_SELECTION_POWER: bitstring(4)>
– In units of 0,5 dB. Valid range: 0 - 6,0 dB

<LA Information Class 2>::=
– Contains information for the LAI. Refer to GMR-1 05.008 [19]

<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 GMR-1 05.002 [16])

– Value in the range 0 - 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 are not allowed to 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 Early sending is explicitly accepted

– 0 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 neighbor. The first three neighbours shall be stored in BCCH NEIGHBOUR LIST1 and the last three neighbours shall be stored in BCCH NEIGHBOUR LIST2. Missing beams, neighboring 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

### 11.5.2.68 Segment 2Abis

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, GMR-1 04.007 [15].

<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

<Spare: bitstring (38)> – 38 bits

<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 GMR-1 05.002 [16] for details

<SA_BCCH_STN: bitstring(5)> – Binary representation of starting timeslot number

– Range (0 - 23); refer to GMR-1 05.002 [16] 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

<Selection Criterion Class 2>::= – Refer to GMR-1 05.008 [19] for details

<C1: bitstring(5)> – Threshold to camp on system in units of 0,5 dB. Valid range: 0 - 15,5 dB

<Misc. Information Class 2>::=

<SB_SELECTION_POWER: bitstring(4)> – In units of 0,5 dB. Valid range: 0 - 6,0 dB

<LA Information Class 2>::= – Contains information for the LAI; refer to GMR-1 05.008 [19]

<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 GMR-1 05.002 [16]). Value in the range 0 - 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 are not allowed to 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 Early sending is explicitly accepted

– 0 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_NEIGHBOUR_LIST1b and the last five neighbours shall be stored in BCCH_ NEIGHBOUR_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

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 GMR-1 05.002 [16]). The MES can derive the correct frame number knowing that the BCCH burst always occurs in (2+SA_SIRFN_DELAY)mod 8.

### 11.5.2.69 Segment 2B

Segment 2B contains the last 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, GMR-1 04.007 [15].

<Header: bitstring (6)> – 6 bits

<BCCH NEIGHBOUR LIST2> – 57 bits – three BCCH neighbours provided

<Spare: bitstring(121)> – 121 bits

<Header Segment 2B>::=

<Class Type 2: 10><Segment type: 0001>

<BCCH NEIGHBOUR LIST2>::= – Three remaining BCCHs shall be specified. 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

### 11.5.2.70 Segment 2Bbis

Segment 2B*bis* contains the last 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 of GMR-1 04.007 [15].

<Header: bitstring (6)> – 6 bits

<BCCH NEIGHBOUR LIST2b> – 95 bits (five BCCH neighbours)

<Spare: bitstring(19)> – 19 bits

<Header Segment 2B*bis*>::=

<Class Type 2: 10><Segment type: 0001>

<BCCH NEIGHBOUR LIST2b>::= – Five (5) remaining BCCHs shall be specified. 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

### 11.5.2.71 Segment 3A

Segment 3A contains the LAI, system and satellite ID, satellite position, and beam centre position. The description of the messages is done according to the compact notation described in annex B of GMR-1 04.007 [15].

Size: 120 bits

<Header: bitstring(5)> – 5 bits

<LAI> – 40 bits (for this gateway station)

<System > – 6 bits

<Satellite Position> – 36 bits

<BEAM_CENTER_POS_main> – 23 bits

<Misc. Information Class 3> – 6 bits

<Spare: bitstring (4)> – 4 bits

<Header Segment 3A>::=

<Class Type 3: 0><Segment type: 0000>

<LAI>::= – Refer to clause 11.5.1.3 for a complete definition

<Location Area Identifier: octet string(5)> – Format is V, i.e., without IEI field. First octet of the string maps to first octet of the value part in table in clause 11.5.1.3, second octet maps to second octet of the value part in table in clause 11.5.1.3, and so on

<System>::=

<Satellite Id: bitstring(2)>

<System Id: bitstring(4)>

<Satellite Position>::=

<Latitude: bitstring(8)> – The latitude is in 2's complement represented in units of 0,1 degree. Range is from –12,8 degrees to +12,7 degrees. Positive indicates North

<Longitude: bitstring(12)> – The longitude is represented in unit of 0,1 degree with range 0 to 360 degrees. The degree spans in the westward direction with 0 degrees at Greenwich

<Radius: bitstring(16)> – The geocentric radius is represented in units of 0,005 km with a range of –163,84 to +163,83 km, as the deviation from a default value of 42,162 km

<BEAM_CENTER_POS_main>::=

<Latitude: bitstring(11)> – The geocentric latitude is represented in units of 0,1 degree with range from –90 to +90 degrees latitude. Positive indicates North

<Longitude: bitstring(12)> – The geocentric longitude is represented in units of 0,1 degree with range from 0-360 degrees. Starting from 0 degrees at Greenwich, the degree reading increases in the westward direction

<Misc. Information 3>::=

<SB_RESELECTION_TIMER: bitstring(6)> – In units of 4 minutes. Valid range: 0 - 252 minutes

### 11.5.2.72 Segment 3B

Segment 3B contains the first partition of the concurrent BCCH information list. The description of the messages is done according to the compact notation described in annex B of GMR-1 04.007 [15].

Size: 184 bits

<Header::bitstring(5)>

<Number of Concurrent BCCH: bitstring(4)> – Range 0 - 15. The maximum value depends upon the number of BCCHs that can actually be accommodated

<Concurrent_BCCH_Information_part1: bitstring(155)> – First partition of the concurrent BCCH information list

<Spare: bitstring (42)> – 42 bits

<Header Segment 3>::=

<Class Type 3: 0><Segment type: 0001>

<Concurrent BCCH Info_part1>::= – Compressed encoding (see clause 4.2.2.1.4)

### 11.5.2.73 Segment 3Bbis

Segment 3B*bis* contains the first partition of the concurrent BCCH information list. The second partition is transmitted in Segment 3E*bis*. The description of the messages is done according to the compact notation described in annex B of GMR-1 04.007 [15].

Size: 120 bits

<Header::bitstring(5)>

<Number of Concurrent BCCH: bitstring(4)>
– Range from 0 - 15, the maximum value depends upon the number of BCCHs that can actually be accommodated

<Concurrent BCCH Information_part1:bitstring(91)>
– First partition of the concurrent BCCH information list

<Spare: bitstring (23)>
– 23 bits

<Header Segment 3B*bis*>::=

<Class Type 3: 0><Segment type: 0001>

<Concurrent BCCH Inforomation_part1>::=
– Compressed encoding (see clause 4.2.2.1.4)

### 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 GMR-1 04.007 [15].

Size: 120 bits

<Header: bitstring(5)>

<SA_CCCH_CHANS: bitstring(5)>
– Range 1 - 31. See GMR-1 05.002 [16]

<SA_CCCH_LIST_PART1: (82)>
– First partition of the differentially encoded CCCH list. See clause 4.2.2.1.5

<Spare: bitstring(28)>

<Header Segment 3C>::=

<Class Type 3: 0><Segment type: 0010>

### 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 GMR-1 04.007 [15].

Size: 120 bits

<Header: bitstring(5)>
– 5 bits

<SA_CCCH_LIST_PART2: bitstring(82)>
– Second partition of the differentially encoded CCCH list. (See clause 4.2.2.1.5)

<Spare: bitstring(33)>

<Header Segment 3D>::=

<Class Type 3: 0><Segment type: 0011>

### 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, GMR-1 04.007 [15].

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(70)>
– Last partition of the differentially encoded CCCH list. See clause 4.2.2.1.5

<Spare: bitstring(48)>

<Header Segment 3E>::=

<Class Type 3: 0><Segment type: 0100>

<Concurrent BCCH Inforomation_part2>::=
– Compressed encoding (see clause 4.2.2.1.4)

SA_CCCH_LIST_PART3>::=
– Differentially encoded (see clause 4.2.2.1.4)

### 11.5.2.77 Segment 3Ebis

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, GMR-1 04.007 [15].

Size: 120 bits

<Header: bitstring(5)>

<Concurrent BCCH_information_part2: bitstring(50)>
– Second partition of the concurrent BCCH information list

<Spare: bitstring(65)>

<Header Segment 3Ebis>::=

<Class Type 3: 0><Segment type: 0100>

<Concurrent BCCH Info>::=
– Compressed encoding (see clause 4.2.2.1.4)

### 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 GMR-1 04.007 [15].

Size: 120 bits

<Header: bitstring(5)>
– 5 bits

<SA_AGCH_CHANS: bitstring(5)>
– Range 0 - 31. Indicates number of AGCHs/ CCCHs in the LAI

<SA_AGCH_LIST_PART1: bitstring(82)>
– First partition of differentially encoded AGCH/CCCH list. See clause 4.2.2.1.5

<Spare: bitstring(28)>

<Header Segment 3F>::=

<Class Type 3: 0><Segment type: 0101>

### 11.5.2.79 Segment 3G

Segment 3G contains the second partition of the AGCH/CCCH list. The description of the messages is done according to the compact notation described in annex B of GMR-1 04.007 [15].

Size: 184 bits

<Header: bitstring(5)>

<SA_AGCH_LIST_PART2: bitstring(70)>
– Second partition of the differentially encoded AGCH/CCCH list. See clause 4.2.2.1.5

<Spare: bitstring(109)>
– 109 bits

<Header Segment 3G>::=

<Class Type 3: 0><Segment type: 0110>

### 11.5.2.80 Segment 3Gbis

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 GMR-1 04.007 [15].

Size: 120 bits

<Header: bitstring(5)>

<SA_AGCH_LIST_PART2>
– Second partition of differentially encoded list. See clause 4.2.2.1.5

<Spare: bitstring(83)>
– 83 bits

<Header Segment 3Gbis>::=

<Class Type 3: 0><Segment type: 0110>

### 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 GMR-1 04.007 [15].

Size: 120 bits

<Header: bitstring(5)>

<SA_AGCH_LIST_PART3: bitstring(82)>
– Last partition of the differentially encoded list

<Class Type 3: 0><Segment type: 0111>

### 11.5.2.82 Segment 3I

Segment 3I contains many parameters used during idle mode. The description of the messages is done according to the compact notation described in annex B of GMR-1 04.007 [15].

Size: 120 bits

<Header: bitstring(5)>
– 5 bits

<LA Information Class 3>
– 55 bits

<Periodic LU Timer: bitstring(8)>
– Value of the timer T3212. Range 0 - 1 530 minutes in units of 6 minutes

<Dual Mode Hold Timer: bitstring(3)>
– Range 15 - 120 minutes in units of 15 minutes

<Position Parameters>
– 43 bits

<Spare: bitstring(6)
– 6 bits

<Header Segment 3I>::=

<Class Type 3: 0><Segment type: 1001>

<LA Information Class 3>::=

<Spare: bitstring(2)>

<SA_CBCH_CONFIG: bitstring(5)>
– Bitmap of CCBCH frame pairs in use.
See GMR-1 05.002 [16]

<SA_CBCH_RF: bitstring(11)>
– ARFCN of the CBCH. Range 1 - 1 087.
"11111111111" signifies that there is no CBCH

<SA_CBCH_TS: bitstring(5)>
– Starting timeslot of CBCH channel on BCCH carrier.
Range 0 - 23. Should be set to 0 if there is no CBCH

<Pause Time: bitstring(8)>
– Value of T3115 in 100 msec units

<RACH Access Timer: bitstring(8)>
– Value of T3126 in 100 msec units

<Alert Timer: bitstring(8)>
– Value of Alert Timer (T3112) in 1-second units

<Page Timer: bitstring(8)>
– Value of Page Timer in 1-second units

<Almanac Present: bitstring(1)>
– Flag to indicate the presence of almanac data on the PCH

– 1 PCH contains almanac data

– 0 PCH does not contain almanac data

<Position Parameters>::=

<RACH Position Timer: bitstring(8)>
– In 100 milliseconds

<GPS Update Timer: bitstring(8)>

– In 3-minute increments. Value 0 indicates that no periodic GPS measurements shall be required

<GPS Update Distance: bitstring(8)>

– In kilometers. Value 0 indicates that the distance should not be checked for position reporting

<GPS Position Age: bitstring(8)>

– In 6-minute increments; applicable for all accesses except MT calls

<Page GPS Position Age: bitstring(8)>

– In 6-minute increments; applicable for MT calls

<Page Response Current GPS: bitstring(1)>

– Applicable to MT calls only

– 0 Use RACH Position timer

– 1 Use Page Timer/Alert timer

<Position Reporting Required: bitstring(2)>

– Specifies the GPS usage and reporting (see GMR-1 03.299 [9] for specific requirements)

– 00 Required

– 01 Optional

– 10 No Reporting

– 11: GPS forbidden

### 11.5.2.83 Segment 3J

Segment 3J contains the neighbour beam centre positions. The description of the messages is done according to the compact notation described in annex B of GMR-1 04.007 [15].

Size: 184 bits

<Header: bitstring(5)>

<BEAM_CENTER_POS_neighbours>
– 108 bits

<Spare: bitstring(71)>

<Header Segment 3J>::=

<Class Type 3: 0><Segment type: 1010>

<BEAM_CENTER_POS_neighbours>::=
– This information is repeated six times, one for each neighbour. The neighbours shall be ordered in a clockwise fashion around the centre beam, starting with the first neighbour positioned at the northernmost location. Missing beams shall have a latitude and longitude offset of 0,0 degree

<Latitude: bitstring(9)>
– This parameter contains the geocentric latitude offset from the latitude of the main beam center point, as provided in BEAM_ CENTER_POS_main. It is a 2's complement number, in units of 0,1 degree, with a valid range of –25,6 degrees to +25,5 degrees

<Longitude: bitstring(9)>
– This parameter contains the geocentric longitude offset from the longitude of the main beam centre as provided in BEAM_ CENTER_POS_main. It is a 2's complement number in units of 0,1 degree with a valid range of –25,6 degrees to +25,5 degrees

### 11.5.2.84 Segment 3Jbis

Segment 3*Jbis* contains the neighbour beam centre positions. The description of the messages is done according to the compact notation described in annex B of GMR-1 04.007 [15].

Size: 120 bits

<Header: bitstring(5)>

<BEAM_CENTER_POS_neighbours>
– 108 bits

<Spare: bitstring (7)>

<Header Segment 3*Jbis*>::=

<Class Type 3: 0><Segment type: 1010>

<BEAM_CENTER_POS_neighbours>::=
– This information is repeated six times, one for each neighbour. The neighbours shall be ordered in a clockwise fashion around the centre beam, starting with the first neighbour positioned at the northernmost location. Missing beams shall have a latitude and longitude offset of 0,0 degree

<Latitude: bitstring (9)>
– This parameter contains the geocentric latitude offset from the latitude of the main beam centre point, as provided in BEAM_ CENTER_POS_main. It is a 2's complement number, in units of 0,1 degree, with a valid range of –25,6 degrees to +25,5 degrees

<Longitude: bitstring (9)>
– This parameter contains the geocentric longitude offset from the longitude of the main beam centre as provided in BEAM_ CENTER_POS_main. It is a 2's complement number in units of 0,1 degree with a valid range of –25,6 degrees to +25,5 degrees

### 11.5.2.85 Segment 4A

Segment 4A contains various Class 4 information. The description of the messages is done according to the compact notation described in annex B of GMR-1 04.007 [15].

Size: 120 bits

<Header: bitstring(7)>

<Misc. Params Class 4>
– 12 bits

<OTHER_SAT_BCCH>
– 11 bits

<Spare: bitstring(90)>
– 90 bits

<Header Segment 4A>::=

<Class Type 4: 110><Segment type: 0000>

<Misc. Params Class 4>::=

<RADIO_LINK_TIMEOUT: bitstring(8)>
– Maximum value of radio link fail counter. See GMR-1 05.008 [19]

<Spare: bitstring(4)>

<OTHER_SAT_BCCH>::=

<ARFCN: bitstring(11)>
– Range 1 - 1 087. The absence of a valid value is indicated by a pattern of "11111111111"b

### 11.5.2.86 Segment 4B

Segment 4B contains the first sublist of the BCCH_Full_List parameter. The description of the messages is done according to the compact notation described in annex B of GMR-1 04.007 [15].

Size: 120 bits

<Header: bitstring(7)>

<BCCH_ CHANS: bitstring(6)>
– Valid range 1 - 32 (number of the BCCH carriers present)

<BCCH_LIST_PART1: bitstring(60)>
– First partition of the differentially encoded list. See clause 4.2.2.1.5

<Spare: bitstring(43)>

<Header Segment 4B>::=

<Class Type 4: 110><Segment type: 0001>

### 11.5.2.87 Segment 4C

Segment 4C contains the Power Control parameters. The description of the messages is done according to the compact notation described in annex B of GMR-1 04.007 [15].

Size: 120 bits

<Header: bitstring(7)>

<Power Control Params> – 112 bits

<Spare: bitstring(26)>

<Header Segment 4C>::=

<Class Type 4: 110><Segment type: 0010>

<Power Control Parameters>

| | |
|---|---|
| ***<HHT SQT: bitstring(7)>*** | SQT value for Extended Power Class 0 terminals except during fax and data. This parameter also covers all other Extended Power Classes not specifically listed in this section |
| <HHT Data SQT: bitstring(7)> | SQT value for Extended Power Class 0 terminals during fax and data. This parameter also covers all other Extended Power Classes not specifically listed in this section |
| <VT SQT: bitstring(7)> | SQT value for Extended Power Class 1 terminals except during fax and data |
| <VT Data SQT: bitstring(7)> | SQT value for Extended Power Class 1 terminals during fax and data |
| <FT SQT: bitstring(7)> | SQT value for Extended Power Class 6 terminals except during fax and data |
| <FT Data SQT: bitstring(7)> | SQT value for Extended Power Class 6 terminals during fax and data |

<PANinit: bitstring(6)>

<PANmin: bitstring(6)>

<PANmax: bitstring(6)>

<GainUp: bitstring(5)>

<GainDn: bitstring(5)>

<Olthresh: bitstring(5)>

<OlupGain: bitstring(5)>

<OldnGain: bitstring(5)>

<VarUp: bitstring(5)>

<VarDn: bitstring(5)>

<SQIfactor: bitstring(5)>

<Mestep: bitstring(4)>

<LQI-n1: bitstring(4)>

<LQI-n2: bitstring (4)>

### 11.5.2.88 Segment 4D

Segment 4D contains the second sublist of the BCCH_Full_List parameter. The description of the messages is done according to the compact notation described in annex B of GMR-1 04.007 [15].

Size: 120 bits

<Header: bitstring(7)>

<BCCH_LIST_PART2: bitstring(60)>

– Second partition of the differentially encoded BCCH list. See clause 4.2.2.1.5

<Spare: bitstring(49)>

<Header Segment 4D>::=

<Class Type 4: 110><Segment type: 0011>

### 11.5.2.89 Segment 4E

Segment 4E contains the third sublist of the BCCH_Full_List parameter. The description of the messages is done according to the compact notation described in annex B of GMR-1 04.007 [15].

Size: 120 bits

<Header: bitstring(7)>

<BCCH_LIST_PART3: bitstring(60)>

– Third partition of the differentially encoded BCCH list. See clause 4.2.2.1.5

<Spare: bitstring(49)>

<Header Segment 4E>::=

<Class Type 4: 110><Segment type: 0100>

### 11.5.2.90 Segment 4F

Segment 4F contains the last sublist of the BCCH_Full_List parameter. The description of the messages is done according to the compact notation described in annex B of GMR-1 04.007 [15].

Size: 120 bits

<Header: bitstring(7)>

<BCCH_LIST_PART4: bitstring(60)>

– Fourth partition of the differentially encoded BCCH list. See clause 4.2.2.1.5

<Spare: bitstring(49)>.

<Header Segment 4F>::=

<Class Type 4: 110><Segment type: 0101>

### 11.5.2.91 Disconnection indication

The Disconnection Indication IE is used to indicate to a VT that has sent a POSITION UPDATE REQUEST, whether the current call will soon be disconnected because it has moved into a position that violates position restrictions. This IE is coded as shown in figure 11.40 and table 11.38. Disconnection Indication IE is a Type 3 IE, 2 octets in length.

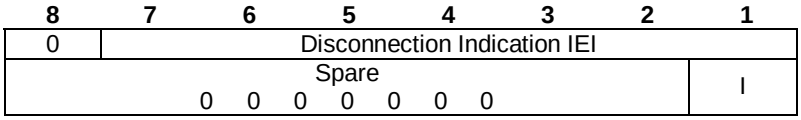


**Figure 11.40: Disconnection indication IE**

**Table 11.38: Disconnection indication IE**

```
Disconnection Indication (I) (octet 2)
Bit
1
0  Call will not be disconnected
1  Call will be disconnected soon
```

## 11.5.2.92 Handover parameter

The Handover Parameter IE is used to convey the operation parameters the MES shall apply to the new channel.

The Handover Parameter IE is coded as shown in figure 11.41 and table 11.39.

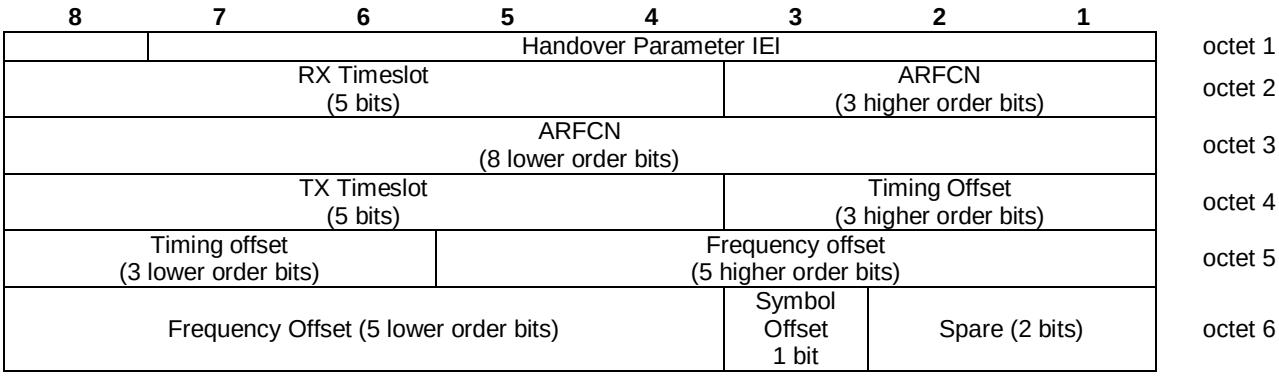


**Figure 11.41: Handover parameter IE**

**Table 11.39: Handover parameter information element**

RX Timeslot Number (octet 2)
Bits
8 7 6 5 4

Binary representation of receive timeslot number
Range: 0 - 23

ARFCN (high order bits) (octet 2)
Bits
3 2 1

ARFCN (lower order bits) (octet 3)
Bits
8 7 6 5 4 3 2 1

Binary representation of absolute RF channel number
Range: 1 - 1 087

TX Timeslot Number (octet 4)
Bits
8 7 6 5 4

Binary representation of transmit timeslot number
Range: 0 - 23

Timing Offset (high order bits) (octet 4)
Bits
3 2 1

Timing Offset (lower order bits) (octet 5)
Bits
8 7 6

Frequency Offset (high order bits) (octet 5)
Bits
5 4 3 2 1

Frequency Offset (lower order bits) (octet 6)
Bits
8 7 6 5 4

The frequency offset information is a 10-bit signed value. The valid range for the frequency offset is from –511 to +511 in 1 Hz resolution units.

Symbol Offset (octet 6)
Bit
3
0 No Offset
1 1/2 Symbol Offset

No Offset – the same timing as the BCCH

1/2 Symbol Offset - ½ symbol offset relative to the timing of the BCCH
(See GMR-1 05.010 [20])

Spare (octet 6)
Bits
2 1

## 11.5.2.93 Information request code

The Information Request Code IE is used to specify the kind of debugging/status information requested from the MES in the INFORMATION REQUEST message. This IE is coded as shown in figure 11.42 and table 11.40. Information Request Cause IE is a Type 3 IE, 2 octets in length.

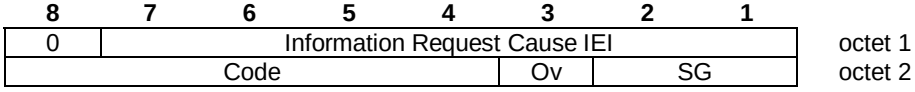


**Figure 11.42: Information request code IE**

**Table 11.40: Information request code IE**

```
Code (octet 2)
Bits
8 7 6 5 4
0 0 0 0 0  null
0 0 0 0 1  spot beam selection
0 0 0 1 0  current beam
0 0 0 1 1  power control
0 0 1 0 0  version
0 0 1 0 1  position
1 x x x x  vendor specific

xxxx: Defined by MES vendor

All other values reserved

Ov (octet 2)
Bit 3
1  Override previous information request if any
0  Do not override previous information request

SG (octet 2): Service Grade
Bits
2 1
0 0  Immediate SACCH
0 1  Wait-then-Go SACCH
1 0  Wait-then-Discard SACCH
1 1  Reserved
```

## 11.5.2.94 Last spot beams information

The Last Spot Beams Information IE is used to send information to the network about the spot beams that were measured as part of the last beam selection/reselection done by the MES. This IE contains the measured Radio Signal Strength Indicator (RSSI) of up to seven beams. See figure 11.43 and table 11.41. Last Spot Beams Information is a Type 3 IE, 6 octets in length.

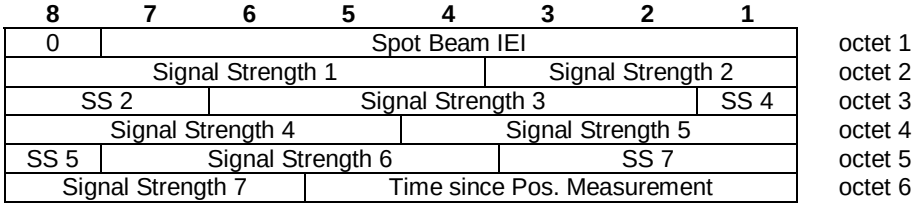


**Figure 11.43: Last spot beams IE**

**Table 11.41: Last spot beams IE**

Signal Strength (SS)
Spot beam 1: bits 8-4 octet 2
Spot beam 2: bits 3-1 octet 2, and bits 8-7 octet 3
Spot beam 3: bits 6-2 octet 3
Spot beam 4: bit 1 octet 3, and bits 8-5 octet 4
Spot beam 5: bits 4-1 octet 4, and bit 8 octet 5
Spot beam 6: bits 7-3 octet 5
Spot beam 7: bits 2-1 octet 5, and bits 8-6 octet 6

The signal strength shall be the mean relative signal strength of the current beam and its neighbours. Spot beam 1 shall be the current beam. Spot beams 2-7 shall be the neighbour beams in order of their appearance in the system information. A null value shall be used for nonexistent neighbours

This is a 5-bit signed integer, with range –5 to 25 dB in units as follows

Bits (e.g., Spot Beam 1)

| 8 7 6 5 4 | | | | |
|---|---|---|---|---|
| 0 0 0 0 0 | <NULL> | | | |
| 0 0 0 0 1 | -5 | | SS <= | -4.5 |
| 0 0 0 1 0 | -4 | -4.5 < | SS <= | -3.5 |
| 0 0 0 1 1 | -3 | -3.5 < | SS <= | -2.75 |
| 0 0 1 0 0 | -2.5 | -2.75 < | SS <= | -2.25 |
| 0 0 1 0 1 | -2 | -2.25 < | SS <= | -1.75 |
| 0 0 1 1 0 | -1.5 | -1.75 < | SS <= | -1.25 |
| 0 0 1 1 1 | -1 | -1.25 < | SS <= | -0.9 |
| 0 1 0 0 0 | -0.8 | -0.9 < | SS <= | -0.7 |
| 0 1 0 0 1 | -0.6 | -0.7 < | SS <= | -0.5 |
| 0 1 0 1 0 | -0.4 | -0.5 < | SS <= | -0.3 |
| 0 1 0 1 1 | -0.2 | -0.3 < | SS <= | -0.1 |
| 0 1 1 0 0 | 0 | -0.1 < | SS < | 0.1 |
| 0 1 1 0 1 | 0.2 | 0.1 <= | SS < | 0.3 |
| 0 1 1 1 0 | 0.4 | 0.3 <= | SS < | 0.5 |
| 0 1 1 1 1 | 0.6 | 0.5 <= | SS < | 0.7 |
| 1 0 0 0 0 | 0.8 | 0.7 <= | SS < | 0.9 |
| 1 0 0 0 1 | 1 | 0.9 <= | SS < | 1.25 |
| 1 0 0 1 0 | 1.5 | 1.25 <= | SS < | 1.75 |
| 1 0 0 1 1 | 2 | 1.75 <= | SS < | 2.25 |
| 1 0 1 0 0 | 2.5 | 2.25 <= | SS < | 2.75 |
| 1 0 1 0 1 | 3 | 2.75 <= | SS < | 3.5 |
| 1 0 1 1 0 | 4 | 3.5 <= | SS < | 4.5 |
| 1 0 1 1 1 | 5 | 4.5 <= | SS < | 5.5 |
| 1 1 0 0 0 | 6 | 5.5 <= | SS < | 6.5 |
| 1 1 0 0 1 | 7 | 6.5 <= | SS < | 8 |
| 1 1 0 1 0 | 9 | 8 <= | SS < | 10 |
| 1 1 0 1 1 | 11 | 10 <= | SS < | 12 |
| 1 1 1 0 0 | 13 | 12 <= | SS < | 14 |
| 1 1 1 0 1 | 15 | 14 <= | SS < | 17.5 |
| 1 1 1 1 0 | 20 | 17.5 <= | SS < | 22.5 |
| 1 1 1 1 1 | 25 | | SS >= | 22.5 |

Time Since Pos. Measurement (bit 5-1, octet 6)

This field refers to the GPS position within an INFORMATION RESPONSE POSITION message being sent in response to the other request code in the same INFORMATION REQUEST message. Otherwise the MES shall set this field to NULL

This time measures the difference between the time at which

**Table 11.41: Last spot beams IE**

| |
|---|
| the GPS position that has been reported was measured and the time at which the signal strength measurements were taken. It is a 2's complement number with a range shown below. Positive denotes that the GPS position was measured after the signal strength measurement was taken |

| Bits 5 4 3 2 1 | | | |
|---|---|---|---|
| 0 0 0 0 0 | >=2 weeks | 252:00:00 and above | |
| 0 0 0 0 1 | 1 week | 120:00:00 to | 251:59:59 |
| 0 0 0 1 0 | 3 days | 48:00:00 to | 119:59:59 |
| 0 0 0 1 1 | 1 days | 18:00:00 to | 47:59:59 |
| 0 0 1 0 0 | 12 hours | 10:00:00 to | 17:59:59 |
| 0 0 1 0 1 | 8 hours | 6:00:00 to | 9:59:59 |
| 0 0 1 1 0 | 4 hours | 3:30:00 to | 5:59:59 |
| 0 0 1 1 1 | 3 hours | 2:30:00 to | 3:29:59 |
| 0 1 0 0 0 | 2 hours | 1:30:00 to | 2:29:59 |
| 0 1 0 0 1 | 1 hour | 0:52:30 to | 1:29:59 |
| 0 1 0 1 0 | 45 min | 0:37:30 to | 0:52:29 |
| 0 1 0 1 1 | 30 min | 0:22:30 to | 0:37:29 |
| 0 1 1 0 0 | 15 min | 0:12:30 to | 0:22:29 |
| 0 1 1 0 1 | 10 min | 0:07:30 to | 0:12:29 |
| 0 1 1 1 0 | 5 min | 0:02:30 to | 0:07:29 |
| 0 1 1 1 1 | 0 min | -0:02:29 to | 0:02:29 |
| 1 0 0 0 0 | -5 min | -0:07:29 to | -0:02:30 |
| 1 0 0 0 1 | -10 min | -0:12:29 to | -0:07:30 |
| 1 0 0 1 0 | -15 min | -0:22:29 to | -0:12:30 |
| 1 0 0 1 1 | -30 min | -0:37:29 to | -0:22:30 |
| 1 0 1 0 0 | -45 min | -0:52:29 to | -0:37:30 |
| 1 0 1 0 1 | -1 hour | -1:29:59 to | -0:52:30 |
| 1 0 1 1 0 | -2 hour | -2:29:59 to | –1:30:00 |
| 1 0 1 1 1 | -3 hour | -3:29:59 to | -2:30:00 |
| 1 1 0 0 0 | -4 hour | -5:59:59 to | -3:30:00 |
| 1 1 0 0 1 | -8 hour | -9:59:59 to | -6:00:00 |
| 1 1 0 1 0 | -12 hour | -17:59:59 to | –10:00:00 |
| 1 1 0 1 1 | -1 day | -47:59:59 to | –18:00:00 |
| 1 1 1 0 0 | -3 day | -119:59:59 to | –48:00:00 |
| 1 1 1 0 1 | -1 week | -251:59:59 to | –120:00:00 |
| 1 1 1 1 0 | <=-2 weeks | -252:00:00 and below | |
| 1 1 1 1 1 | NULL | | |

## 11.5.2.95 Current spot beam information

The Current Spot Beam Information IE is used to send information to the network about the spot beam that the MES is camped on currently. This IE contains the measured RSSI. See figure 11.44 and table 11.42. Current Spot Beam Information is a Type 3 IE, 2 octets in length.

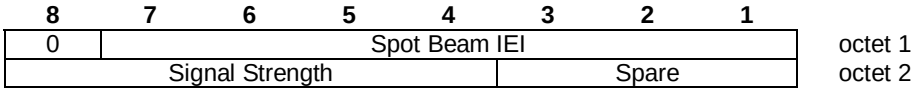


**Figure 11.44: Current spot beam IE**

**Table 11.42: Current spot beam IE**

```
Signal strength (bits 8-4 octet 2)
Contains the mean relative signal strength of the beam on
which the MES is currently camped-on. This is a 5-bit signed
integer, with range –5 to 25 dB in units as follows:
Bits
8 7 6 5 4
0 0 0 0 0  <NULL>
0 0 0 0 1   -5             SS <= -4.5
0 0 0 1 0   -4    -4.5  <  SS <= -3.5
0 0 0 1 1   -3    -3.5  <  SS <= -2.75
0 0 1 0 0   -2.5  -2.75 <  SS <= -2.25
0 0 1 0 1   -2    -2.25 <  SS <= -1.75
0 0 1 1 0   -1.5  -1.75 <  SS <= -1.25
0 0 1 1 1   -1    -1.25 <  SS <= -0.9
0 1 0 0 0   -0.8  -0.9  <  SS <= -0.7
0 1 0 0 1   -0.6  -0.7  <  SS <= -0.5
0 1 0 1 0   -0.4  -0.5  <  SS <= -0.3
0 1 0 1 1   -0.2  -0.3  <  SS <= -0.1
0 1 1 0 0    0    -0.1  <  SS <   0.1
0 1 1 0 1    0.2   0.1  <= SS <   0.3
0 1 1 1 0    0.4   0.3  <= SS <   0.5
0 1 1 1 1    0.6   0.5  <= SS <   0.7
1 0 0 0 0    0.8   0.7  <= SS <   0.9
1 0 0 0 1    1     0.9  <= SS <   1.25
1 0 0 1 0    1.5   1.25 <= SS <   1.75
1 0 0 1 1    2     1.75 <= SS <   2.25
1 0 1 0 0    2.5   2.25 <= SS <   2.75
1 0 1 0 1    3     2.75 <= SS <   3.5
1 0 1 1 0    4     3.5  <= SS <   4.5
1 0 1 1 1    5     4.5  <= SS <   5.5
1 1 0 0 0    6     5.5  <= SS <   6.5
1 1 0 0 1    7     6.5  <= SS <   8
1 1 0 1 0    9     8    <= SS <  10
1 1 0 1 1   11    10    <= SS <  12
1 1 1 0 0   13    12    <= SS <  14
1 1 1 0 1   15    14    <= SS <  17.5
1 1 1 1 0   20    17.5  <= SS <  22.5
1 1 1 1 1   25             SS >= 22.5

Spare (bit 3-1 octet 2
These bits shall be set to 0.
```

## 11.5.2.96 Power control information

The Power Control Information IE is used to specify by the MES to respond to a network INFORMATION REQUEST message regarding the values of the MESs call statistics related to power control. This IE is coded as shown in figure 11.45 and table 11.43. Power Control Information IE is a Type 3 IE, 4 octets in length.

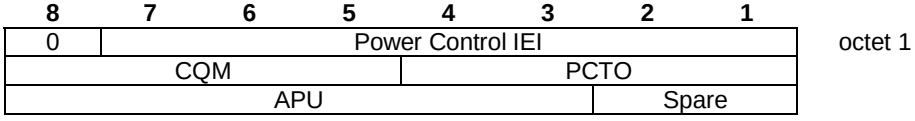


**Figure 11.45: Power control IE**

**Table 11.43: Power control IE**

```
CQM (bits 8-5 octet 2)
Call Quality Metric: Contains an estimate of the percentage
of post-FEC burst error occurring for the call. This is a
4-bit parameter with a range 0 - 100% as follows:
8 7 6 5 (Bits in octet 2)
0 0 0 0   0,1%  0.0 < CQM <=   0,1%
0 0 0 1   0,2%  0.1 < CQM <=   0,2%
0 0 1 0   0,5%  0.2 < CQM <=   0,5%
0 0 1 1   1,0%  0.5 < CQM <=   1,0%
0 1 0 0   1,5%  1.0 < CQM <=   1,5%
0 1 0 1   2,0%  1.5 < CQM <=   2,0%
0 1 1 0   3,0%  2.0 < CQM <=   3,0%
0 1 1 1   5,0%  3.0 < CQM <=   5,0%
1 0 0 0  10%    5.0 < CQM <=  10,0
1 0 0 1  15%   10.0 < CQM <=  15,0%
1 0 1 0  20%   15.0 < CQM <=  20,0%
1 0 1 1  40%   20.0 < CQM <=  40,0%
1 1 0 0  60%   40.0 < CQM <=  60,0%
1 1 0 1  80%   60.0 < CQM <=  80,0%
1 1 1 0 100%   80.0 < CQM <= 100,0%
1 1 1 1 NULL

PCTO (bits 4-1 octet 2)
Power Control Topped-Out: Contains the percentage of messages
for which the calculated PAS was less than PASmin. This is a
4-bit parameter with a range 0 - 100% with the same format as
CQM

NOTE: The PCTO is not applicable for SDCCH (NULL).

APU (bits 8-3 octet 3)
Average Power Used: Contains the averaged power used in dB
calculated as a power-averaged PAS setting. This is a 6-bit
unsigned parameter with a range 0,0 to 24,0 dB in units of
0,4 dB

Spare (bit 2-1 octet 3)
These bits shall be set to 0
```

## 11.5.2.97 Version information

The Version Information IE provides information about the terminal hardware and software. This IE is coded as shown in figure 11.46 and table 11.44. Version Information IE is a Type 3 IE, 6 octets in length.

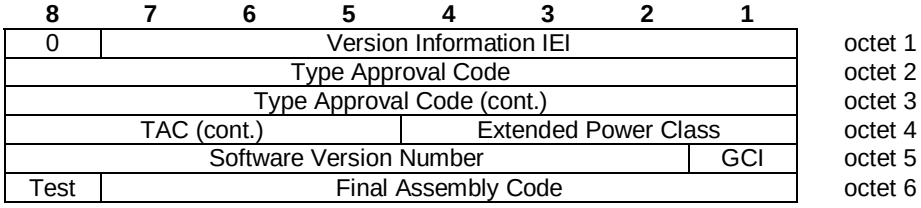


**Figure 11.46: Version IE**

**Table 11.44: Version IE**

```
(octet 2)
Type Approval Code (High order bits)
(octet 3)
Type Approval Code (Middle bits)
(octet 4, bits 8-5)
Type Approval Code (Low order bits)

The 6-digit Type Approval Code (see GMR-1 03.003 [3])
represented as a 20-bit binary number with range 0 - 999999

Bits
4 3 2 1 (octet 4)
Extended Power Class (see clause 11.5.2.50)

Bits
8 7 6 5 4 3 2 (octet 5)
Software Version Number (see GMR-1 03.003 [3]) represented as
a 7-bit binary number with range 0 - 99

Bits
1 (octet 5)
GPS Capability Indicator
0  MES is not GPS capable
1  MES is GPS capable

Bits
8 (octet 6)
Test Mobile flag indicates that the MES contains special
features intended for system testing. The determination that
an MES is a test mobile shall be made by the MES vendor.
0  MES is not a test mobile
1  MES is a test mobile

Bits
7 6 5 4 3 2 1 (octet 6)
Final Assembly Code (See GMR-1 03.003 [3]) represented as a
7-bit binary number with range 0 - 99
```

## 11.5.2.98 Information response error code

The Information Response Error Code IE is used to specify why the MES cannot respond to a request for a particular kind the kind of debugging/status information requested from the MES in the INFORMATION REQUEST message. This IE is coded as shown in figure 11.47 and table 11.45. Information Response Error Code IE is a Type 3 IE, 2 octets in length.

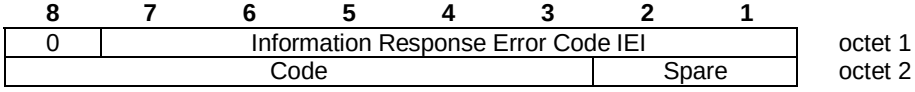


**Figure 11.47: Error code IE**

**Table 11.45: Error code IE**

```
Code (octet 2)
Bits
8 7 6 5 4 3
0 0 0 0 0 0  Unrecognized request code
0 0 0 0 0 1  Information not available
0 0 0 0 1 0  Not GPS capable
0 0 0 0 1 1  IRVS not supported
1 1 x x x x  vendor specific error codes

xxxx: Defined by the MES vendor

All other values reserved
```

## 11.5.2.99 Vendor specific subcommand

The Vendor Specific Subcommand IE is used to specify by the MES to respond to a network INFORMATION REQUEST message regarding the version of the CAI that is being used by the MES. This IE is coded as shown in figure 11.48 and table 11.46. Vendor Specific Subcommand IE is a Type 3 IE, 4 octets in length.

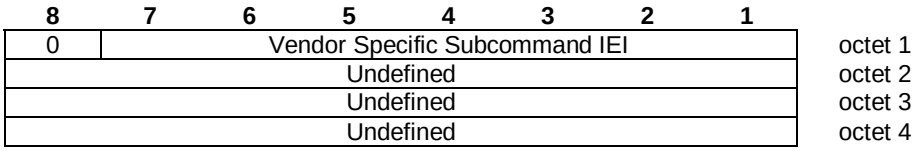


**Figure 11.48: Vendor specific subcommand IE**

**Table 11.46: Vendor specific subcommand IE**

```
Vendor Specific Subcommand IEI
(octet 1)

Bits
7 6 5 4 3 2 1
Not required

Undefined
(octets 2-4)
The MES vendor shall determine the significance, if any, of
this field. It can be used to specify the specific
information to be returned by the MES
```

## 11.5.2.100 MSC ID

The MSC ID IE is used to identify the MSC through which the MES shall route the current call. It is used in the IMMEDIATE ASSIGNMENT REJECT and EXTENDED IMMEDIATE ASSIGNMENT REJECT messages, when the MES is being redirected to a new satellite for optimal routing purpose. This IE is coded as shown in figure 11-49 and table 11-47.

MSC ID IE is a Type 3 IE, 2 octets in length.

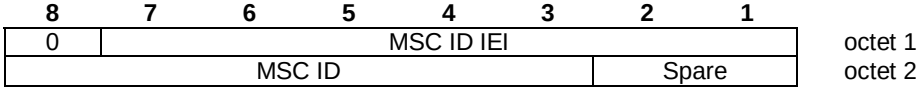


**Figure 11.49: MSC ID IE**

**Table 11.47: MSC ID IE**

| |
|---|
| MSC ID (octet 2)<br>Bits 8-3<br>MSC ID is a 6-bit integer. Valid values 0 - 63 |

### 11.5.2.101 GPS discriminator

The purpose of the GPS Discriminator IE is to provide the basis for contention resolution after a possible RACH collision. This IE is coded as shown in figure 11.50 and table 11.48. The GPS Discriminator Value is a Type 3 IE, 3 octets in length.

| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
|---|---|---|---|---|---|---|---|---|
| 0 | GPS Discriminator IEI | | | | | | | octet 1 |
| Discriminator Value | | | | | | | | octet 2 |
| Discriminator Value (cont.) | | | | | | | | octet 3 |

**Figure 11.50: GPS discriminator information element**

**Table 11.48: GPS discriminator information element**

| |
|---|
| Discriminator Value (octets 2-3)<br>The value shall be calculated from the 40-bit GPS Position field in the Channel Request using the 16-bit CRC generator polynomial (see GMR-1 05.003 [17]) |

### 11.5.2.102 Current timing offset

The Current Timing Offset IE gives the timing offset between the uplink frame (corresponding to the Tx burst) and the downlink frame (corresponding to the Rx burst) as measured by the MES. This IE is coded as shown in figure 11.51 and table 11.49. The Timing Offset is a Type 3 IE, 3 octets in length.

| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
|---|---|---|---|---|---|---|---|---|
| 0 | Current Timing Offset IEI | | | | | | | octet 1 |
| Timing Offset (Higher order bits) | | | | | | | | octet 2 |
| Timing Offset (Lower order bits) | | | | | | | | octet 3 |

**Figure 11.51: Current timing offset information element**

**Table 11.49: Current timing offset information element**

| |
|---|
| The Timing Offset shall be a 16-bit unsigned value representing the current MES-measured offset between frame N+7 uplink and frame N downlink (see GSM 05.10 [28]). The measured value shall be expressed in units of 1/40 symbol time |

## 11.5.3 Mobility management Ies

Same as clause 10.5.3 of GSM 04.08 [22].

## 11.5.4 Call control Ies

### 11.5.4.1 Extensions of codesets

Same as clause 10.5.4.1 of GSM 04.08 [22].

### 11.5.4.2 Locking shift procedure

Same as clause 10.5.4.2 of GSM 04.08 [22].

### 11.5.4.3 Non-locking shift procedure

Same as clause 10.5.4.3 of GSM 04.08 [22].

### 11.5.4.4 Auxiliary states

Same as clause 10.5.4.4 of GSM 04.08 [22].

### 11.5.4.5 Bearer capability

Same as clause 10.5.4.5 of GSM 04.08 [22] with the following exception:

a) The Speech Version indication (octets 3a etc) shall be replaced with:

0 0 0 0 GMR-1 speech version 1

0 0 1 0 Reserved

0 0 0 1 Reserved.

b) The Coding Standard (bit 5 of octet 3) shall be coded as:

0 GMR-1 coding standard as described below

1 Reserved.

### 11.5.4.5a Call control capabilities

Same as clause 10.5.4.5a of GSM 04.08 [22].

### 11.5.4.6 Call state

Same as clause 10.5.4.6 of GSM 04.08 [22].

### 11.5.4.7 Called party BCD number

Same as clause 10.5.4.7 of GSM 04.08 [22].

### 11.5.4.8 Called party subaddress

Same as clause 10.5.4.8 of GSM 04.08 [22].

### 11.5.4.9 Calling party BCD number

Same as clause 10.5.4.9 of GSM 04.08 [22].

### 11.5.4.10 Calling party subaddress

Same as clause 10.5.4.10 of GSM 04.08 [22].

### 11.5.4.11 Cause

Same as clause 10.5.4.11 of GSM 04.08 [22].

### 11.5.4.11a CLIR suppression

Same as clause 10.5.4.11a of GSM 04.08 [22].

### 11.5.4.11b CLIR invocation

Same as clause 10.5.4.11b of GSM 04.08 [22].

### 11.5.4.12 Congestion level

Same as clause 10.5.4.12 of GSM 04.08 [22].

### 11.5.4.13 Connected number

Same as clause 10.5.4.13 of GSM 04.08 [22].

### 11.5.4.14 Connected subaddress

Same as clause 10.5.4.14 of GSM 04.08 [22].

### 11.5.4.15 Facility

Same as clause 10.5.4.15 of GSM 04.08 [22].

### 11.5.4.16 High layer compatibility

Same as clause 10.5.4.16 of GSM 04.08 [22].

### 11.5.4.17 Keypad facility

Same as clause 10.5.4.17 of GSM 04.08 [22].

### 11.5.4.18 Low layer compatibility

Same as clause 10.5.4.18 of GSM 04.08 [22].

### 11.5.4.19 More data

Same as clause 10.5.4.19 of GSM 04.08 [22].

### 11.5.4.20 Notification indicator

Same as clause 10.5.4.20 of GSM 04.08 [22].

### 11.5.4.21 Progress indicator

Same as clause 10.5.4.21 of GSM 04.08 [22], except for an additional value for progress description as defined in table 11.50.

**Table 11.50**

| Progress Description (octet 4) | |
|---|---|
| Bits | |
| 7 6 5 4 3 2 1 0 | |
| 0 0 0 0 1 0 1 0 | Delay in response at the called interface |

#### 11.5.4.22 Repeat indicator

Same as clause 10.5.4.22 of GSM 04.08 [22].

#### 11.5.4.22a Reverse call setup direction

Same as clause 10.5.4.22a of GSM 04.08 [22].

#### 11.5.4.23 Signal

Same as clause 10.5.4.23 of GSM 04.08 [22].

#### 11.5.4.24 SS version indicator

Same as clause 10.5.4.24 of GSM 04.08 [22].

#### 11.5.4.25 User-user

Same as clause 10.5.4.25 of GSM 04.08 [22].

# 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.

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 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.

T31DT: This timer is started by the MES DTRS entity when it receives an indication that a user has pressed a key in order to generate a DTMF digit during a call. If the user does not release the key by the time this timer expires, the DTRS entity initiates the start of the tone by sending a DTMF TONE GENERATE REQ message to the peer entity. This message requests the peer entity to indicate to the peer network services layer to start generation of the corresponding tone on the peer side. When the user does release the keypress, the DTRS entity shall transmit another DTMF TONE GENERATE REQ message, asking it to indicate to the peer network services layer to stop the generation of this tone on the peer side.

The value of this timer is currently TBD.

T31DA: This timer is started by the DTRS entity when it transmits a DTMF TONE GENERATE REQ message. Its purpose is to detect the lack of an answer from the peer. It is stopped when the corresponding DTMF TONE GENERATE ACK message is received from the peer. On its expiry, the tones that had been transmitted in the DTMF TONE GENERATE REQ message shall be flushed from the DTRS transmit buffer.

The value of this timer is 20 seconds.

## 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 a 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 a 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.

### 12.1.3 Other parameters

Same as clause 11.1.3 of GSM 04.08 [22].

# 12.2 Timers of mobility management

Same as clause 11.2 of GSM 04.08 [22], but with changes in specific values.

Tables 12.1 and 12.2 show the MES side and the network side MM timers.

**Table 12.1: Mobility management timers – MES side**

| TIMER NUM. | MM STATE | TIME OUT VAL. | CAUSE FOR START | NORMAL STOP | AT THE EXPIRY |
|---|---|---|---|---|---|
| T3210 | 3 | | LOC_UPD_REQ sent | LOC_UPD_ACC<br>LOC_UPD_REJ<br>Lower layer failure | Start T3211 |
| T3211 | 19.1<br>19.2 | | LOC_UPD_REJ with cause #17 network.<br>Failure Lower layer failure or RR conn. Released after RR conn.<br>Abort during loc. Updating | Time out<br>Cell change<br>Request for MM connection establishment<br>Change of LA | Restart the Location update process |
| T3212 | 19.1<br>19.2 | note | Termination of MM service or MM signalling | Initiation of MM service or MM signalling | Initiate periodic updating |
| T3220 | 7 | | IMSI DETACH | Release from the RM sublayer | Enter Null or Idle, ATTEMPTING TO UPDATE |
| T3230 | 5 | | CM SERV REQ<br>CM REEST REQ | Cipher mode setting<br>CM SERV REJ<br>CM SERV ACC | Provide release ind. |
| T3240 | 9<br>10 | | See clause 12.2.1 | See clause 12.2.1 | Abort the RR connection |
| NOTE: The timeout value is broadcast in a SYSTEM INFORMATION message. | | | | | |

**Table 12.2: Mobility management timers – network side**

| TIMER | MM STATE | CAUSE FOR START | NORMAL STOP | AT THE FIRST EXPIRY |
|---|---|---|---|---|
| T3250 | 6 | TMSI-REAL-CMD or LOC UPD ACC with new TMSI sent | TMSI-REAL-COM received | Optionally Release RR connection |
| T3255 | note | LOC UPD ACC sent with follow on proceed | CM SERVICE REQUEST | Release RR Connection or use for mobile earth station terminating call |
| T3260 | 5 | AUTHENT-REQUEST sent | AUTHENT-RESPONSE received | Optionally Release RR connection |
| T3270 | 4 | IDENTITY REQUEST sent | IDENTITY RESPONSE received | Optionally Release RR connection |
| NOTE: The value of this timer is not specified by this recommendation. | | | | |

### 12.2.1 Timer T3240

Timer T3240 is started in the MES when the following occurs:

- The MES receives a LOCATION UPDATING ACCEPT message completing a location updating procedure.
- The MES receives a LOCATION UPDATING REJECT message.
- The MES has sent a CM SERVICE ABORT message.
- The MES has released or aborted all MM connections.

Timer T3240 is stopped, reset, and started again upon receipt of an MM message.

Timer T3240 is stopped and reset (but not started) upon receipt of a CM message that initiates establishment of a CM connection (an appropriate SETUP, REGISTER, or CP-DATA message as defined in GSM 04.08 [22], GSM 04.10 [23], or GSM 04.11 [24]).

## 12.3 Timers of circuit-switched call control

Same as clause 11.3 of GSM 04.08 [22], but with changes in specific values.

Tables 12.3 and 12.4 show the MES side and the network side of the Call Control timers.

**Table 12.3: Call control timers – MES side**

| TIM NUM | STATE OF CALL | CAUSE FOR START | NORMAL STOP | AT THE FIRST EXPIRY | AT THE SECOND EXPIRY |
|---|---|---|---|---|---|
| T303 | Call initiated | CM SER RQ sent | CALL PROC, or REL COMP received | Clear the call | Timer is not restarted |
| T305 | Disconnect request | DISC sent | REL or DISC received | REL sent | Timer is not restarted |
| T308 | Release request | REL sent | REL COMP or REL received | Retrans. RELEASE restart T308 | Call ref. Release |
| T310 note | Outgoing call Proceeding | CALL PROC received | ALERT, CONN, DISC or PROG rec. | Send DISC | Timer is not restarted |
| T313 | Connect Request | CONN sent | CONNect ACKnowledge received | Send DISC | Timer is not restarted |
| T323 | Modify Request | MOD sent | MOD COMP or MOD REJ received | Clear the call | Timer is not restarted |
| NOTE: T310 is not started if progress indicator #1 or #2 has been delivered in the CALL PROCEEDING message or in a previous PROGRESS message. | | | | | |

**Table 12.4: Call control timers – network side**

| TIM NUM | STATE OF CALL | CAUSE FOR START | NORMAL STOP | AT THE FIRST EXPIRY | AT THE SECOND EXPIRY |
|---|---|---|---|---|---|
| T301 note | Call received | ALERT received | Conn received | Clear the call | Timer is not restarted |
| T303 | Call present | SETUP sent | CALL CONF or REL COMP received | Clear the call | Timer is not restarted |
| T305 | Disconnect Indication | DISC without progress indic. #8 sent | REL or DISC received | Network sends RELEASE | Timer is not restarted |
| T306 | Disconnect Indication | DISC with progress indic. #8 sent | REL or DISC received | Stop the tone/announc. Send REL | Timer is not restarted |
| T308 | Release request | REL sent | REL COMP or REL received | Retrans. RELEASE restart T308 | Release call reference |
| T310 | Incoming call proceeding | CALL CONF received | ALERT, CONN or DISC received | Clear the call | Timer is not restarted |
| T313 | Connect Indication | CON sent | CON ACK received | Clear the call | Timer is not restarted |
| T323 | Modify request | MOD sent | MOD COMP or MOD REJ received | Clear the call | Timer is not restarted |
| NOTE: The network may already have applied an internal alerting supervision function (e.g., incorporated within call control). If such a function is known to be operating on the call, then timer T301 is not used. | | | | | |

# Annex A:
# (Void)

# Annex B:
# (Void)

# Annex C:
# (Void)

# Annex D:
# (Void)

# Annex E:
# (Void)

# Annex F (informative): GMR specific cause values for radio resource management

This is same as annex F of GSM 04.08 [22] with the exception that the following cause values are not used in GMR.

- Cause value = 8 Handover impossible, timing advance out of range
- Cause value = 65 Call already cleared
- Cause value = 101 No cell allocation available

NOTE: Any cause value defined in GSM 04.08 should not be reused with a different meaning in GMR systems.

# History

| Document history | | |
|---|---|---|
| V1.1.1 | March 2001 | Publication |
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