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**Digital cellular telecommunications system (Phase 2+);
Mobile radio interface layer 3 specification;
Radio Resource Control Protocol
(GSM 04.18 version 8.4.0 Release 1999)**

GLOBAL SYSTEM FOR
MOBILE COMMUNICATIONS

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Contents

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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Special Mobile Group (SMG), and is now submitted for the ETSI standards One-step Approval Procedure.

The present document specifies the procedures used at the radio interface (Reference Point Um, see GSM 04.02) for Radio Resource (RR) management within the digital cellular telecommunications system.

The contents of the present document are subject to continuing work within SMG and may change following formal SMG approval. Should SMG modify the contents of the present document it will then be re-submitted for OAP with an identifying change of release date and an increase in version number as follows:

Version 8.x.y

where:

8 indicates GSM Release 1999 of Phase 2+

x the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

y the third digit is incremented when editorial only changes have been incorporated in the specification.

Proposed national transposition dates	
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1 Scope

The present document specifies the procedures used at the radio interface (Reference Point Um, see GSM 04.02) for Radio Resource (RR) management.

Notation "Reserved section number" is used to indicate which sections of the specification were moved from this part of the standard to the other part when this standard was split between RAN and CN parts.

When the notations for "further study" or "FS" or "FFS" are present in this specification they mean that the indicated text is not a normative portion of this standard.

These procedures are defined in terms of messages exchanged over the control channels of the radio interface. The control channels are described in GSM 04.03.

The structured functions and procedures of this protocol and the relationship with other layers and entities are described in general terms in TS 24.007.

1.1 Scope of the Technical Specification

The procedures currently described in this EN are for radio resource management for circuit-switched and GPRS services.

TS 24.010 contains functional procedures for support of supplementary services.

GSM 04.11 contains functional procedures for support of point-to-point short message services.

GSM 04.12 contains functional description of short message - cell broadcast.

GSM 04.60 contains procedures for radio link control and medium access control (RLC/MAC) of packet data physical channels.

TS 24.071 contains functional descriptions and procedures for support of location services.

TS 24.008 contains the procedures for CN protocols.

NOTE: "layer 3" includes the functions and protocols described in this Technical Specification. The terms "data link layer" and "layer 2" are used interchangeably to refer to the layer immediately below layer 3.

1.2 Application to the interface structures

The layer 3 procedures apply to the interface structures defined in GSM 04.03. They use the functions and services provided by layer 2 defined in GSM 04.05 and GSM 04.06. TS 24.007 gives the general description of layer 3 including procedures, messages format and error handling.

1.3 Structure of layer 3 procedures

A building block method is used to describe the layer 3 procedures.

The basic building blocks are "elementary procedures" provided by the protocol control entities of the three sublayers, i.e. radio resource management, mobility management and connection management sublayer.

Complete layer 3 transactions consist of specific sequences of elementary procedures. The term "structured procedure" is used for these sequences.

1.4 Test procedures

Test procedures of the GSM radio interface signalling are described in GSM 11.10 and GSM 11.2x series.

1.5 Use of logical channels

The logical control channels are defined in GSM 05.02. In the following those control channels are considered which carry signalling information or specific types of user packet information:

i) Broadcast Control CHannel (BCCH): downlink only, used to broadcast Cell specific information;

ii) Synchronization CHannel (SCH): downlink only, used to broadcast synchronization and BSS identification information;

iii) Paging CHannel (PCH): downlink only, used to send page requests to Mobile Stations (MSs);

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

v) Access Grant CHannel (AGCH): downlink only, used to allocate a Dedicated Control CHannel;

vi) Standalone Dedicated Control CHannel (SDCCH): bi-directional;

vii) Fast Associated Control CHannel (FACCH): bi-directional, associated with a Traffic CHannel;

viii) Slow Associated Control CHannel (SACCH): bi-directional, associated with a SDCCH or a Traffic CHannel;

ix) Cell Broadcast CHannel (CBCH): downlink only used for general (not point to point) short message information;

x) Notification CHannel (NCH): downlink only, used to notify mobile stations of VBS (Voice Broadcast Service) calls or VGCS (Voice Group Call Service) calls.

Two service access points are defined on signalling layer 2 which are discriminated by their Service Access Point Identifiers (SAPI) (see GSM 04.06):

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

ii) SAPI 3: supports the transfer of user short messages.

Layer 3 selects the service access point, the logical control channel and the mode of operation of layer 2 (acknowledged, unacknowledged or random access, see GSM 04.05 and GSM 04.06) as required for each individual message.

1.6 Overview of control procedures

1.6.1 List of procedures

The following procedures are specified in this Technical Specification:

a) Clause 3 specifies elementary procedures for Radio Resource management:

- system information broadcasting (subclause 3.2.2)
- RR connection establishment (subclause 3.3)
    - entering the dedicated mode : immediate assignment procedure (subclause 3.3.1.1)
    - paging procedure for RR connection establishment (subclause 3.3.2)
    - notification procedure (subclause 3.3.3)
- Procedures in dedicated mode and in group transmit mode (subclause 3.4)
    - measurement report procedure (subclause 3.4.1.2)
    - intracell change of channels (subclause 3.4.3)
    - intercell change of channels (subclause 3.4.4)
    - frequency redefinition procedure (subclause 3.4.5)

  - channel mode change procedure (subclause 3.4.6)
  - ciphering mode setting procedure (subclause 3.4.7)
  - additional channel assignment procedure (subclause 3.4.8)
  - partial channel release procedure (subclause 3.4.9)
- radio resources connection release (subclause 3.4.13)
- specific RR procedures for voice broadcast channels and voice group call channels (subclause 3.4.15)
- application procedures (subclause 3.4.21)
- RR procedures on CCCH related to temporary block flow establishment (subclause 3.5)
  - packet paging procedure using CCCH (subclause 3.5.1)
  - packet access procedure using CCCH (subclause 3.5.2)
- packet downlink assignment procedure using CCCH (subclause 3.5.3)
- RR procedures on DCCH related to temporary block flow establishment
  - Assignment to Packet Data Channel procedure (subclause 3.4.19)
  - Network commanded cell reselection (subclause 3.4.20)

Clause 8 specifies actions to be taken on various error conditions and also provides rules to ensure compatibility with future enhancements of the protocol.

1.7 Applicability of implementations

The applicability of procedures of this technical specification for the mobile station is dependent on the services and functions which are to be supported by a mobile station. For the MS, the Revision level indicating Release ’99 is linked to the full support of the RR protocol and procedures in GSM 04.18 Release ’99.

1.7.1 Voice Group Call Service (VGCS) and Voice Broadcast Service (VBS)

For mobile stations supporting the Voice Group Call Service or the Voice Broadcast Service, it is explicitly mentioned throughout this technical specification if a certain procedure is applicable only for such a service and, if necessary, how mobile stations not supporting such a service shall behave.

For VGCS and VBS, the following possible mobile station implementations exist:

- support of listening to voice broadcast calls (VBS listening)
- support of originating a voice broadcast call (VBS originating)
- support of listening to voice group calls (VGCS listening)
- support of talking in voice group calls (VGCS talking. This always includes the implementation for VGCS listening)
- support of originating a voice group call (VGCS originating. This always includes the implementation for VGCS talking)

Apart from the explicitly mentioned combinations, all possible combinations are optional and supported by this technical specification.

The related terms are used in this technical specification, if information on these implementation options is required.

1.7.2 General Packet Radio Service (GPRS)

For mobile stations supporting the General Packet Radio Service (GPRS), it is explicitly mentioned throughout the technical specification if a certain procedure is applicable only for such a service and, if necessary, how mobile stations not supporting such a service shall behave.

A GPRS MS may operate in one of the following MS operation modes, see TS 23.060 [74]:

- MS operation mode A;
- MS operation mode B; or
- MS operation mode C.

The MS operation mode depends on the services that the MS is attached to, i.e., only GPRS or both GPRS and non-GPRS services, and upon the MS's capabilities to operate GPRS and other GSM services simultaneously. Mobile stations that are capable to operate GPRS services are referred to as GPRS MSs.

NOTE: Other GSM technical specifications may refer to the MS operation modes A, B, and C as GPRS class-A MS, GPRS class-B MS, and GPRS class-C MS.

It should be noted that it is possible that for a GPRS MS, the GMM procedures currently described in the present document do not support combinations of VGCS, VBS and GPRS. The possible interactions are not studied yet.

2 References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.
- For this Release 1999 document, references to GSM documents are for Release 1999 versions (version 8.x.y).

[1] GSM 01.02: "Digital cellular telecommunications system (Phase 2+); General description of a GSM Public Land Mobile Network (PLMN)".

[2] GSM 01.04: "Digital cellular telecommunications system (Phase 2+); Abbreviations and acronyms".

[3] TS 22.002: "Digital cellular telecommunications system (Phase 2+); Bearer Services (BS) supported by a GSM Public Land Mobile Network (PLMN)".

[4] GSM 02.03: "Digital cellular telecommunications system (Phase 2+); Teleservices supported by a GSM Public Land Mobile Network (PLMN)".

[5] GSM 02.09: "Digital cellular telecommunications system (Phase 2+); Security aspects".

[6] TS 22.011: "Digital cellular telecommunications system (Phase 2+); Service accessibility".

[7] GSM 02.17: "Digital cellular telecommunications system (Phase 2+); Subscriber identity modules Functional characteristics".

[8] GSM 02.40: "Digital cellular telecommunications system (Phase 2+); Procedures for call progress indications".

[9] GSM 03.01: "Digital cellular telecommunications system (Phase 2+); Network functions".

[10] TS 23.003: "Digital cellular telecommunications system (Phase 2+); Numbering, addressing and identification".

[11] GSM 03.13: "Digital cellular telecommunications system (Phase 2+); Discontinuous Reception (DRX) in the GSM system".

[12] TS 23.014: "Digital cellular telecommunications system (Phase 2+); Support of Dual Tone Multi-Frequency signalling (DTMF) via the GSM system".

[12a] TS 23.071: "Digital cellular telecommunications system (Phase 2+); Location Services; Functional description – Stage 2".

[13] GSM 03.20: "Digital cellular telecommunications system (Phase 2+); Security related network functions".

[14] TS 23.022: "Digital cellular telecommunications system (Phase 2+); Functions related to Mobile Station (MS) in idle mode".

[15] GSM 04.02: "Digital cellular telecommunications system (Phase 2+); GSM Public Land Mobile Network (PLMN) access reference configuration".

[16] GSM 04.03: "Digital cellular telecommunications system (Phase 2+); Mobile Station - Base Station System (MS - BSS) interface Channel structures and access capabilities".

[17] GSM 04.04: "Digital cellular telecommunications system (Phase 2+); layer 1 General requirements".

[18] GSM 04.05: "Digital cellular telecommunications system (Phase 2+); Data Link (DL) layer General aspects".

[19] GSM 04.06: "Digital cellular telecommunications system (Phase 2+); Mobile Station - Base Station System (MS - BSS) interface Data Link (DL) layer specification".

[20] TS 24.007: "Digital cellular telecommunications system (Phase 2+); Mobile radio interface signalling layer 3; General aspects".

[21] TS 24.010: "Digital cellular telecommunications system ; Mobile radio interface layer 3 Supplementary services specification; General aspects".

[22] GSM 04.11: "Digital cellular telecommunications system (Phase 2); Point-to-Point (PP) Short Message Service (SMS) support on mobile radio interface".

[23] GSM 04.12: "Digital cellular telecommunications system (Phase 2+); Short Message Service Cell Broadcast (SMSCB) support on the mobile radio interface".

[23a] TS 24.071: "Digital cellular telecommunications system (Phase 2+); Mobile radio interface layer 3 location services specification.

[23b] GSM 04.31 "Digital cellular telecommunication system (Phase 2+);Location Services;Mobile Station (MS) – Serving Mobile Location Centre (SMLC); Radio Resource LCS Protocol (RRLP)".

[[24] TS 24.080: "Digital cellular telecommunications system (Phase 2+); Mobile radio interface layer 3 supplementary services specification Formats and coding".

[25] TS 24.081: "Digital cellular telecommunications system (Phase 2+); Line identification supplementary services - Stage 3".

[26] TS 24.082: "Digital cellular telecommunications system (Phase 2+); Call Forwarding (CF) supplementary services - Stage 3".

[27] TS 24.083: "Digital cellular telecommunications system (Phase 2+); Call Waiting (CW) and Call Hold (HOLD) supplementary services - Stage 3".

[28] TS 24.084: "Digital cellular telecommunications system (Phase 2+); MultiParty (MPTY) supplementary services - Stage 3".

[29] TS 24.085: "Digital cellular telecommunications system (Phase 2+); Closed User Group (CUG) supplementary services - Stage 3".

[30] TS 24.086: "Digital cellular telecommunications system (Phase 2+); Advice of Charge (AoC) supplementary services - Stage 3".

[31] GSM 04.88: "Digital cellular telecommunications system (Phase 2+); Call Barring (CB) supplementary services - Stage 3".

[32] GSM 05.02: "Digital cellular telecommunications system (Phase 2+); Multiplexing and multiple access on the radio path".

[33] GSM 05.05: "Digital cellular telecommunications system (Phase 2+); Radio transmission and reception".

[34] GSM 05.08: "Digital cellular telecommunications system (Phase 2+); Radio subsystem link control".

[35] GSM 05.10: "Digital cellular telecommunications system (Phase 2+); Radio subsystem synchronization".

[36] TS 27.001: "Digital cellular telecommunications system (Phase 2+); General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS)".

[37] TS 29.002: "Digital cellular telecommunications system (Phase 2+); Mobile Application Part (MAP) specification".

[38] TS 29.007: "Digital cellular telecommunications system (Phase 2+); General requirements on interworking between the Public Land Mobile Network (PLMN) and the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN)".

[39] GSM 11.10: "Digital cellular telecommunications system (Phase 2+); Mobile Station (MS) conformity specification".

[40] GSM 11.21: "Digital cellular telecommunications system (Phase 2); The GSM Base Station System (BSS) equipment specification".

[41] ISO/IEC 646 (1991): "Information technology - ISO 7-bit coded character set for information interchange".

[42] ISO/IEC 6429: "Information technology - Control functions for coded character sets".

[43] ISO 8348 (1987): "Information processing systems - Data communications - Network service definition".

[44] CCITT Recommendation E.163: "Numbering plan for the international telephone service".

[45] CCITT Recommendation E.164: "Numbering plan for the ISDN era".

[46] CCITT Recommendation E.212: "Identification plan for land mobile stations".

[47] ITU-T Recommendation F.69 (1993): "Plan for telex destination codes".

[48] CCITT Recommendation I.330: "ISDN numbering and addressing principles".

[49] CCITT Recommendation I.440 (1989): "ISDN user-network interface data link layer - General aspects".

[50] CCITT Recommendation I.450 (1989): "ISDN user-network interface layer 3 General aspects".

[51] ITU-T Recommendation I.500 (1993): "General structure of the ISDN interworking recommendations".

[52] CCITT Recommendation T.50: "International Alphabet No. 5".

[53] CCITT Recommendation Q.931: ISDN user-network interface layer 3 specification for basic control".

[54] CCITT Recommendation V.21: "300 bits per second duplex modem standardized for use in the general switched telephone network".

[55] CCITT Recommendation V.22: "1200 bits per second duplex modem standardized for use in the general switched telephone network and on point-to-point 2-wire leased telephone-type circuits".

[56] CCITT Recommendation V.22bis: "2400 bits per second duplex modem using the frequency division technique standardized for use on the general switched telephone network and on point-to-point 2-wire leased telephone-type circuits".

[57] CCITT Recommendation V.23: "600/1200-baud modem standardized for use in the general switched telephone network".

[58] CCITT Recommendation V.26ter: "2400 bits per second duplex modem using the echo cancellation technique standardized for use on the general switched telephone network and on point-to-point 2-wire leased telephone-type circuits".

[59] CCITT Recommendation V.32: "A family of 2-wire, duplex modems operating at data signalling rates of up to 9600 bit/s for use on the general switched telephone network and on leased telephone-type circuits".

[60] CCITT Recommendation V.110: "Support of data terminal equipments (DTEs) with V-Series interfaces by an integrated services digital network".

[61] CCITT Recommendation V.120: "Support by an ISDN of data terminal equipment with V-Series type interfaces with provision for statistical multiplexing".

[62] CCITT Recommendation X.21: "Interface between data terminal equipment (DTE) and data circuit-terminating equipment (DCE) for synchronous operation on public data networks".

[63] CCITT Recommendation X.25: "Interface between data terminal equipment (DTE) and data circuit-terminating equipment (DCE) for terminals operating in the packet mode and connected to public data networks by dedicated circuit".

[64] CCITT Recommendation X.28: "DTE/DCE interface for a start-stop mode data terminal equipment accessing the packet assembly/disassembly facility (PAD) in a public data network situated in the same country".

[65] CCITT Recommendation X.30: "Support of X.21, X.21 bis and X.20 bis based data terminal equipments (DTEs) by an integrated services digital network (ISDN)".

[66] CCITT Recommendation X.31: "Support of packet mode terminal equipment by an ISDN".

[67] CCITT Recommendation X.32: "Interface between data terminal equipment (DTE) and data circuit-terminating equipment (DCE) for terminals operating in the packet mode and accessing a packet switched public data network through a public switched telephone network or an integrated services digital network or a circuit switched public data network".

[68] CCITT Recommendation X.75 (1988): "Packet-switched signalling system between public networks providing data transmission services".

[69] CCITT Recommendation X.121: "International numbering plan for public data networks".

[70] ETS 300 102-1: "Integrated Services Digital Network (ISDN); User-network interface layer 3 Specifications for basic call control".

[71] ETS 300 102-2: "Integrated Services Digital Network (ISDN); User-network interface layer 3 Specifications for basic call control".

[72] ISO/IEC10646: “Universal Multiple-Octet Coded Character Set (UCS)”; UCS2, 16 bit coding.

[73] TS 22.060: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Service Description; Stage 1".

[74] TS 23.060: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Service Description; Stage 2".

[75] GSM 03.64: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Overall description of the GPRS radio interface; Stage 2".

[76] GSM 04.60: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Mobile Station - Base Station System (MS-BSS) interface; Radio Link Control and Medium Access Control (RLC/MAC) layer specification".

[77] IETF RFC 1034: "Domain names - Concepts and Facilities " (STD 7).

[78] GSM 04.65: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Subnetwork Dependent Convergence Protocol (SNDCP)".

[79] TS 24.008: "3rd Generation Partnership Project; Technical Specification Group Core Network; Mobile Radio Interface Layer 3 specification; Core Network Protocols - Stage 3".

[80] TIA/EIA/IS-2000-5-A: “Upper Layer (Layer 3) Signaling Standard for cdma2000 Spread Spectrum Systems”.

[81] TIA/EIA/IS-833: “Multi-Carrier Specification for Spread Spectrum Systems on GSM MAP (MC-MAP) (Lower Layers Air Interface)”

[82] TIA/EIA/IS-2000-4-A: “Signaling Link Access Control (LAC) Standard for cdma2000 Spread Spectrum Systems”

2.1 Definitions and abbreviations

Abbreviations used in the present document are listed in GSM 01.04

2.1.1 Random values

In a number of places in this Technical Specification, it is mentioned that some value must take a "random" value, in a given range, or more generally with some statistical distribution. Such cases interest only the Mobile Station.

It is required that there is a low probability that two MSs in the same conditions (including the case of two MSs of the same type from the same manufacturer) will choose the same value. Moreover, it is required that, if it happens that two MSs in similar conditions choose the same value, the probability of their choices being identical at the next occasion is the same as if their first choices had been different.

The meaning of such a specification is that any statistical test for these values, done on a series of similar events, will obtain a result statistically compatible with the specified distribution. This shall hold even in the cases where the tests are conducted with a subset of possible events, with some common parameters. Moreover, basic tests of independence of the values within the series shall pass.

Data against which correlation with the values shall not be found are the protocol state, or the IMSI, or identities or other unrelated information broadcast by the network, or the current TDMA frame number.

2.1.2 Vocabulary

The following terms are used in this Technical Specification:

- **idle mode:** In this mode, the mobile station is not allocated any dedicated channel; it listens to the CCCH and the BCCH.

- **group receive mode:** (only applicable for mobile stations supporting VGCS listening or VBS listening) In this mode, the mobile station is not allocated a dedicated channel with the network; it listens to the downlink of a voice broadcast channel or voice group call channel allocated to the cell. Occasionally, the mobile station has to listen to the BCCH of the serving cell as defined in TS 23.022 and GSM 05.08.

- **dedicated mode:** In this mode, the mobile station is allocated at least two dedicated channels, only one of them being a SACCH.

- **group transmit mode:** (only applicable for mobile stations supporting VGCS talking) In this mode, one mobile station of a voice group call is allocated two dedicated channels, one of them being a SACCH. These channels can be allocated to one mobile station at a time but to different mobile stations during the voice group call.
- **packet idle mode**: (only applicable for mobile stations supporting GPRS) In this mode, mobile station is not allocated any radio resource on a packet data physical channel; it listens to the PBCCH and PCCCH or, if those are not provided by the network, to the BCCH and the CCCH, see GSM 04.60.
- **packet transfer mode**: (only applicable for mobile stations supporting GPRS) In this mode, the mobile station is allocated radio resource on one or more packet data physical channels for the transfer of LLC PDUs.
- **main DCCH:** In Dedicated mode and group transmit mode, only two channels are used as DCCH, one being a SACCH, the other being a SDCCH or a FACCH; the SDCCH or FACCH is called here "the main DCCH".
- A channel is **activated** if it can be used for transmission, in particular for signalling, at least with UI frames. On the SACCH, whenever activated, it must be ensured that a contiguous stream of layer 2 frames is sent.
- A TCH is **connected** if circuit mode user data can be transferred. A TCH cannot be connected if it is not activated. A TCH which is activated but not connected is used only for signalling, i.e. as a DCCH.
- The data link of SAPI 0 on the main DCCH is called the **main signalling link**. Any message specified to be sent on the main signalling link is sent in acknowledged mode except when otherwise specified.
- The term **"to establish"** a link is a short form for **"to establish the multiframe mode"** on that data link. It is possible to send UI frames on a data link even if it is not established as soon as the corresponding channel is activated. Except when otherwise indicated, a data link layer establishment is done without an information field.
- **“channel set”** is used to identify TCHs that carry related user information flows, e.g., in a multislot configuration used to support circuit switched connection(s), which therefore need to be handled together.
- A **temporary block flow** (TBF) is a physical connection used by the two RR peer entities to support the uni-directional transfer of LLC PDUs on packet data physical channels, see GSM 04.60.
- **RLC/MAC block:** A RLC/MAC block is the protocol data unit exchanged between RLC/MAC entities, see GSM 04.60.
- A **GMM context** is established when a GPRS attach procedure is successfully completed.
- -- **Network operation mode**

  The three different network operation modes I, II, and III are defined in TS 23.060 [74].

The network operation mode shall be indicated as system information. For proper operation, the network operation mode should be the same in each cell of one routing area.

- -- **GPRS MS operation mode**

  The three different GPRS MS operation modes A, B, and C are defined in TS 23.060 [74].
- **Anonymous access** refers to limited service provisioning to an MS whose identity is unknown in the network.

3 Radio Resource management procedures

3.1 Overview/General

3.1.1 General

Radio Resource management procedures include the functions related to the management of the common transmission resources, e.g. the physical channels and the data link connections on control channels.

The general purpose of Radio Resource procedures is to establish, maintain and release RR connections that allow a point-to-point dialogue between the network and a mobile station. This includes the cell selection/reselection and the handover procedures. Moreover, Radio Resource management procedures include the reception of the uni-directional BCCH and CCCH when no RR connection is established. This permits automatic cell selection/reselection.

If VGCS listening or VBS listening are supported, the radio resource management also includes the functions for the reception of the voice group call channel or the voice broadcast channel, respectively, and the automatic cell reselection of the mobile station in Group receive mode.

If VGCS talking is supported, the radio resource management also includes the functions for the seizure and release of the voice group call channel.

If GPRS point-to-point services are supported, the radio resource management procedures includes functions related to the management of transmission resources on packet data physical channels. This includes the broadcast of system information to support a mobile station in packet idle and packet transfer modes, see also GSM 04.60.

NOTE 1: This chapter includes some procedures used for multislot operation and for the TCH/H + TCH/H configuration which need not be supported by simple mobile stations.

NOTE 2: The procedures and the information content relating to the TCH/H + TCH/H configuration in RR messages is for further study.

3.1.2 Services provided to upper layers

A RR connection is a physical connection used by the two peer entities to support the upper layers' exchange of information flows.

3.1.2.1 Idle mode

In idle mode no RR connection exists.

The RR procedures include (on the mobile station side) those for automatic cell selection/reselection. The RR entity indicates to upper layers the unavailability of a BCCH/CCCH and the cell change when decided by the RR entity. Upper layers are advised of the BCCH broadcast information when a new cell has been selected, or when a relevant part of this information changes.

In Idle mode, upper layers can require the establishment of an RR connection.

3.1.2.2 Dedicated mode

In dedicated mode, the RR connection is a physical point-to-point bi-directional connection, and includes a SAPI 0 data link connection operating in multiframe mode on the main DCCH. If dedicated mode is established, RR procedures provide the following services:

- establishment/release of multiframe mode on data link layer connections other than SAPI 0, on the main DCCH or on the SACCH associated with the channel carrying the main signalling link;
- transfer of messages on any data link layer connection;
- indication of temporary unavailability of transmission (suspension, resuming);

- indication of loss of RR connection;
- automatic cell reselection and handover to maintain the RR connection;
- setting/change of the transmission mode on the physical channels, including change of type of channel, change of the coding/decoding/transcoding mode and setting of ciphering;
- allocation/release of an additional channel (for the TCH/H + TCH/H configuration);
- allocation/release of additional channels for multislot operation;
- release of an RR connection.

3.1.2.3 Group receive mode

Only applicable for mobile stations supporting VGCS listening or VBS listening.

In this mode, the RR procedures on the mobile station side provide the services:

- local connection to the voice broadcast channel or voice group call channel;
- reception of messages in unacknowledged mode;
- automatic cell reselection for the mobile station in Group receive mode;
- local disconnection from the received voice group call or broadcast call channels.

For mobile stations supporting both VGCS listening and VGCS transmit, in addition, the RR procedures on the mobile station side provide the service:

- uplink access procedures to establish the RR connection.

3.1.2.4 Group transmit mode

Only applicable for mobile stations supporting VGCS talking.

In group transmit mode, the RR connection is a physical point-to-point bi-directional connection, and includes a SAPI 0 data link connection operating in multiframe mode on the main DCCH. If the group transmit mode is established, RR procedures provide the following services:

- transfer of messages on the SAPI 0 of the data link layer connection;
- indication of loss of RR connection;
- automatic cell reselection and handover to maintain the RR connection;
- setting of the transmission mode on the physical channels, change of type of channel and setting of ciphering;
- release of the RR connection.

3.1.2.5 Packet idle mode

Only applicable for mobile stations supporting GPRS.

In packet idle mode, no temporary block flow exists (see GSM 04.60). Upper layers may require the transfer of a LLC PDU, which implicitly triggers the establishment of a temporary block flow.

3.1.2.6 Packet transfer mode

Only applicable for mobile stations supporting GPRS.

In packet transfer mode, the mobile station is allocated radio resource providing a temporary block flow on one or more packet data physical channels. The RR sublayer provides the following services, see also GSM 04.60:

- transfer of LLC PDUs in acknowledged mode;

- transfer of LLC PDUs in unacknowledged mode.

Depending on the GPRS mode of operation (class A or B), the mobile station may leave both packet idle mode and packet transfer mode before entering dedicated mode, group receive mode or group transmit mode.

Cell reselection in packet idle and packet transfer modes is specified in GSM 05.08. The RR entity on the mobile station side indicates to the upper layers the availability of a cell and a cell change when decided by the RR sublayer. Upper layers are advised of system information broadcast in the cell when a new cell has been selected, or when a relevant part of this information changes.

3.1.2.7 Dual transfer mode (DTM)

In dual transfer mode, the mobile station is simultaneously in dedicated mode and in packet transfer mode.This feature is optional for the mobile station and the network. It is only applicable for a mobile station supporting GPRS. Dual transfer mode is a subset of class A mode of operation, only possible if there is radio resource allocation co-ordination in the network.

3.1.3 Services required from data link and physical layers

The RR sublayer uses the services provided by the data link layer as defined in GSM 04.05.

Moreover, the RR sublayer directly uses services provided by the physical layer such as BCCH searching and transfer of RLC/MAC blocks, as defined in GSM 04.04.

3.1.4 Change of dedicated channels

3.1.4.1 Change of dedicated channels using SAPI = 0

In case a change of dedicated channels is required using a dedicated assignment and handover procedure, respectively, the RR sublayer will request the data link layer to suspend multiple frame operation before the mobile station leaves the old channel. When the channel change has been completed, layer 3 will request the data link layer to resume multiple frame operation again. The layer 2 suspend/resume procedures are described in GSM 04.05 and 04.06.

These procedures are specified in such a way that a loss of a layer 3 message cannot occur on the radio interface. However, messages sent from the mobile station to the network may be duplicated by the data link layer if a message has been transmitted but not yet completely acknowledged before the mobile station leaves the old channel (see GSM 04.06).

As the RR sublayer is controlling the channel change, a duplication of RR messages does not occur. However, there are some procedures for which a duplication is possible, e.g. DTMF procedures. For all upper layer procedures using the transport service of the GSM RR sub-layer (e.g., MM and CM procedures but not GMM or Session Management procedures), the request messages sent by the mobile station contain a sequence number in order to allow the network to detect duplicated messages, which are then ignored by the network. The same sequence number is used to protect against message duplication caused by channel changes between GSM and UMTS and also by other UMTS procedures (eg hard handover). The procedures for sequenced transmission on layer 3 are described in subclause 3.1.4.2.

3.1.4.2 Change of dedicated channels using other SAPIs than 0

For SAPIs other than 0, the data link procedures described in GSM 04.06 do not provide any guarantee against message loss or duplication.

Therefore, if an application uses a SAPI other than 0 and if this application is sensitive to message loss or duplication, then it has to define its own protection mechanism. No general protection mechanism is provided by the protocol defined in this Technical Specification.

3.1.4.3 Sequenced message transfer operation

Upper layer messages sent using the RR sub-layer transport service from the mobile station to the network can be duplicated by the data link layer in at least the following cases:

- a channel change of dedicated channels is required (assignment or handover procedure) and the last layer 2 frame has not been acknowledged by the peer data link layer before the mobile station leaves the old channel.

- a channel change from UMTS to GSM is performed and the UMTS layer 2 protocol has not acknowleged the layer 2 frames carrying one or more upper layer messages.

In this case, the mobile station does not know whether the network has received the message correctly. Therefore, the mobile station has to send the message again after the new dedicated channel is established (see GSM 04.06).

The network must be able to detect the duplicated received message. Therefore, each concerned upper layer message must be marked with a send sequence number.

To allow for different termination points in the infrastructure of the messages of different PDs, the sequence numbering is specific to each PD. For historical reasons, an exception is that messages sent with the CC, SS and MM PDs share the same sequence numbering. In the following, the phrase **upper layer message flow** refers to a flow of messages sharing the same sequence numbering. The different upper layer flows are MM+CC+SS, GCC, BCC and RRLP. The GMM, SM and SMS protocols do not use layer 3 sequence numbering.

3.1.4.3.1 Variables and sequence numbers

3.1.4.3.1.1 Send state variable V(SD)

The RR (GSM case) and/or RRC (UMTS case) sublayer of the mobile station shall have one associated send state variable V(SD) ("Send Duplicated") for each upper layer message flow. The send state variable denotes the sequence number of the next in sequence numbered message in the flow to be transmitted. The value of the corresponding send state variable shall be incremented by one with each numbered message transmission. When the RR or RRC connection starts with a core network of release ’98 or earlier arithmetic operations on V(SD) are performed modulo 2. When the RR or RRC connection starts with a core network of Release ’99 or later, arithmetic operations on V(SD) are performed modulo 4.

3.1.4.3.1.2 Send sequence number N(SD)

At the time when such a message to be numbered is designated for transmission, the value of N(SD) for the message to be transferred is set equal to the value of the send state variable V(SD). See TS 24.007.

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

3.1.4.3.2.1 Initiation

The sequenced message transfer operation is initiated by establishing a RR connection. The send state variables V(SD) are set to 0.

3.1.4.3.2.2 Transfer Execution

A release ’98 or earlier core network must compare the send sequence numbers of pairs of subsequent messages in the same upper layer messages flow. In case the send sequence numbers of two subsequent messages in a flow are not identical, no duplication has occurred. In case the send sequence numbers are identical, the network must ignore the second one of the received messages.

A release ’99 or later core network shall discard any message whose N(SD) is not greater (modulo 4) than the N(SD) of the last accepted message.

3.1.4.3.2.3 Termination

The sequenced message transfer operation is terminated by the RR connection release procedure.

Handover from GSM to UMTS or from UMTS to GSM shall not terminate the sequenced message transfer. UMTS SRNC relocation shall not terminate the sequenced message transfer.

3.1.5 Procedure for Service Request and Contention Resolution

Upon seizure of the assigned dedicated channel, the mobile station establishes the main signalling link on this channel by sending a layer 2 SABM frame containing a layer 3 service request message. The data link layer will store this message to perform the contention resolution. The service request message will be returned by the network in the UA frame.

The data link layer in the mobile station compares the content of the information field (i.e. the layer 3 service request message) received in the UA frame with the stored message and leaves the channel in case they do not match. This procedure resolves contentions in the case where several mobile stations have accessed at the same random access slot and with the same random reference and one has succeeded due to capture. The full description of the procedure is given in GSM 04.06.

The purpose of the service request message is to indicate to the network which service the mobile station is requesting. This then allows the network to decide how to proceed (e.g. to authenticate or not).

The service request message must contain the identity of the mobile station and may include further information which can be sent without encryption.

The layer 3 service request message is typically one of the following:

- CM SERVICE REQUEST
- LOCATION UPDATING REQUEST
- IMSI DETACH
- PAGING RESPONSE
- CM RE-ESTABLISHMENT REQUEST
- NOTIFICATION RESPONSE
- IMMEDIATE SETUP
- RR INITIALISATION REQUEST

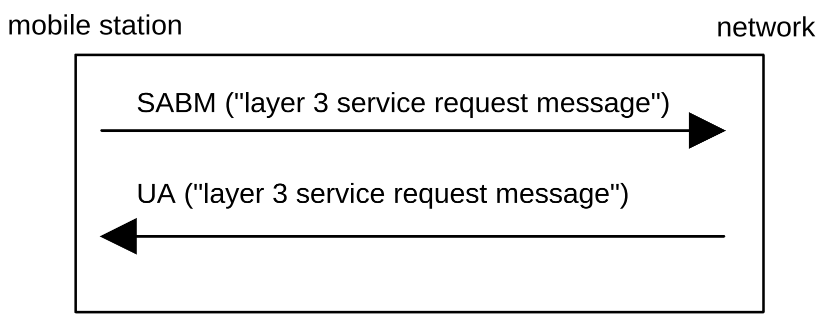


Figure 3.1/GSM 04.18: Service request and contention resolution

3.1.6 Preemption

The datalink layer provides the capability to assign a priority to any message transferred in dedicated mode on SAPI 0 with multiframe operation. The available message priorities defined in GSM 04.06 are “high”, “normal” and “low”. Messages assigned a “high” priority are enabled to preempt, in the data link layer, all preceeding untransmitted and partially transmitted messages assigned a “low” priority that are using the same data link connection (same SAPI and logical channel). Messages or message portions that are preempted are discarded without notification to higher layers except that the first 2*N201 octets of any partially transmitted message are not discarded. The following priority assignments are defined for those Radio Resource, Mobility Management and Connection Management messages that use SAPI 0.

Table 2.1/GSM 04.18: Priority Values of Layer 3 Messages

Priority	Messages
Low	RR Application Information message
Normal	All MM messages All CM messages All other RR messages using SAPI 0 not listed here
High	RR Channel Establishment: RR INITIALISATION REQUEST ADDITIONAL ASSIGNMENT IMMEDIATE ASSIGNMENT IMMEDIATE ASSIGNMENT EXTENDED IMMEDIATE ASSIGNMENT REJECT RR Configuration Change: CONFIGURATION CHANGE COMMAND CONFIGURATION CHANGE ACK. CONFIGURATION CHANGE REJECT RR Handover related ASSIGNMENT COMMAND ASSIGNMENT COMPLETE ASSIGNMENT FAILURE HANDOVER COMMAND HANDOVER COMPLETE HANDOVER FAILURE PHYSICAL INFORMATION RR-CELL CHANGE ORDER PDCH ASSIGNMENT COMMAND RR Channel release CHANNEL RELEASE PARTIAL RELEASE PARTIAL RELEASE COMPLETE

Use of the preemption capability by layer 3 is not required in a BSS or MS that does not send any “low” priority message. In this case, all messages may be treated as having “normal” priority.

3.2 Idle mode procedures and general procedures in packet idle and packet transfer modes

3.2.1 Mobile Station side

In idle mode, the MS listens to the BCCH and to the paging sub-channel for the paging group the MS belongs to in idle mode (cf. GSM 03.13); it measures the radio propagation for connection with other cells.

In packet idle and packet transfer modes (applicable only to a GPRS mobile station), the mobile station listens to either the PBCCH, if that is present in the cell, or BCCH. The requirements for the monitoring of system information is further specified in GSM 04.60. Moreover, the mobile station measures the radio propagation for connection with other cells.

In packet idle mode (applicable only to a GPRS mobile station), the mobile station listens to the paging sub-channels on the PCCCH or CCCH. Paging sub-channels are monitored according to the paging group determined for the mobile station and its current discontinuous reception (DRX) mode. The determination of paging group for the mobile station is defined in GSM 05.02. The DRX procedures are defined in GSM 04.60 and GSM 05.02.

Measurements are treated to assess the need of a cell change as specified in GSM 05.08. When the decision to change cells is made, the mobile station switches to the BCCH or PBCCH of the new cell. The broadcast information is then checked to verify the allowance to camp on this cell (cf. section 3.2.2). Dependent on the mobile station type and configuration, the mobile station may be required to try to read further BCCH and PBCCH information. If allowed, the cell change is confirmed, and the broadcast information is then treated for Mobility Management actions (cf. section 4). Similarly, physical contexts are updated (list of neighbouring cells frequencies, thresholds for some actions, etc. (cf. GSM 05.08 and section 3.2.2)).

3.2.2 Network side

3.2.2.1 System information broadcasting

SYSTEM INFORMATION TYPE 2 to 4 messages, and optionally TYPE 1, 2bis, 2ter, 7, 8, 13, 16 and 17 and further types are regularly broadcast by the network on the BCCH. Based on this information the mobile station is able to decide whether and how it may gain access to the system via the current cell. The SYSTEM INFORMATION TYPE 2bis message shall be sent if and only if the EXT-IND bit in the Neighbour Cells Description IE in both the TYPE 2 and TYPE 2bis messages indicates that each IE only carries part of the BA. SYSTEM INFORMATION TYPE 2ter message shall be sent if and only if this is indicated in SYSTEM INFORMATION TYPE 3 message.

A GSM 900 mobile station which only supports the primary GSM band P-GSM 900 (cf. GSM 05.05) may consider the EXT-IND bit in the Neighbour Cells Description IE in the SYSTEM INFORMATION TYPE 2 message as a spare bit. If it does so it shall assume that the information element carries the complete BA and it shall ignore any SYSTEM INFORMATION TYPE 2bis and 2ter messages.

SYSTEM INFORMATION TYPE 2quater messages are only sent if there are UTRAN Neighbour cells.

If the additional cell reselection parameters are broadcast then SYSTEM INFORMATION TYPE 3 message shall always contain these parameters. In addition to SYSTEM INFORMATION TYPE 3 at least either SYSTEM INFORMATION TYPE 4 or SYSTEM INFORMATION TYPE 7 and 8 messages shall contain these parameters too.

If additional SoLSA specific parameters are broadcast then SYSTEM INFORMATION TYPE 16 and 17 messages, shall always contain these parameters. In addition to SYSTEM INFORMATION TYPE 16 and 17 messages at least either SYSTEM INFORMATION TYPE 4 or SYSTEM INFORMATION TYPE 7 and 8 messages shall contain these SoLSA specific parameters too.

The SYSTEM INFORMATION TYPE 18 and 20 messages are sent when non-GSM broaodcast information must be transmitted. The scheduling and repetition rate of these messages is determined by the system operator and is indicated in SYSTEM INFORMATION TYPE 9 message. Mobile stations without non-GSM capabilities defined for SI 18 and SI 20 should ignore these messages. An MS with non-GSM capabilities shall decode and identify information related to the respective Non-GSM protocol by reading the Non-GSM Protocol Discriminator field.

SYSTEM INFORMATION TYPE 19 messages shall be provided if COMPACT neighbour cells exist (see GSM 05.08). The presence of SI 19 messages shall be indicated in SI 9 message.

The support of GPRS shall be indicated in SYSTEM INFORMATION TYPE 3 message. In addition, the support of GPRS shall be indicated in either SYSTEM INFORMATION TYPE 4 or SYSTEM INFORMATION TYPE 7 and 8 messages. If GPRS is supported, SYSTEM INFORMATION TYPE 13 message shall be sent. SI 13 message shall not be sent if GPRS is not supported. Additional requirements for the broadcast of system information in a cell supporting GPRS are specified in GSM 04.60.

NOTE 1: The allowed scheduling of SYSTEM INFORMATION messages on the BCCH are specified in GSM 05.02.

NOTE 2: The network should take into account limitations of certain mobile stations to understand SYSTEM INFORMATION TYPE 2bis, TYPE 2ter, the EXT-IND bit in the Neighbour Cells Description, the indication of 2ter in SYSTEM INFORMATION TYPE 3 and formats used in the Neighbour Cells Description IE and Cell Channel Description IE used in SYSTEM INFORMATION messages, see this section, section 10.5.2.1b, and section 10.5.2.22.

NOTE 3: The network should take into account the limitations of earlier version of mobile equipments to understand the 3-digit MNC format of the location area identification, see section 10.5.1.3.

The information broadcast may be grouped in the following classes:

- information giving unique identification of the current network, location area and cell;
- information used for candidate cell measurements for handover and cell selection procedures;
- information describing the current control channel structure;
- information controlling the random access channel utilization;
- information defining different options supported within the cell; and
- information about the length of the part of the message belonging to the phase 1 protocol.

The network may send to the mobile station BCCH scheduling information as specified below:

1) The BCCH scheduling information may be contained in the SYSTEM INFORMATION TYPE 9 messages. If so, SYSTEM INFORMATION TYPE 3 specifies where to find SYSTEM INFORMATION TYPE 9 messages carrying BCCH scheduling information.

2) If the mobile station has received BCCH scheduling information, it shall assume that this BCCH scheduling information is valid in the location area until new scheduling information is received. It may store the information in the ME and assume its validity after switch on in the same location area.

3) The network need not indicate the schedule of all SYSTEM INFORMATION messages in SYSTEM INFORMATION 9. For any System Information message, the MS shall monitor all blocks specified in GSM 05.02 for that System Information message and all blocks specified in the SYSTEM INFORMATION TYPE 9 message for that System Information message.

4) When the mobile station detects that the BCCH information is not scheduled as defined in the last received SI 9 message, it shall read the SYSTEM INFORMATION TYPE 3 message. If presence of BCCH scheduling information in SYSTEM INFORMATION TYPE 9 message is indicated, it shall try to read the information and continue as in 2 above. If presence of BCCH scheduling information in SYSTEM INFORMATION TYPE 9 message is not indicated, it shall assume that there is no valid BCCH scheduling information.

3.2.2.2 Paging

The network is required to send valid layer 3 messages continuously on all paging subchannels on CCCH.

3.3 RR connection establishment

3.3.1 RR connection establishment initiated by the mobile station

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

3.3.1.1 Entering the dedicated mode : immediate assignment procedure

The immediate assignment procedure can only be initiated by the RR entity of the mobile station. Initiation is triggered by request from the MM sublayer or LLC layer to enter the dedicated mode or by the RR entity in response to a PAGING REQUEST message or to initiate a notification response procedure. Upon such a request,

- if access to the network is allowed (as defined in 3.3.1.1.1), the RR entity of the mobile station initiates the immediate assignment procedure as defined in section 3.3.1.1.2;
- 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 a RR connection in response to a PAGING REQUEST 1, 2 or 3 message specifies one of the establishment causes "answer to paging"; the request from the RR entity to establish an RR connection in order to initiate a notification response procedure specifies one of the establishment causes " procedures that can be completed with a SDCCH".

3.3.1.1.1 Permission to access the network

All mobile stations with an inserted SIM are members of one out of 10 access classes numbered 0 to 9. The access class number is stored in the SIM. In addition, mobile stations may be members of one or more out of 5 special access classes (access classes 11 to 15) (see TS 22.011), this is also held on the SIM card.

The system information messages on the BCCH broadcast the list of authorized access classes and authorized special access classes in the system information messages, and whether emergency calls are allowed in the cell to all mobile stations or only to the members of authorized special access classes.

If the establishment cause for the request of the MM sublayer is not "emergency call", access to the network is allowed if and only if the mobile station is a member of at least one authorized:

- access class; or
- special access class.

If the establishment cause for the request of the MM sublayer is "emergency call", access to the network is allowed if and only if:

- emergency calls are allowed to all mobile stations in the cell or the mobile station is a member of at least one authorized special access class
- the network support voice services.

If requesting emergency call access in a cell where voice services are not available (CELL_BAR_QUALIFY_2 parameter indicates no voice service), the mobile station shall immediately go to “Any Cell Selection” state as defined in GSM 03.22, prior to establishing the emergency call.

3.3.1.1.2 Initiation of the immediate assignment procedure

The RR entity of the mobile station initiates the immediate assignment procedure by scheduling the sending on the RACH and leaving idle mode (in particular, the mobile station shall ignore PAGING REQUEST messages).

It then sends maximally M + 1 CHANNEL REQUEST or EGPRS PACKET CHANNEL REQUEST messages on the RACH in a way such that:

- the number of slots belonging to the mobile station's RACH between initiation of the immediate assignment procedure and the first CHANNEL REQUEST or EGPRS PACKET CHANNEL REQUEST message (excluding the slot containing the message itself) is a random value drawn randomly for each new initial assignment initiation with uniform probability distribution in the set {0, 1, ..., max (T,8) - 1};
- the number of slots belonging to the mobile station's RACH between two successive CHANNEL REQUEST or EGPRS PACKET CHANNEL REQUEST messages (excluding the slots containing the messages themselves) is a random value drawn randomly for each new transmission with uniform probability distribution in the set {S, S + 1, ..., S + T - 1};

Here, T is the value of the parameter "Tx-integer" broadcast on the BCCH;

M is the value of the parameter "max retrans" broadcast on the BCCH;

S is a parameter depending on the CCCH configuration and on the value of Tx-integer as defined in table 3.1/GSM 04.18.

The CHANNEL REQUEST messages are sent on the RACH (cf. section 1.5) and contain as parameters:

- an establishment cause which corresponds to the establishment cause given by the MM sublayer and the broadcast NECI value, or which corresponds to one of the establishment causes "answer to paging" given by the RR entity in response to a PAGING REQUEST message including the Channel Needed information, or which corresponds to one of the establishment causes " procedures that can be completed with a SDCCH" given by the RR entity in order to initiate a notification response procedure;
- a random reference which is drawn randomly from a uniform probability distribution for every new transmission.

After sending the first CHANNEL REQUEST message, the mobile station shall start listening to the BCCH; it shall also listen to the full downlink CCCH timeslot corresponding to its CCCH group.

Having sent M + 1 CHANNEL REQUEST messages, the RR entity of the mobile station starts timer T3126. At expiry of timer T3126, 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.

Table 3.1/GSM 04.18: Values of parameter S

TX-integer	non combined CCCH	combined CCH/SDCCH
3,8,14,50	55	41
4,9,16	76	52
5,10,20	109	58
6,11,25	163	86
7,12,32	217	115

3.3.1.1.3 Answer from the network

3.3.1.1.3.1 On receipt of a CHANNEL REQUEST message

The network may allocate a dedicated channel to the mobile station by sending an IMMEDIATE ASSIGNMENT message or IMMEDIATE ASSIGNMENT EXTENDED message in unacknowledged mode on the same CCCH timeslot on which it has received the CHANNEL REQUEST. There is no further restriction on what part of the downlink CCCH an IMMEDIATE ASSIGNMENT message or IMMEDIATE ASSIGNMENT EXTENDED message can be sent. The type of channel allocated (SDCCH or TCH; the channel mode shall be set to signalling only) is a network operator decision. Timer T3101 is then started on the network side.

NOTE: There are two types of immediate assignment messages:

- IMMEDIATE ASSIGNMENT message, containing assignment information for one mobile station only;
- IMMEDIATE ASSIGNMENT EXTENDED message, containing assignment information for two mobile stations at the same time.

The IMMEDIATE ASSIGNMENT or IMMEDIATE ASSIGNMENT EXTENDED message contains:

- the description of the assigned channel;
- the information field of the CHANNEL REQUEST message and the frame number of the frame in which the CHANNEL REQUEST message was received;
- the initial timing advance (cf. GSM 04.04);
- optionally, a starting time indication.

If frequency hopping is applied, the mobile station uses the last CA received on the BCCH to decode the Mobile Allocation.

On receipt of an IMMEDIATE ASSIGNMENT or IMMEDIATE ASSIGNMENT EXTENDED message corresponding to one of its 3 last CHANNEL REQUEST messages, the mobile station stops T3126 (if running), stops sending CHANNEL REQUEST messages, switches to the assigned channels, sets the channel mode to signalling only and activates the assigned channels. It then establishes the main signalling link with an SABM containing an information field (see section 3.1.5).

An IMMEDIATE ASSIGNMENT or IMMEDIATE ASSIGNMENT EXTENDED message may indicate a frequency change in progress, with a starting time and possibly alternative channel descriptions.

In the case of the reception of an IMMEDIATE ASSIGNMENT EXTENDED message, or of an IMMEDIATE ASSIGNMENT message which contains only the description of a channel to be used after the starting time, the mobile station shall wait up to the starting time before accessing the channel. If the starting time has already elapsed, the mobile shall access the channel as an immediate reaction to the reception of the message (see GSM 05.10 for the timing constraints).

If the message contains both the description of a channel to be used after the indicated time and of a channel to be used before, the mobile station accesses a channel as an immediate reaction to the reception of the message. If the moment the mobile station is ready to access is before the indicated time, the mobile station accesses the channels described for before the starting time. The mobile station then changes to the channel described for after the starting time at the indicated time. New parameters can be frequency list and MAIO. Other parameters describing the channel to be used before the starting time are taken from the description of the channel defined for use after the starting time. If the moment the mobile station is ready to access is after the starting time, the mobile station accesses the channel described for after the starting time.

If frequency hopping is applied, the mobile station uses the last CA received on the BCCH.

3.3.1.1.3.2 Assignment rejection

If no channel is available for assignment, the network may send to the mobile station an IMMEDIATE ASSIGNMENT REJECT message in unacknowledged mode on the same CCCH timeslot on which the channel request message was received. There is no further restriction on what part of the downlink CCCH timeslot an IMMEDIATE ASSIGNMENT REJECT message can be sent. This message contains the request reference and a wait indication.

On receipt of an IMMEDIATE ASSIGNMENT REJECT message corresponding to one of its 3 last CHANNEL REQUEST messages, the mobile station, stops sending CHANNEL REQUEST messages, starts timer T3122 with the indicated value, ("wait indication" information element), starts T3126 if it has not already been started, and listens to the downlink CCCH until T3126 expires. During this time, additional IMMEDIATE ASSIGNMENT REJECT messages are ignored, but any immediate assignment corresponding to any other of its 3 last CHANNEL REQUEST messages make the mobile station follow the procedure in section 3.3.1.2. If no such immediate assignment is received, the mobile station returns to CCCH idle mode (listening to its paging channel).

As an option the mobile station may return to CCCH idle mode as soon as it has received responses from the network on all, or in case more than 3 were sent the last 3, of its CHANNEL REQUEST messages.

The mobile station is not allowed to make a new attempt to establish a non emergency 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 mobile station may attempt to enter the dedicated mode for an emergency call in the same cell before T3122 has expired.

The Wait Indication IE (i.e. T3122) relates to the cell from which it was received.

The mobile station in packet idle mode (only applicable to mobile station supporting GPRS) may initiate packet access in the same cell before T3122 has expired, see GSM 04.60 and section 3.5.2.1.3.4.

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

3.3.1.1.4 Assignment completion

The immediate assignment procedure is terminated on the network side when the main signalling link is established. Timer T3101 is stopped and the MM sublayer on the network side is informed that the RR entity has entered the dedicated mode.

On the mobile station side, the procedure is terminated when the establishment of the main signalling link is confirmed. The MM sublayer is informed that the RR entity has entered the dedicated mode.

3.3.1.1.4.1 Early classmark sending

Early classmark sending consists in the mobile station sending as early as possible after access a CLASSMARK CHANGE message and/or UTRAN CLASSMARK CHANGE message to provide the network with additional classmark information.

A mobile station which 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 last reception in the accessed cell of the SYSTEM INFORMATION TYPE 3 message.

A mobile station which implements support for multiple band shall also implement the « Controlled Early Classmark Sending » option.

A mobile station which implements the support of one or more non-GSM Radio Access Technology shall also implement the « Controlled Early Classmark Sending » option.

A mobile station which implements the « multislot capability » option shall also implement the « Controlled Early Classmark Sending » option.

A mobile station that implements some form of treatment of UCS2 alphabet (see TS GSM 03.38) encoded character string (e.g., in short message, or in USSD string) may indicate so in the classmark. (An example is a Mobile Equipment able to display UCS2 encoded character string.) In such a case, it should also implement the « Controlled Early Classmark Sending » option. It is the mobile station responsibility to provide the UCS2 support information in due time. If the network needs this information and the mobile station did not provide it, the network may assume that the Mobile Equipment does not support UCS2.

A mobile station which implements the R-GSM band (see GSM 05.05) shall also implement the « Controlled Early Classmark Sending » option.

A mobile station which implements the extended measurement function shall also implement the « Controlled Early Classmark Sending » option.

A mobile station which implements the «GPRS» option shall also implement the « Controlled Early Classmark Sending » option.

A mobile station which implements the «SoLSA» option shall also implement the « Controlled Early Classmark Sending» option.

A mobile station which implements the «EDGE» option shall also implement the « Controlled Early Classmark Sending » option.

A mobile station which implements the «LCS» option shall also implement the « Controlled Early Classmark Sending» option.

A mobile station which implements the « Controlled Early Classmark Sending » option shall indicate it in the classmark (ES IND bit).

3.3.1.1.4.2 GPRS suspension procedure

This procedure enables the network to suspend GPRS services packet flow in the downlink direction.

The GPRS suspension procedure is initiated by the mobile station by sending a GPRS SUSPENSION REQUEST message. This can be done as early as possible after access but shall be done after sending a CLASSMARK CHANGE message. The RR sublayer of the mobile station shall indicate a RR GPRS suspend condition to the MM sublayer, see section 4.

When a mobile station which is IMSI attached for GPRS services (section 4) enters the dedicated mode, and when the mobile station limitations make it unable to handle both dedicated mode and either packet idle mode or packet transfer mode simultaneously, the mobile station shall perform the GPRS suspension procedure.

3.3.1.1.5 Abnormal cases

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

- If the failure is due to information field mismatch in the contention resolution procedure, see section 3.1.5, and no repetition as described in this paragraph has been performed, the immediate assignment procedure shall be repeated.
- If the failure is due to any other reason or if a repetition triggered by a contention resolution failure has been performed. The mobile station returns to idle mode (RR connection establishment failure), transactions in progress are aborted and cell reselection then may take place.

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

If the Mobile Allocation IE indexes frequencies in more than one frequency band then a RR connection establishment failure has occurred.

If an IMMEDIATE ASSIGNMENT message indicates (a) channel(s) in a different frequency band to which the CHANNEL REQUEST message was sent then, if the frequency band is supported by the mobile station, the mobile station shall access the indicated channel(s) with the same power control level as used for the CHANNEL REQUEST message.

If an IMMEDIATE ASSIGNMENT message indicates a channel in non-supported frequency band then a RR connection establishment failure has occurred.

On the network side, if timer T3101 elapses before the main signalling link is established, the newly allocated channels are released and the request is forgotten. Note that the network has no means to distinguish repeated attempts from initial attempts from a mobile station.

3.3.1.2 Entering the group transmit mode: uplink access procedure

Only applicable for mobile stations supporting « VGCS transmit ».

The purpose of the uplink control procedure is to establish an RR connection on a VGCS channel between a mobile station which is in group receive mode on that channel and the network.

The mobile station enters the group transmit mode when a successful establishment of the RR connection is indicated. The channel mode assumed by the mobile station is the one derived from the channel description.

3.3.1.2.1 Mobile station side

3.3.1.2.1.1 Uplink investigation procedure

The mobile station in group receive mode shall consider the uplink as free if the last message indicating the uplink as being free was received less than 480 ms ago and if no UPLINK BUSY message has been received since the last message indicating the uplink as free.

On receipt of a request from the upper layer to access the uplink and if the uplink is not free, the mobile station starts the timer T3128.

If the uplink is free or becomes free before expiry of timer T3128, then the uplink investigation procedure is terminated, the mobile station shall stop T3128, and start the uplink access procedure.

NOTE: The start of the uplink access procedure is not subject to the access class of the mobile station.

If the uplink is not indicated free before the timer expires, the mobile station shall remain in the group receive mode and indicate a reject of the uplink request to the upper layer.

3.3.1.2.1.2 Uplink access procedure

The mobile station shall send UPLINK ACCESS messages on the voice group call channel with the appropriate establishment cause. The first UPLINK ACCESS message shall be transmitted by the mobile station with a random delay between 0 and 20ms. The UPLINK ACCESS messages shall be repeated after a further period of 100ms plus a random delay between 0 and 20ms.

The UPLINK ACCESS messages contain a random reference which is drawn randomly from a uniform probability distribution. The UPLINK ACCESS messages repetitions shall contain the same random reference as the one contained in the first message.

If an uplink identity code (UIC) of the current cell has been provided by the network in the UPLINK FREE message, the mobile station shall use this UIC IE for the coding of the UPLINK ACCESS messages (see GSM 05.03). If no UIC is provided, the mobile station shall use the BSIC received from the current cell, for instance from the initial synchronization.

Having sent the first UPLINK ACCESS message, the mobile station starts timer T3130. At expiry of timer T3130, the mobile station shall repeat the same procedure if the uplink is free. A maximum of three attempts is allowed and after that a rejection of the uplink request is indicated to the upper layers.

If no VGCS UPLINK GRANT or UPLINK BUSY message is received by the mobile station 480 ms after having sent the first UPLINK ACCESS message, the mobile station shall stop sending UPLINK ACCESS messages and wait in order to receive a VGCS UPLINK GRANT or UPLINK BUSY message.

On receipt of an VGCS UPLINK GRANT message corresponding to one of its UPLINK ACCESS messages, the mobile station stops T3130, stops sending UPLINK ACCESS messages, and establishes the main signalling link with an SABM containing the TALKER INDICATION message in the information field. Early classmark sending shall be performed if applicable. If a UA is received containing the message sent, the mobile station enters the group transmit mode and indicates the successful seizure of the uplink to the upper layer. If a UA is received with a message different from the message sent, the mobile station shall remain in the group receive mode and indicate the rejection of the uplink request to the upper layers.

When receiving an UPLINK BUSY message or a VGCS UPLINK GRANT message aimed to another mobile station (i.e. not corresponding to one of its UPLINK ACCESS messages), the mobile station stops T3130 and stops sending UPLINK ACCESS messages. The mobile shall remain in the group receive mode and shall indicate a rejection of the uplink request to the upper layers.

3.3.1.2.2 Network side

On receipt of an UPLINK ACCESS message the network shall perform, if necessary, contention resolution and grant the uplink to one mobile station by sending a VGCS UPLINK GRANT message to the mobile station in unacknowledged mode on the main signalling link. Furthermore, the network shall provide UPLINK BUSY messages on the main signalling link in all cells of the group call area. After having sent the first message, the network starts T3115. If the timer expires before the reception of a correctly decoded frame from the MS, the network repeats the VGCS UPLINK GRANT message to the mobile station, reset and restarts timer T3115. If the VGCS UPLINK GRANT message has been repeated Ny2 times without a correctly decoded frame being received from the MS, the network shall stop sending VGCS UPLINK GRANT messages and provide an UPLINK FREE message on the main signalling channel and wait for a new UPLINK ACCESS message. The correct decoding of a frame means that the decoding algorithm and the error detection tests, if any, indicate no error.

After the data link layer is established, the RR entity of the network shall analyse the TALKER INDICATION message received from the mobile station, adapt the RR procedures to the new classmark if necessary and provide the mobile subscriber identity to the upper layer.

3.3.1.2.3 Abnormal cases

If a lower link failure has occurred or an indication of the release of the data link layer was provided by the lower layer and no RR release request was previously received from the upper layer, the network shall provide an UPLINK FREE message on the main signalling channel and wait for a new UPLINK ACCESS message.

3.3.1.3 Dedicated mode and GPRS

A mobile station whose Channel Request message contained a packet access establishment cause may receive an Immediate Assignment message to a Channel which is to be used in dedicated mode. A mobile station supporting the <<GPRS>> option shall obey this command. When establishing the main signalling link the information field in the SABM shall contain an RR INITIALISATION REQUEST message.

This message contains:

TLLI;

MS Classmark type 2;

Ciphering Key Sequence Number;

MAC Mode and Channel Coding Requested;

Channel Request Description.

Following a successful contention resolution procedure, the mobile station shall implement the Early Classmark Sending option. Then, the upper layers in the mobile station shall wait for commands from the network, eg for the allocation of a GPRS resource.

While on the dedicated channel the mobile station shall obey the RR management procedures of 04.18, in particular the mobile station shall send measurement reports on the SACCH.

3.3.2 Paging procedure for RR connection establishment

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

3.3.2.1 Paging initiation by the network

The network initiates the paging procedure to trigger RR connection establishment by broadcasting a paging request message on the appropriate paging subchannel on CCCH or PCCCH, and starts timer T3113. The paging subchannels on CCCH and PCCCH are specified in GSM 05.02 and GSM 03.13.

The network may also send paging related information on PACCH to a mobile station in packet transfer mode, see section 3.3.2.1.3.

The network may also broadcast paging related information on any voice broadcast or voice group call channel downlink.

3.3.2.1.1 Paging initiation using paging subchannel on CCCH

Paging initiation using the paging subchannel on CCCH is used when sending paging information to a mobile station in idle mode. It is also used when sending paging information to a mobile station in packet idle mode, if PCCCH is not present in the cell.

NOTE 1: There are 3 types of paging messages which may be used on CCCH:

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

In a PAGING REQUEST message on CCCH to trigger RR connection establishment, the mobile station shall be identified by the TMSI (non-GPRS TMSI) or its IMSI. If the mobile station is identified by the TMSI, it shall proceed as specified in section 3.3.2.2.

If the mobile station in packet idle mode is identified by its IMSI, it shall parse the message for a corresponding *Packet Page Indication* field:

- if the *Packet Page Indication* field indicates a paging procedure for RR connection establishment, or the field is not present in the message, the mobile station shall proceed as specified in section 3.3.2.2;
- if the *Packet Page Indication* field indicates a packet paging procedure, the mobile station shall proceed as specified in section 3.5.1.2.

A PAGING REQUEST message on CCCH includes for each mobile station that is paged to trigger RR connection establishment an indication which defines how mobiles of different capabilities shall code the establishment cause field in the CHANNEL REQUEST message. The information received in the CHANNEL REQUEST can be used by the network to assign a suitable channel.

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

A PAGING REQUEST TYPE 1 message on CCCH may have additionally a notification message coded in the P1 rest octets information element.

A PAGING REQUEST message on CCCH may also include priority levels related to the mobile station identifications. A mobile station in group receive mode supporting eMLPP shall take into account this information to decide whether to respond to this PAGING REQUEST and, if the call is answered, the mobile station shall store the priority level for the duration of the call. A mobile station not supporting eMLPP shall ignore this information element when received in a PAGING REQUEST message.

NOTE 2: A mobile station not supporting VGCS or VBS may ignore this information element when received in a PAGING REQUEST message, since the priority level is also provided in the SETUP message.

If VGCS or VBS is supported by the network and the network supports reduced NCH monitoring, messages sent on the PCH may also include an indication of the change of the information sent on the NCH (see section 3.3.3.2).

The choice of the message type depends on the number of mobile stations to be paged and of the types of identities that are used. The maximum number of paged mobile stations per message is 4 when using only TMSIs for identification of the mobile stations.

The mobile station in idle mode is required to receive and analyse the paging messages and immediate assignment messages sent on the paging subchannel corresponding to its paging subgroup, as specified in GSM 05.02.

NOTE 3: The possible immediate assignment messages are: the IMMEDIATE ASSIGNMENT, the IMMEDIATE ASSIGNMENT EXTENDED and the IMMEDIATE ASSIGNMENT REJECT messages.

The paging and immediate assignment type messages contain a page mode information element. This information element controls possible additional requirements on mobile stations belonging to the paging subgroup corresponding to the paging subchannel the message was sent on. This implies that a given mobile station shall take into account the page mode information element of any message sent on its own paging subchannel whatever the nature of this message (paging messages or immediate assignment messages). This further implies that the mobile station does not take into account page mode information element of messages sent on paging subchannels other than its own paging subchannel. The requirements yielded by the page mode information element are as follows:

a) normal paging: no additional requirements;

b) extended paging: the mobile station is required in addition to receive and analyse the next but one message on the PCH;

c) paging reorganization: The mobile station shall receive all messages on the CCCH regardless of the BS-AG-BLKS-RES setting. It is required to receive all BCCH messages. When the mobile station receives the next message to its (possibly new) paging subgroup the subsequent action is defined in the page mode information element in that message;

d) same as before: No change of page mode from the previous page mode.

Note that a mobile station takes into account the page mode information only in messages of its own paging subchannel whatever the currently applied requirements (a, b, c or d).

When the mobile station selects a new PCH, the initial page mode in the mobile station shall be set to paging reorganization. If a message in the paging subchannel is not received correctly, the message is ignored and the previous page mode is assumed.

3.3.2.1.2 Paging initiation using paging subchannel on PCCCH

Paging initiation using a paging subchannel on PCCCH, see GSM 04.60, applies when sending paging information to a mobile station in packet idle mode and PCCCH is provided in the cell.

The paging initiation procedure and the paging request message used on PCCCH are specified in GSM 04.60.

3.3.2.1.3 Paging initiation using PACCH

Paging initiation using PACCH, see GSM 04.60, applies to a mobile station in packet transfer mode.

The paging initiation procedure and the message used to carry paging related information on PACCH are specified in GSM 04.60.

3.3.2.2 Paging response

Upon receipt of a paging request message, or other message containing information to trigger the establishment of a RR connection, and if access to the network is allowed, the addressed mobile station shall, when camped on a cell as specified in TS 23.022, initiate the immediate assignment procedure as specified in 3.3.1. The establishment of the main signalling link is then initiated by use of an SABM with information field containing the PAGING RESPONSE message (see section 3.1.5). The MM sublayer in the mobile station is informed that the RR entity has entered the dedicated mode.

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

3.3.2.3 Abnormal cases

Lower layer failure occurring 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.

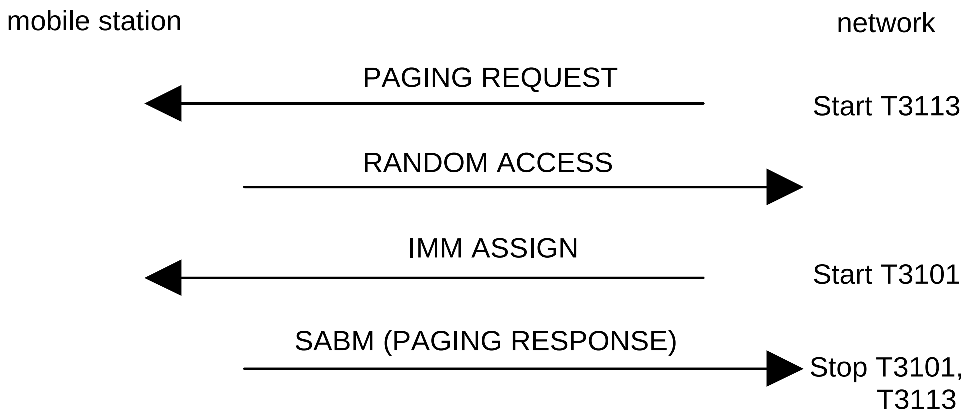


Figure 3.2/GSM 04.18: Paging sequence

3.3.3 Notification procedure

The support of notification procedure is mandatory for mobile stations supporting « VGCS receive » and/or « VBS receive ».

The network informs the mobile station of starting or on-going voice broadcast calls and voice group calls with the notification procedure.

In cases where the mobile station has initiated a VGCS call, if the channel mode modify procedure is applied to turn the dedicated channel into a VGCS channel and ciphering may be applied for that call, in this case the network should suspend transmission of notification messages until ciphering with the group cipher key has started on the dedicated channel.

3.3.3.1 Notification of a call

The mobile station may receive a notification that a voice broadcast call or a voice group call is established. Notifications may be sent on the NCH, on the PCH, or on the FACCH when in dedicated mode or group receive mode. The presence of an NCH is indicated on the PCH in the Pi Rest Octets IE. A notification contains the group call reference and possibly other related information. This notification may be contained:

- in a NOTIFICATION/NCH message sent on the NCH to notify mobile stations of VBS or VGCS calls in the current cell, possibly together with a description of the related VBS or VGCS channel;

- in a NOTIFICATION/FACCH message sent in unacknowledged mode on the main DCCH to notify mobile stations in dedicated mode or on the main DCCH of a VGCS or VBS channel, of other VBS or VGCS calls in the current cell, possibly together with a description of the related VBS or VGCS channel.

- in the rest octets part of a PAGING REQUEST TYPE 1 message.

A mobile station supporting neither VGCS listening nor VBS listening may ignore the notifications sent on the NCH or PCH. It may also ignore the notifications sent on the main DCCH except that a RR-STATUS message shall be sent to the network with cause #97, "message not existent or not implemented".

Upon receipt of every notification message a mobile station supporting VGCS listening or VBS listening shall give an indication containing the notified group call reference(s) to upper layers in the mobile station which may then decide:

- not to react on the notification, or

- join the voice broadcast call or the voice group call, if needed after having stopped on going activities.

3.3.3.2 Joining a VGCS or VBS call

In order to join a VGCS or a VBS call the following procedures apply.

In this subclause, the term **notification** refers to the notification which has triggered the decision to join a VGCS or VBS call.

If the notification on the main DCCH concerns a VBS or VGCS in the current cell and does not contain a description of the VGCS or VBS channel, the mobile station shall read the corresponding notification on the NCH.

If the description of the VGCS or VBS channel was included in the notification for the current cell, RR connection establishment shall not be initiated, instead, the mobile station shall enter the group receive mode.

If no description for the VGCS or VBS channel is included in the notification, the mobile station shall establish a RR connection in dedicated mode in order to initiate the notification response procedure.

3.3.3.3 Reduced NCH monitoring mechanism

This section applies to mobile stations which read the NCH in idle mode in order to receive the notification messages for the voice broadcast call and the voice group call, which read the PCH to receive pagings and which aim at reducing the reception load.

A reduced NCH monitoring mechanism may be used on the NCH. When the mobile station in idle mode enters a cell and deduces from the BCCH that an NCH is present, it shall read the NCH until it has received at least two messages on the NCH indicating NLN, with the two last received NLN being identical. Then it may stop reading the NCH until it receives on the PCH an NLN(PCH) different from the last previously received NLN or on the SACCH an NLN(SACCH) different from the last previously received NLN..

A mobile is able to determine the reduced NCH monitoring is active in the network if it receives an NLN in any message. Once received, the mobile shall assume that NCH monitoring is active for a certain period of time which is not specified.

For this, parameters are provided:

- **NLN:** Notification List Number;

  The NLN is a modulo 4 counter which is changed every time a notification for a new VGCS or VBS call is started on the NCH. If the reduced NCH monitoring is indicated, the NLN provides information on new notifications provided on the NCH.

- NLN status :
  The NLN status is a single bit field which indicates the status of the content of the NOTIFICATION/NCH messages for a particular NLN value. A change of the NLN status field indicates a change of information on the NCH which is not related to new calls (e.g. There may have been a release of a previous notified call or change of priority, etc ...).

If the reduced NCH monitoring is active in the network, the network has to provide both NLN and NLN status parameters.

These parameters may be provided on the NCH, PCH and SACCH:

NLN(NCH): Notification List Number (received on the NCH).

NLN(PCH): Notification List Number (received on the PCH).

NLN(SACCH): Notification List Number (received on the SACCH).

NLN status(PCH): NLN status (received on the PCH).

NLN status(SACCH): NLN status (received on the SACCH).

A mobile station supporting neither VGCS listening nor VBS listening shall ignore the NLN(NCH),NLN(PCH), NLN(SACCH) and NLN status fields.

If a mobile station (supporting VGCS listening and/or VBS listening) receives a NLN parameters on the NLN(PCH) or NLN(SACCH) field different from the last received NLN value it shall read the NCH until it has received at least two messages on the NCH indicating NLN with the two last received NLN being identical.

If a message in the paging subchannel is not received correctly, or if a paging message does not contain the information on the notification status, the mobile station shall read the NCH until it has received at least two messages on the NCH indicating NLN, with the two last received NLN being identical.

3.3.3.4 Notification response procedure

In order to initiate the notification response procedure, if access to the network is allowed, the mobile station shall, when camped on a cell as specified in GSM 03.22, initiate the immediate assignment procedure as specified in 3.3.1. The establishment of the main signalling link is then initiated by use of an SABM with information field containing the NOTIFICATION RESPONSE message (see section 3.1.5). The MM sublayer in the mobile station is informed that the RR entity has entered the dedicated mode.

Upon receipt of the NOTIFICATION RESPONSE message the network stops timer T3101. The MM sublayer in the network may be informed that an RR connection exists; in this case, the MM sublayer may initiate MM common procedures.

The network may use the dedicated connection to order the mobile station to enter the group receive mode.

3.4 Procedures in dedicated mode and in group transmit mode

Procedures described in this section apply to the dedicated mode and/or the group transmit mode.

Those procedures which are specific for group transmit mode or refer to transitions to the group transmit mode are only applicable for mobile stations supporting VGCS talking.

Direct transition between dedicated mode and group transmit mode is possible in both directions by use of the following procedures:

- Channel assignment procedure;
- Handover procedure;
- Channel mode modify procedure.

3.4.1 SACCH procedures

3.4.1.1 General

In dedicated mode and group transmit mode, the SACCH is used in signalling layer at least for measurement results transmission from the mobile station.

The SACCH has the particularity that continuous transmission must occur in both directions at least on the channel carrying the main signalling link. For that purpose, in the mobile station to network direction, measurement result messages are sent at each possible occasion when nothing else has to be sent (see section 3.4.1.2). Similarly, SYSTEM INFORMATION TYPE 5, 6 and optionally 5bis and 5ter messages are sent in the network to mobile station direction in UI frames when nothing else has to be sent.

The network may in adddition send MEASUREMENT INFORMATION messages on the SACCH, which may order the MS to use the enhanced measurement report.

In a multislot configuration the SYSTEM INFORMATION TYPE 5, 6 and optionally 5bis, 5ter and MEASUREMENT INFORMATION messages shall be sent on the SACCH associated with the channel carrying the main signalling link.

In a multislot configuration the mobile station shall ignore all messages received on the SACCH(s) that are not associated with the channel carrying the main signalling link.

On a VGCS channel, the network may send additional or alternative system information messages for both mobile stations in group transmit mode and those in group receive mode (see section 3.4.15.2.1).

A mobile station with extended measurement capabilities which receives EXTENDED MEASUREMENT ORDER (EMO) messages on the SACCH, shall perform and report extended measurements, see section 3.4.1.3.

The SYSTEM INFORMATION TYPE 5bis message shall be sent if and only if the EXT IND bit in the Neighbour Cell Description information element in both the SYSTEM INFORMATION TYPE 5 and TYPE 5bis messages indicates that each information element only carries part of the BA.

A GSM 900 mobile station which only supports the primary GSM band P-GSM 900 (cf. GSM 05.05) may consider the EXT-IND bit in the Neighbour Cells Description IE in the SYSTEM INFORMATION TYPE 5 message bit as a spare bit, assume that the information element carries the complete BA, and ignore any SYSTEM INFORMATION TYPE 5bis messages.

NOTE: The network should take into account limitations of certain mobile stations to understand SYSTEM INFORMATION TYPE 5ter and TYPE 5bis messages, the EXT-IND bit in the Neighbour Cells Description, and formats used in the Neighbour Cells Description information element and Cell Channel Description information element used in SYSTEM INFORMATION messages, see section 10.5.2.1b, and section 10.5.2.22.

As specified in GSM 05.08, problems occurring in the reception of SACCH frames are interpreted as a loss of communication means and appropriate procedures are then triggered as specified in section 3.4.13.

3.4.1.2 Measurement report and Enhanced Measurement Report

When in dedicated mode or group transmit mode, the mobile station regularly sends either MEASUREMENT REPORT or ENHANCED MEASUREMENT REPORT messages to the network. These messages contain measurement results about reception characteristics from the current cell and from neighbour cells. The BA (list) which is the basis for the measurements is derived from information received on the BCCH in System Information 2 and optionally 2bis and/or 2ter and on the SACCH in System Information 5 and optionally 5bis and/or 5ter. The MEASUREMENT INFORMATION message may add information for the GSM Neighbour List and provide 3G Neighbour list. The Mobile Station shall use ENHANCED MEASUREMENT REPORT messages instead of MEASUREMENT REPORT messages if that is indicated by the parameter Report_Type and if at least one BSIC is allocated to each BA (list) frequency.

In addition, the MS which implements ECSD options shall use fast inband procedure for downlink quality reporting if the use of such procedure has been ordered by the BSC.

When the information is received in more than one message the mobile station shall only combine information relating to the BA (list) from messages received on the same channel and indicating the same value of the BCCH allocation sequence number without any message indicating a different value of the BCCH allocation sequence number received in between. When the information is received in more than one message the mobile station shall only combine information relating to 3G Radio Access Technology from messages indicating the same value of the 3G allocation sequence number without any message indicating a different value of the 3G allocation sequence number. If neighbouring cell information for the serving cell is not available, the mobile station indicates this in the MEASUREMENT REPORT message. These measurement results are obtained as specified in GSM 05.08.

These messages are sent on the slow ACCH, in unacknowledged mode.

If no other message is scheduled on the SACCH at the instant when a layer 2 frame is due to be sent, then the mobile station shall send a MEASUREMENT REPORT message or an ENHANCED MEASUREMENT REPORT or an EXTENDED MEASUREMENT REPORT message (see section 3.4.1.3) in that frame. The interval between two successive layer 2 frames containing MEASUREMENT REPORT or ENHANCED MEASUREMENT REPORT messages shall not exceed one layer 2 frame.

3.4.1.3 Extended measurement report $(MAFA)$

Only applicable to mobile stations which support extended measurement.

When in dedicated mode or group transmit mode, a mobile station may receive an EXTENDED MEASUREMENT ORDER (EMO) message, from the network. The mobile station shall then, as defined in GSM 05.08, for one reporting period perform measurements on the frequencies specified by this EMO message. The mobile station shall thereafter send an EXTENDED MEASUREMENT REPORT message. This message contains the measurement results as defined in GSM 05.08.

If the mobile station has not started to send its EXTENDED MEASUREMENT REPORT within 10 seconds after the reception of the EMO message, no EXTENDED MEASUREMENT REPORT shall be sent. The mobile station shall after a successful channel change abort any pending measurements or reporting related to an EMO message received on the old channel.

If a mobile station receives an EMO message indicating the same value of the sequence code as an EMO message received earlier on the same channel without having received any EMO message indicating a different value of the sequence code in between, that EMO message shall be ignored. If the mobile station, before the reporting related to an EMO message has started, receives a new EMO message with a different value of the sequence code, any pending measurements or reporting related to the earlier EMO message shall be aborted and the new message treated.

The EMO message and the EXTENDED MEASUREMENT REPORT message are sent on the SACCH, in unacknowledged mode.

3.4.2 Transfer of messages and link layer service provision

When in dedicated mode or in group transmit mode, upper layers can send messages in multiframe or unacknowledged mode on SAPI 0.

Moreover, but only when in dedicated mode, upper layers have access to the full link layer services for SAPIs other than 0, with the exception of the error indication and local end release that are directly treated by the RR sublayer, as specified in particular places of section 3.

3.4.3 Channel assignment procedure

In dedicated mode or in group transmit mode, 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 an internal handover. This change may be performed through the dedicated channel assignment procedure.

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

This procedure shall not be used for changing between dependent configurations, i.e. those sharing Radio Resource for the main signalling link. An example of dependent channels is a full rate channel and one of the corresponding half rate channels. In multislot operation however, it is allowed to use the same timeslots before and after the assignment, as long as the main signalling link has been changed. The only procedures provided for changing between dependent configurations for the main signalling link are the additional assignment and the partial release procedures.

The channel assignment procedure happens only in dedicated mode and in group transmit mode. This procedure cannot be used in the idle mode; in this case the immediate assignment procedure is used.

The channel assignment procedure includes:

- the suspension of normal operation except for RR management (layer 3);
- the release of the main signalling link, and of the other data links as defined in section 3.1.4, and the disconnection of TCHs if any;
- the deactivation of previously assigned channels (layer 1);
- the activation of the new channels and their connection if applicable;
- The triggering of the establishment of the data link connections for SAPI = 0.

The channel assignment procedure is always initiated by the network.

3.4.3.1 Channel assignment initiation

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

NOTE: The network should take into account limitations of certain mobile stations to understand formats used in the Frequency List IE and Cell Channel Description IE used in the ASSIGNMENT COMMAND message, see section 10.5.2.13 and section 10.5.2.1b.

When sending this message on the network side, and when receiving it on the mobile station 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. These RR messages can be deduced from sections 3.4.3 and 8.8 Radio Resource management.

Upon receipt of the ASSIGNMENT COMMAND message, the mobile station initiates a local end release of link layer connections, 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 message contains the description of the new configuration, including for the multislot configuration and the TCH/H + TCH/H + ACCHs configuration, the exact ACCHs to be used and a power command. The power level defined in this power command shall be used by the mobile station for the initial power on the new channel(s). It shall not affect the power used on the old channel(s). The message may also contain definitions of the channel mode to be applied for one or several channel sets. If a previously undefined channel set is defined by the ASSIGNMENT COMMAND message, a definition of the channel mode for the new channel set shall be included in the message.

If the channel mode to be applied corresponds to a multi-rate speech codec, the ASSIGNMENT COMMAND message may contain the MultiRate Configuration IE, which defines the set of codec modes and related information to use on the new channel. For an initial assignment of a multi-rate speech codec, the MS shall expect in the ASSIGNMENT COMMAND the MultiRate Configuration IE. After reception of the ASSIGNMENT COMMAND, the mobile station shall use the Initial Codec Mode specified in the MultiRate Configuration IE, if present, or apply the implicit rule defined in GSM 05.09.

An ASSIGNMENT COMMAND message may indicate a frequency change in progress, with a starting time and possibly alternative channel descriptions.

In the case of the reception of an ASSIGNMENT COMMAND message which contains only the description of a channel to be used after the starting time, the mobile station shall wait up to the starting time before accessing the channel. If the starting time has already elapsed, the mobile shall access the channel as an immediate reaction to the reception of the message (see GSM 05.10 for the timing constraints).

If the message contains both the description of a channel to be used after the indicated time and of a channel to be used before, the mobile station accesses a channel as an immediate reaction to the reception of the message. If the moment the mobile station is ready to access is before the indicated time, the mobile station accesses the channels described for before the starting time. The mobile station then changes to the channel described for after the starting time at the indicated time. New parameters can be frequency list, MAIO and HSN. Other parameters describing the allocated channels must be identical to the parameters described for before the starting time. If the moment the mobile station is ready to access is after the starting time, the mobile station accesses the channel described for after the starting time.

If frequency hopping is applied, the cell allocation if present in the message is used to decode the mobile allocation. If the cell allocation is not included, the mobile station uses its current cell allocation, the current CA is the last CA received on the BCCH. Afterward, the current CA may be changed by some messages sent on the main signalling link containing a CA (the possible messages are: ASSIGNMENT COMMAND, HANDOVER COMMAND and FREQUENCY REDEFINITION). Note that there are cases in which the current CA is undefined, see section 3.4.3.3.

The ASSIGNMENT COMMAND message may contain a cipher mode setting IE. In that case, this ciphering mode has to be applied on the new channel. If no such information is present, the ciphering mode is the same as on the previous channel. In either case the ciphering key shall not be changed. The ASSIGNMENT COMMAND message shall 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 message is received it shall be regarded as erroneous, an ASSIGNMENT FAILURE with cause "Protocol error unspecified" message shall be returned immediately, and no further action taken.

In a voice group call, the ASSIGNMENT COMMAND message may contain a VGCS target mode information element defining which RR mode is to be used on the new channel (i.e. dedicated mode or group transmit mode). If this information element is not present, the mode shall be assumed to be the same as on the previous channel. The VGCS target mode information element shall also indicate the group cipher key number for the group cipher key to be used on the new channel or if the new channel is non ciphered. If the information element is not present, the ciphering mode and group cipher key shall be the same as on the previous channel. Mobile stations not supporting VGCS talking shall ignore the ASSIGNMENT COMMAND message if the VGCS target mode information element is included in the message and shall send an RR STATUS message to the network with cause #96. If a VGCS target mode information element and a cipher mode setting information element is included in the same message, then a mobile station supporting VGCS talking mobile shall regard the ASSIGNMENT COMMAND message as erroneous, an ASSIGNMENT FAILURE message with cause "Protocol error unspecified" shall be returned immediately, and no further action taken.

3.4.3.2 Assignment completion

After the main signalling link is successfully established, the mobile station returns an ASSIGNMENT COMPLETE message, specifying cause "normal event", to the network on the main DCCH.

The sending of this message on the mobile station side and its receipt on the network side allow the resumption of the transmission of signalling layer messages other than those belonging to RR management.

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

3.4.3.3 Abnormal cases

If the mobile station has no current CA and if it needs a CA to analyse the ASSIGNMENT COMMAND message, it stays on the current channel(s) and sends an ASSIGNMENT FAILURE message with cause "no cell allocation available".

If the ASSIGNMENT COMMAND message instructs the mobile station to use a Channel Description or Mode that it does not support, or if the Channel Mode to use is not defined for all channel sets, then the mobile station shall return an ASSIGNMENT FAILURE message with cause "channel mode unacceptable", and the mobile station shall remain on the current channel(s) and uses the old Channel Description or Channel Mode(s).

If the mobile station receives an ASSIGNMENT COMMAND message containing an inconsistent MultiRate Configuration IE, then the mobile station shall return an ASSIGNMENT FAILURE message with cause "channel mode unacceptable", and the mobile station shall remain on the current channel(s) and uses the old Channel Description or Channel Mode(s).

If during the initial assignment of the multirate speech the mobile station receives an ASSIGNMENT COMMAND message and the MultiRate Configuration IE is not present, then the mobile station shall return an ASSIGNMENT FAILURE message with cause "channel mode unacceptable", and the mobile station shall remain on the current channel(s) and uses the old Channel Description or Channel Mode(s).

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

If the mobile station receives an ASSIGNMENT COMMAND message with a Frequency List IE indicating frequencies that are not all in one band, then the mobile station shall stay on the current channel(s) and send an ASSIGNMENT FAILURE message with cause "frequency not implemented". If the mobile station receives an ASSIGNMENT COMMAND message with a Mobile Allocation IE indexing frequencies that are not all in one band, then the mobile station shall stay on the current channel(s) and send an ASSIGNMENT FAILURE message with cause "frequency not implemented".

NOTE: An ASSIGNMENT COMMAND message sent to a multi band mobile station shall not be considered invalid because it indicates frequencies that are all in a different frequency band to that of the current channel.

On the mobile station side, if a lower layer failure happens on the new channel before the ASSIGNMENT COMPLETE message has been sent, the mobile station deactivates the new channels, reactivates the old channels, reconnects the TCHs if any and triggers the establishment of the main signalling link. It then sends a ASSIGNMENT FAILURE message, 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) when returning on the old channel are those applied before the procedure.

When receiving the ASSIGNMENT FAILURE message, the network stops T3107.

If a lower layer failure happens while attempting to connect back to the old channels, the radio link failure procedure is applied (see section 3.4.13.2 for dedicated mode and 3.4.13.5 for group transmit mode).

On the network side, if timer T3107 elapses before either the ASSIGNMENT COMPLETE message has been received on the new channels or an ASSIGNMENT FAILURE message is received on the old channels, the old channels and the new channels are released if they both were dedicated channels and, unless the mobile station has re-established the call, all contexts related to the connections with that mobile station are cleared. If one of the channels was a VGCS channel, it shall be maintained and the uplink shall be set free. If both channels were VGCS channels, the network shall maintain one of the channels and the uplink shall be set free.

On the network side, lower layer failure occurring on the old channels after the sending of the ASSIGNMENT COMMAND message are ignored. Lower layer failures occurring after the receipt of the SABM Frame on the new main signalling link are treated following the general rules (cf. section 3.5.2).

3.4.4 Handover procedure

In dedicated mode or group transmit mode, an intercell or intracell change of channel(s) can be requested by the network RR sublayer. This change may be performed through the handover procedure

NOTE: The decision to do a handover and the choice of the new cell is out of the scope of this technical specification.

The purpose of the handover procedure is to completely modify the channels allocated to the mobile station e.g. when the cell is changed. A change in the channel configuration nature is possible. This procedure is used only while in dedicated mode or group transmit mode.

The handover procedure is also used by Location Services as described in TS 23.071.

The handover procedure shall not be used for changing between dependent configurations (see section 3.4.3). An exception to this is when the handover procedure is used by Location Services. In this case the mobile may be commanded to attempt a handover to the same channel as currently assigned to the MS. The MS shall attempt to perform a handover to this unchanged channel, which includes the transmission of access bursts.

The handover procedure includes:

- The suspension of normal operation except for RR management (layer 3).

- The disconnection of the main signalling link, and of the other links via local end release (layer 2), and the disconnection of the TCH(s) if any.

- The disconnection and the deactivation of previously assigned channels and their release (layer 1).

- The activation of the new channels, and their connection if applicable.

- The triggering of the establishment of data link connection for SAPI = 0 on the new channels.

The handover procedure is always initiated by the network.

3.4.4.1 Handover initiation

The network initiates the handover procedure by sending a HANDOVER COMMAND message to the mobile station on the main DCCH. It then starts timer T3103.

NOTE: The network should take into account limitations of certain mobile stations to understand formats used in the Frequency List IE, Frequency Short List IE, and Cell Channel Description IE used in the HANDOVER COMMAND message, see section 10.5.2.13, section 10.5.2.14, and section 10.5.2.1b.

When sending this message on the network side, and when receiving it on the mobile station side, all transmission of signalling layer messages except for those RR messages needed for this procedure and for abnormal cases, is suspended until resuming is indicated. These RR messages can be deduced from section 3.4.3 and 8.5.1 "Radio Resource management".

Upon receipt of the HANDOVER COMMAND message, the mobile station initiates, as described in section 3.1.4, the release of link layer connections, 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 data links).

The HANDOVER COMMAND message contains:

- The characteristics of the new channels, including for the multislot configuration and the TCH/H + TCH/H + ACCHs configuration the exact ACCHs to be used. The message may also contain definitions of the channel mode to be applied for one or several channel sets. If a previously undefined channel set is defined by the HANDOVER COMMAND message, a definition of the channel mode for the new channel set shall be included in the message.

- The characteristics of the new cell that are necessary to successfully communicate (e.g. frequency list in the case of slow frequency hopping), including the data that allows the mobile station to use the pre-knowledge about synchronization it acquires by the measurement process (i.e. BSIC + BCCH frequency).

- A power command (cf. GSM 05.08). The power level defined in this power command shall be used by the mobile station for the initial power on the new channel(s). It shall not affect the power used on the old channel(s).

- An indication of the physical channel establishment procedure to be used.

- A handover reference, used as specified in the following section. The choice of the handover reference by the network is out of the scope of this specification and left to the manufacturers.

- Optionally a timing advance to be used on the new cell.

- Optionally a cipher mode setting. In that case, this ciphering mode has to be applied on the new channel. If no such information is present, the ciphering mode is the same as on the previous channel. In either case the ciphering key shall not be changed. The HANDOVER COMMAND message shall not contain a cipher mode setting IE that indicates "start ciphering" unless a CIPHERING MODE COMMAND message has been transmitted previously in this instance of the dedicated mode: if such a HANDOVER COMMAND message is received it shall be regarded as erroneous, a HANDOVER FAILURE message with cause "Protocol error unspecified" shall be returned immediately, and no further action taken.

- Optionally, in a voice group call, a VGCS target mode information element defining which RR mode is to be used on the new channel (i.e. dedicated mode or group transmit mode). If this information element is not present, the mode shall be assumed to be the same as on the previous channel. The VGCS target mode information element shall also indicate the group cipher key number for the group cipher key to be used on the new channel or if the new channel is non ciphered. If the information element is not present, the ciphering mode and ciphering key shall be the same as on the previous channel. Mobile stations not supporting VGCS talking shall ignore the HANDOVER COMMAND message if the VGCS target mode information element is included in the message and shall send an RR STATUS message to the network with cause #96. If a VGCS target mode information element and a cipher mode setting information element is included in the same message, then a mobile station supporting VGCS talking shall regard the HANDOVER COMMAND message as erroneous, an HANDOVER FAILURE message with cause "Protocol error unspecified" shall be returned immediately, and no further action taken.

- Optionally, when the channel mode indicates that a multi-rate speech codec must be applied, the MultiRateconfiguration to be used in the new cell. The MultiRate Configuration IE defines the set of codec mode and related information to use after the handover. When accessing the new channel, the mobile station shall use for the Initial Codec Mode the mode specified in the MultiRate Configuration IE, if present, or apply by default the implicit rule defined in GSM 05.09.

In addition, a HANDOVER COMMAND message may indicate a frequency change in progress, with a starting time and possibly alternative channel descriptions.

In the case of the reception of a HANDOVER COMMAND message which contains only the description of a channel to be used after the starting time, the mobile station shall wait up to the starting time before accessing the channel. If the starting time has already elapsed, the mobile shall access the channel as an immediate reaction to the reception of the message (see GSM 05.10 for the timing constraints).

If the message contains both the description of a channel to be used after the indicated time and of a channel to be used before, the mobile station accesses a channel as an immediate reaction to the reception of the message. If the moment the mobile station is ready to access is before the indicated time, the mobile station accesses the channels described for before the starting time. The mobile station then changes to the channel described for after the starting time at the indicated time. New parameters can be frequency list, MAIO and HSN. Other parameters describing the allocated channels must be identical to the parameters described for before the starting time. If the moment the mobile station is ready to access is after the starting time, the mobile station accesses the channel described for after the starting time.

If the channel mode indicates that a multi-rate speech codec must be applied, and the MultiRateConfiguration IE is not included in the HANDOVER COMMAND message, then the mobile station shall assume that the MultiRateconfiguration has not changed. For the Initial Codec Mode, the mobile station shall use the previously received Initial Codec Mode, if any, or apply by default the implicit rule defined in GSM 05.09.

3.4.4.2 Physical channel establishment

Four procedures are defined. The support of three of them is mandatory in the mobile station. The pseudo-synchronization case is optional in the mobile station. A pseudo-synchronized handover can be commanded only to a mobile station that can support it, as indicated in the classmark.

3.4.4.2.1 Finely synchronized cell case

If the mobile station knows that the timing advance with the new cell is not out of range, i.e. smaller than or equal to the maximum timing advance that can be coded as specified in GSM 04.04, or if the new cell does accept out of range timing advance as indicated in the HANDOVER COMMAND message, the mobile station proceeds as follows.

After having switched to the assigned channels, the mobile station sends four times the HANDOVER ACCESS message in four successive layer 1 frames on the main DCCH. This message is sent in an access burst. Its content is reduced to the handover reference information element. The transmission of these four messages is optional if so indicated by the network in the HANDOVER COMMAND message.

Before completion of the 4 access bursts on the DCCH, additional access bursts may also be sent on the SACCH.

In those cells that support extended TA values if TA value in new cell is greater than 63 and the HANDOVER COMMAND message indicates that the transmission of four HANDOVER ACCESS messages is optional the MS shall not transmit these four messages. MS shall not send additional bursts on the SACCH.

It then activates the channels in sending and receiving mode and connects the channels if need be.

If applicable, ciphering is immediately started. The access bursts are not ciphered.

3.4.4.2.2 Non synchronized cell case

After having switched to the assigned channels, the mobile station starts repeating the HANDOVER ACCESS message in successive layer 1 frames on the main DCCH and optionally on the SACCH. This message is sent in an access burst. Its content is reduced to the handover reference information element. The mobile station starts timer T3124 at the start point of the timeslot in which the HANDOVER ACCESS message is sent the first time on the main DCCH.

The mobile station then activates the channels in receiving mode and connects the channels if need be (only for reception).

If applicable, deciphering is then immediately started . The access bursts are not ciphered.

When the network has the RF characteristics that are necessary, it sends in unacknowledged mode a PHYSICAL INFORMATION message to the mobile station on the main DCCH. If applicable, ciphering and deciphering is immediately started (i.e., before even the reception of a correct access burst), and the message is sent enciphered.

The PHYSICAL INFORMATION message contains various physical layer related information, allowing a proper transmission by the mobile station.

When sending the PHYSICAL INFORMATION message, the network starts timer T3105. If this timer times out before the reception of a correctly decoded layer 2 frame in format A or B (see GSM 04.06), or a correctly decoded TCH frame from the mobile station, the network repeats the PHYSICAL INFORMATION message and restarts timer T3105. The maximum number of repetitions is Ny1.

The correct decoding of a frame means that the decoding algorithm and the error detection tests, if any, indicate no error.

When the mobile station receives a PHYSICAL INFORMATION message, it stops timer T3124, stops sending access bursts, activates the physical channels in sending and receiving mode and connects the channels if need be. If the allocated channel is an SDCCH (+ SACCH), performance of the mobile station must enable the mobile station to accept a correct PHYSICAL INFORMATION message sent by the network in any block while T3124 is running.

3.4.4.2.3 Pseudo-synchronized cell case

The details of the use of this procedure are described in GSM 05.10. The mobile station computes the timing advance to be used with the new cell from the real time difference value given in the HANDOVER COMMAND message. If the mobile station knows that the timing advance with the new cell is not out of range , i.e. smaller or equal to the maximum timing advance that can be coded as specified in GSM 04.04, or if the new cell accepts an out of range timing advance as indicated in the HANDOVER COMMAND message, the mobile station switches to the new channel and proceeds as follows.

After having switched to the assigned channels, the mobile station sends in four successive slots on the main DCCH a HANDOVER ACCESS message. This message is sent in random mode and thus does not follow the basic format. Its content is reduced to the handover reference information element. The transmission of these four messages is optional if so indicated by the network in the HANDOVER COMMAND message.

Before completion of the 4 access bursts on the DCCH, additional access bursts may also be sent on the SACCH.

In those cells that support extended TA values if TA value in new cell is greater than 63 and the HANDOVER COMMAND message indicates that the transmission of four HANDOVER ACCESS messages is optional the MS shall not transmit these four messages. The MS shall not send additional bursts on the SACCH.

The mobile station then activates the channels in sending and receiving mode and connects the channels if need be. The mobile station may activate the channels in receiving mode and connect the channels while sending access bursts.

If applicable, ciphering is then immediately started. The access bursts are not ciphered.

3.4.4.2.4 Pre-synchronized cell case

The details of the use of this procedure are described in GSM 05.10. The mobile station switches to the new channel and proceeds as follows.

After having switched to the assigned channels, the mobile station sends in four successive slots on the main DCCH a HANDOVER ACCESS message. This message is sent in an access burst and thus does not follow the basic format. Its content is reduced to the handover reference information element. The transmission of these four messages is optional if so indicated by the network in the HANDOVER COMMAND message.

Before completion of the 4 access bursts on the DCCH, additional access bursts may also be sent on the SACCH.

In those cells that support extended TA values if TA value in new cell is greater than 63 and the HANDOVER COMMAND message indicates that the transmission of four HANDOVER ACCESS messages is optional the MS shall not transmit these four messages. MS shall not send additional bursts on the SACCH.

The mobile station then activates the channel in sending and receiving mode and connects the channels if need be. The timing advance value to be used with the new cell is:

- either the value contained in the HANDOVER COMMAND message if the timing advance information element is present;
- or the default value for pre-synchronized handover as defined in GSM 05.10, if the timing advance information element is not included in the HANDOVER COMMAND message. The MS may activate the channels in receiving mode and connect the channels while sending access bursts.

If applicable, ciphering is immediately started. The access bursts are not ciphered.

3.4.4.3 Handover completion

After lower layer connections are successfully established, the mobile station returns a HANDOVER COMPLETE message, specifying cause "normal event", to the network on the main DCCH.

The sending of this message on the mobile station side and its receipt on the network side allow the resumption of the transmission of signalling layer messages other than those for RR management.

When receiving the HANDOVER COMPLETE message, the network stops timer T3103 and releases the old channels.

If requested to do so in the HANDOVER COMMAND message, the mobile station includes the observed time difference it has measured when performing the handover, corrected by half the timing advance, in the HANDOVER COMPLETE message (detailed specifications are given in GSM 05.10).

3.4.4.4 Abnormal cases

In the case of a synchronous or pseudo-synchronous handover, if the mobile station knows that the timing advance with the new cell is out of range, i.e. is bigger than the maximum timing advance that can be coded as specified in GSM 04.04, and if the new cell does not accept out of range timing advance as indicated in the HANDOVER COMMAND message, the mobile station sends a HANDOVER FAILURE message, cause "handover impossible, timing advance out of range", on the main signalling link and does not attempt that handover.

If the HANDOVER COMMAND message instructs the mobile station to use a Channel Description or Mode that it does not support, or if the Channel Mode to use is not defined for all channel sets, then the MS shall return a HANDOVER FAILURE message with cause "channel mode unacceptable", and the MS shall remain on the current channel(s) and uses the old Channel Description or Mode(s).

If the mobile station receives a HANDOVER COMMAND message containing an inconsistent MultiRateConfiguration IE, then the mobile station shall return a HANDOVER FAILURE message with cause "channel mode unacceptable", and the mobile station shall remain on the current channel(s) and uses the old Channel Description or Mode(s).

If the HANDOVER COMMAND message instructs the mobile station to use a frequency that it is not capable of, then the mobile station shall return a HANDOVER FAILURE message with cause "frequency not implemented", and the mobile station shall remain on the current channel(s).

If the mobile station receives a HANDOVER COMMAND message with a Frequency List IE or Frequency Short List IE indicating frequencies that are not all in one band, then the mobile station shall stay on the current channel(s) and send a HANDOVER FAILURE message with cause "frequency not implemented". If the mobile station receives a HANDOVER COMMAND message with a Mobile Allocation IE indexing frequencies that are not all in one band, then the mobile station shall stay on the current channel(s) and send a HANDOVER FAILURE message with cause "frequency not implemented".

NOTE: A HANDOVER COMMAND message sent to a multi band mobile station shall not be considered invalid because it indicates target channel frequencies that are all in a different frequency band to that of the ARFCN in the Cell Description IE.

On the mobile station side, if timer T3124 times out (only in the non- synchronized case) or if a lower layer failure happens on the new channel before the HANDOVER COMPLETE message has been sent, the mobile station deactivates the new channels, reactivates the old channels, reconnects the TCHs if any and triggers the establishment of the main signalling link. It then sends a HANDOVER FAILURE message on the main signalling link and resumes normal operation as if no handover attempt had occurred. The operational parameters (e.g. ciphering mode) when returning on the old channel are those applied before the HANDOVER COMMAND message was received.

When the HANDOVER FAILURE message has been received, the network releases the new channels if they were dedicated channels and stops timers T3105 and stops T3103 in the non-synchronized case. If the new channels were VGCS channels, they shall be maintained.

If a lower layer failure happens while attempting to connect back to the old channels, the standard rules are applied (cf. section 3.4.13.2 for dedicated mode and 3.4.13.5 for group transmit mode).

On the network side, if timer T3103 elapses before either the HANDOVER COMPLETE message is received on the new channels, or a HANDOVER FAILURE message is received on the old channels, or the mobile station has re-established the call, the old channels are released if they were dedicated channels and all contexts related to the connections with that mobile station are cleared. If the old channel was a VGCS channel, it shall be maintained and the uplink shall be set free.

On the network side, if neither a correctly layer 2 frame in format A or B nor a correctly TCH frame have been received from the mobile station on the new channel, the newly allocated channels are released if they were dedicated channels. If the new channels were VGCS channels, they shall be maintained and the uplink shall be set free..

On the network side, lower layer failures occurring on the old channels after the sending of the HANDOVER COMMAND message are ignored. Lower layer failures occurring after the receipt of the SABM frame on the new main signalling link are treated following a general scheme (cf. section 3.4.13.2 for dedicated mode and 3.4.13.5 for group transmit mode).

3.4.5 Frequency redefinition procedure

In dedicated mode and group transmit mode, this procedure is used by the network to change the frequencies and hopping sequences of the allocated channels. This is meaningful only in the case of frequency hopping.

The network sends to the mobile station a FREQUENCY REDEFINITION message containing the new parameters together with a starting time indication.

NOTE: The network should take into account limitations of certain mobile stations to understand formats used in the Cell Channel Description IE used in the FREQUENCY REDEFINITION message, see section 10.5.2.13.

When receiving such a message, the mobile station modifies the frequencies/hopping sequences it uses at the exact indicated time slot, i.e. the indicated time slot is the first with new parameters. All other functions are not disturbed by this change. New parameters can be the cell channel description, the mobile allocation and the MAIO. In case of multislot configuration, the Channel Description IE shall describe the channel carrying the main signalling link, the new parameters however, shall be used for all assigned timeslots. Other parameters describing the allocated channels must be identical to the current parameters.

3.4.5.1 Abnormal cases

If the mobile station receives a FREQUENCY REDEFINITION message with a Mobile Allocation IE indexing frequencies that are not all in one band and a Starting Time IE indicating a time that has not elapsed, then the mobile station shall stay on the current channel(s) and send a RR STATUS message with cause "frequency not implemented".

If the mobile station receives a FREQUENCY REDEFINITION message with a Mobile Allocation IE indexing frequencies that are not all in one band and a Starting Time IE indicating a time that has elapsed, then the mobile station shall locally abort the radio connection and, if permitted, attempt Call Re-establishment.

If the mobile station receives a FREQUENCY REDEFENITION message on a channel for which it has a pending redefinition (defined by the immediate assignment, assignment or handover procedure or a previous frequency redefinition procedure) the frequencies, hopping and starting time parameters defined by the new frequency redefinition procedure supersedes those of the pending one.

NOTE: A FREQUENCY REDEFINITION message sent to a multi band mobile station shall not be considered invalid because it indicates new frequencies that are all in a different frequency band to that of the ARFCN of the serving cell.

3.4.6 Channel mode modify procedure

In dedicated mode or group transmit mode, higher layers can request the setting of the channel mode.

The channel mode modify procedure allows the network to request the mobile station to set the channel mode for one channel or one channel set. The procedure shall not be used if the multislot configuration contains more than one channel set. The channel mode covers the coding, decoding and transcoding mode used on the indicated channel.

This procedure is always initiated by the network.

NOTE: Direct transitions between full rate speech coder version 1 and full rate speech coder version 2 (and vice versa) may cause unpleasant audio bursts.

3.4.6.1 Normal channel mode modify procedure

3.4.6.1.1 Initiation of the channel mode modify procedure

The network initiates the procedure by sending a CHANNEL MODE MODIFY message to the mobile station. This message contains:

- a channel description of the channel(s) on which the mode in the CHANNEL MODE MODIFY message shall be applied; and

- the mode to be used on that channel, or on all the channels of a channel set in a multislot configuration.

- Optionally, when the channel mode indicates that a multi-rate speech codec must be applied, the MultiRateconfiguration to be used. The MultiRateConfiguration IE defines the set of codec mode and related information to use after the mode modify procedure. When initiating the new mode, the mobile station shall use for the Initial Codec Mode the mode specified in the MultiRateConfiguration IE, if present, or apply by default the implicit rule defined in GSM 05.09.

3.4.6.1.2 Completion of channel mode modify procedure

When it has received the CHANNEL MODE MODIFY message, the mobile station sets the mode for the indicated channel, and if that is in a multislot configuration, the whole channel set and then replies by a CHANNEL MODE MODIFY ACKNOWLEDGE message indicating the ordered channel mode.

This applies whether the mode commanded by the CHANNEL MODE MODIFY is different from the one used by the mobile station or whether it is already in use.

3.4.6.1.3 Abnormal cases

No specific action for a lower layer failure is specified in this section. If the mobile station does not support the indicated mode, it shall retain the old mode and return the associated channel mode information in the CHANNEL MODE MODIFY ACKNOWLEDGE message.

3.4.6.2 Channel mode modify procedure for a voice group call talker

3.4.6.2.1 Initiation of the channel mode modify procedure

The network initiates the procedure by sending a CHANNEL MODE MODIFY message to the mobile station. This message contains:

- a channel description of the channel on which the CHANNEL MODE MODIFY message is sent; and

- the new channel mode to be used on the channel; and

- optionally, the VGCS target mode information element defining which RR mode is to be used with the new channel mode (i.e. dedicated mode or group transmit mode). If this information element is not present, the RR mode shall be assumed to be the same as with the previous channel mode. The VGCS target mode information element shall also indicate the group cipher key number for the group cipher key to be used on the new channel or if the new channel is non ciphered. If the information element is not present, the ciphering mode and ciphering key shall be the same as with the previous channel mode. Mobile stations not supporting VGCS talking shall ignore the CHANNEL MODE MODIFY message if the VGCS target mode information element is included in the message and shall send an RR STATUS message to the network with cause #96.

The start of ciphering with a group cipher key with the new channel mode is only possible when the mode on the old channel was not ciphered.

If a VGCS target mode information element indicating a group cipher key number is included in the message and the previous mode is not non ciphered and the group cipher key number is different to the previous cipher key number, the mobile station shall behave as if it would not support the indicated channel mode.

3.4.6.2.2 Completion of mode change procedure

When it has received the CHANNEL MODE MODIFY message, the mobile station changes the mode for the indicated channel and then replies by a CHANNEL MODE MODIFY ACKNOWLEDGE message indicating the new channel mode.

3.4.6.2.3 Abnormal cases

No specific action for a lower layer failure is specified in this section. If the mobile station does not support the indicated mode, it shall retain the old mode and return the associated channel mode information in the CHANNEL MODE MODIFY ACKNOWLEDGE message.

3.4.7 Ciphering mode setting procedure

In dedicated mode, the ciphering mode setting procedure is used by the network to set the ciphering mode, i.e. whether or not the transmission is ciphered, and if so which algorithm to use. The procedure shall only be used to change from "not ciphered" mode to "ciphered" mode, or vice-versa, or to pass a CIPHERING MODE COMMAND message to the mobile station while remaining in the "not ciphered" mode. The ciphering mode setting procedure is always triggered by the network and it only applies to dedicated resources.

The cipher mode setting procedure shall not be applied in group transmit mode.

3.4.7.1 Ciphering mode setting initiation

The network initiates the ciphering mode setting procedure by sending a CIPHERING MODE COMMAND message to the mobile station on the main signalling link, indicating whether ciphering shall be used or not, and if yes which algorithm to use.

Additionally, the network may, by the use of the cipher response information element, request the mobile station to include its IMEISV in the CIPHERING MODE COMPLETE message.

The new mode is applied for reception on the network side after the message has been sent.

3.4.7.2 Ciphering mode setting completion

Whenever the mobile station receives a valid CIPHERING MODE COMMAND message, it shall, if a SIM is present and considered valid by the ME and the ciphering key sequence number stored on the SIM indicates that a ciphering key is available, load the ciphering key stored on the SIM into the ME. A valid CIPHERING MODE COMMAND message is defined to be one of the following:

- one that indicates "start ciphering" and is received by the mobile station in the "not ciphered" mode;
- one that indicates "no ciphering" and is received by the MS in the "not ciphered" mode; or
- one that indicates "no ciphering" and is received by the mobile station in the "ciphered" mode.

Other CIPHERING MODE COMMAND messages shall be regarded as erroneous, an RR STATUS message with cause "Protocol error unspecified" shall be returned, and no further action taken.

Upon receipt of the CIPHERING MODE COMMAND message indicating ciphering, the mobile station shall start transmission and reception in the indicated mode.

When the appropriate action on the CIPHERING MODE COMMAND has been taken, the mobile station sends back a CIPHERING MODE COMPLETE message. If the "cipher response" field of the cipher response information element in the CIPHERING MODE COMMAND message specified "IMEI must be included" the mobile station shall include its IMEISV in the CIPHERING MODE COMPLETE message.

Upon receipt of the CIPHERING MODE COMPLETE message or any other correct layer 2 frame which was sent in the new mode, the network starts transmission in the new mode.

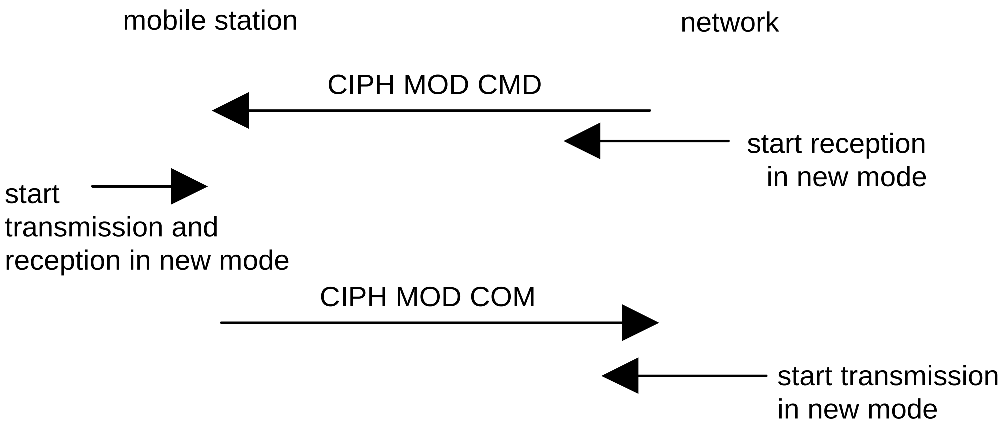


Figure 3.3/GSM 04.18: Ciphering mode setting sequence

3.4.8 Additional channel assignment procedure

NOTE: In the present state of GSM 04.03, this procedure is only possible for the TCH/H + ACCHs to TCH/H + TCH/H + ACCHs transition. As a consequence it is not needed for simple mobile stations. The description of the procedure is in general terms to cope with possible evolution.

In dedicated mode, a change of channel configuration to include an additional channel can be requested by upper layers.

The additional channel assignment procedure shall not be applied in group transmit mode,

The purpose of the additional assignment procedure is to allocate an additional dedicated channel to a mobile station while keeping the previously allocated channels. In particular the main DCCH and the SACCH are not modified, and signalling exchanges are not interrupted.

The additional assignment procedure may happen only in dedicated mode. It is used for instance for the transition from the TCH/H + ACCHs configuration to the TCH/H + TCH/H + ACCHs configuration.

The additional assignment procedure is always initiated by the network.

3.4.8.1 Additional assignment procedure initiation

The network initiates the procedure by sending an ADDITIONAL ASSIGNMENT message to the mobile station on the main DCCH. The ADDITIONAL ASSIGNMENT message contains the description of the newly assigned channel.

On receipt of the message, the mobile station activates the new channel.

3.4.8.2 Additional assignment procedure completion

The mobile station sends an ASSIGNMENT COMPLETE message to the network on the channel, on which it receives the ADDITIONAL ASSIGNMENT message.

3.4.8.3 Abnormal cases

A lower layer failure occurring during the procedure is treated according to the general case (see section 3. 4.13.2).

The network considers the channel as allocated from the sending of the ADDITIONAL ASSIGNMENT message. As a consequence, if a re-establishment occurs, the network will consider the context as if the mobile station has received the message, and the new configuration allocated after the re-establishment may differ from the one the mobile station had before the re-establishment.

3.4.9 Partial channel release procedure

In dedicated mode, a change of channel configuration to release one channel can be requested by upper layers.

The partial channel release procedure shall not be applied in group transmit mode.

The purpose of this procedure is to deactivate part of the dedicated channels in use. The channel configuration remains dedicated.

NOTE: In the present state of GSM 04.03, this procedure is only possible for the TCH/H + TCH/H + ACCHs to TCH/H + ACCHs transition. As a consequence it is not needed for simple mobile stations.

The partial release procedure is always initiated by the network.

3.4.9.1 Partial release procedure initiation

The network initiates the partial release by sending a PARTIAL RELEASE message to the mobile station on the main DCCH.

On receipt of the PARTIAL RELEASE message the mobile station:

- Initiates the disconnection of all the link layer connections carried by the channel to be released;
- Simultaneously initiates the connection on remaining channels of the data link layer connections that have been released;
- Deactivates the physical channels to be released.
- Sends a PARTIAL RELEASE COMPLETE to the network on the (possibly new) main signalling link.

3.4.9.2 Abnormal cases

A lower layer failure is treated following the general rules as specified in section 3.4.13.2.

Moreover, on the network side, the channel configuration nature is set from the sending of the PARTIAL RELEASE message onward. As a consequence, any new assignment after a re-establishment may concern a different channel configuration nature from the one known by the mobile station before the re-establishment.

3.4.10 Classmark change procedure

In dedicated mode or in group transmit mode, this procedure allows the mobile station to indicate to the network a change of characteristics reflected in the classmark (e.g. due to addition of power amplification). Furthermore, a mobile station which implements the « controlled early classmark sending » option may also send a CLASSMARK CHANGE message or a UTRAN CLASSMARK CHANGE message as described in clause 3.3.1.1.4, even if no change of characteristics has occurred.

The mobile station sends a CLASSMARK CHANGE message to the network. This message contains the new mobile station classmark 2 information element. It may also contain a Classmark 3 Information Element. There is no acknowledgement from the network at layer 3.

In case of a UMTS capable mobile the moble station shall send a UTRAN CLASSMARK CHANGE message on the main DCCH as early as possible.In connected mode it may also send a CLASSMARK CHANGE message.

3.4.11 Classmark interrogation procedure

This procedure allows the network to request additional classmark information or RAB preconfiguration data from the mobile station (e.g. if the information initially sent by the mobile station is not sufficient for network decisions).

3.4.11.1 Classmark interrogation initiation

The network initiates the classmark interrogation procedure by sending a CLASSMARK ENQUIRY message to the mobile station on the main DCCH.

3.4.11.2 Classmark interrogation completion

On receipt of the CLASSMARK ENQUIRY message the mobile station sends a CLASSMARK CHANGE or a UTRAN CLASSMARK CHANGE message to the network on the main DCCH. The CLASSMARK CHANGE message contains the mobile station classmark 2 information element. It may also contain a Classmark 3 Information Element. The UTRAN CLASSMARK CHANGE messge contains UE capability and/or UTRAN RAB preconfiguration indication.

3.4.12 Indication of notifications and paging information

Only applicable for mobile stations supporting VGCS listening or VBS listening:

In dedicated mode or in group transmit mode, the RR entity shall provide indications to the upper layer on all received notifications for voice group calls or voice broadcast calls according to the VGCS or VBS subscription data stored in the mobile station. The indication shall include the notified group or broadcast call reference and possibly the related priority, if provided.

In group transmit mode, if the mobile station has received a paging message with the own mobile station identity on the PCH or on the voice group call channel downlink, the RR entity shall provide an indication to the upper layers, together with the related priority, if applicable.

In group transmit mode, if the RR entity receives information on the voice group call channel of the existence of a paging message in its paging subgroup of the PCH, the RR entity shall pass this information to the upper layers together with the related priority if provided (see also section 3.3.2 and 3.3.3).

3.4.13 RR connection release procedure

3.4.13.1 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 mobile station 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.

In dedicated mode and group transmit mode, the channel release procedure is always initiated by the network.

If the mobile station is IMSI attached for GPRS services (section 4) at release of the RR connection, the mobile station shall return to packet idle mode, or if a temporary block flow is established, continue in packet transfer mode.

3.4.13.1.1 Channel release procedure initiation in dedicated mode and in group transmit mode

The network initiates the channel release by sending a CHANNEL RELEASE message to the mobile station on the main DCCH, starts timer T3109 and deactivates the SACCH.

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

NOTE: Data Links other than the main signalling link are disconnected by local end link release.

If case of dedicated mode, 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.

NOTE: The sole purpose of timer T3111 is to let some 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 e.g. a handover procedure is stopped because the call has been cleared.

The CHANNEL RELEASE message may include the information element BA Range which may be used by a mobile station in its selection algorithm (see GSM 05.08 and TS 23.022).

Mobile stations not supporting VGCS or VBS listening shall consider Group Channel Description and Group Cipher Key Number information elements as unnecessary in the message and perform the channel release procedure as normal.

For mobile stations supporting VGCS listening, the following procedures apply:

The CHANNEL RELEASE message may include the information element Group Channel Description. In this case, the mobile station shall release the layer 2 link, enter the group receive mode and give an indication to the upper layer. If a CHANNEL RELEASE message with no Group Channel Description is received, the normal behaviour applies.

If ciphering is applied on the VGCS or VBS channel, the network shall provide in the CHANNEL RELEASE message with the Group Cipher Key Number information element for the group cipher key to be used by the mobile station for reception of the VGCS or VBS channel. If this information element is not included, no ciphering is applied on the VGCS or VBS channel.

A mobile station not supporting the « GPRS » option shall consider the GPRS Resumption information element as an information element unknown in the message and continue the channel release procedure as normal.

For a mobile station supporting the « GPRS » option, the following additional procedures also apply:

The CHANNEL RELEASE message may include the information element GPRS Resumption. If the GPRS Resumption information element indicates that the network has resumed GPRS services, the RR sublayer of the mobile station shall indicate a RR GPRS resumption complete to the MM sublayer, see section 4. If the GPRS Resumption information element indicates that the network has not successfully resumed GPRS services, the RR sublayer of the mobile station shall indicate a RR GPRS resumption failure to the MM sublayer, see section 4.

If the mobile station has performed the GPRS suspension procedure (section 3.3.1.1.4.2) and the GPRS Resumption information element is not included in the message, the RR sublayer of the mobile station shall indicate a RR GPRS resumption failure to the MM sublayer, see section 4.

If the mobile station has not performed the GPRS suspension procedure and the GPRS Resumption information element is not included in the message, the mobile station shall continue the channel release procedure as normal.

3.4.13.1.2 Abnormal cases

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

3.4.13.2 Radio link failure in dedicated mode

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 the cases of loss of communication, called a radio link failure. In dedicated mode, in most of the cases the reaction of the mobile station or the network is the same. Those reactions are described in this section to avoid repetitions.

A radio link failure can be detected by several ways:

1) By analysis of reception at layer 1, as specified in GSM 05.08 and section 3.4.1.1.

2) By a data link layer failure as specified in GSM 04.06, on the main signalling link. A data link failure on any other data link shall not be considered as a radio link failure.

3) When a lower layer failure happens while the mobile station attempts to connect back to the old channels in a channel assignment procedure, handover procedure, PDCH assignment procedure or RR-cell change order procedure.

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

The two first cases are known by the term "lower layer failure".

3.4.13.2.1 Mobile side

When a radio link failure is detected by the mobile station,

- the MS shall perform a local end release on all signalling links unless otherwise specified;
- the mobile station shall deactivate all channels;
- the RR sublayer of the mobile station shall indicate an RR connection failure to the MM sublayer unless otherwise specified.

NOTE: Upper layers may decide on a re-establishment (cf. section 5.5.4).

When a mobile station which has performed the GPRS suspension procedure (section 3.3.1.1.4.2) detects a radio link failure, the RR sublayer of the mobile station shall indicate a RR GPRS resumption failure to the MM sublayer, see section 4.

3.4.13.2.2 Network side

In dedicated 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 procedure as specified in section 3.5.1, or with the following procedure. The network starts timer T3109 and deactivates the SACCH (and hence to stop transmission on the SACCH).

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

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

This procedure relies on the fact that if a mobile station does not receive the SACCH for some time, it completely releases the channels (cf. GSM 05.08).

NOTE: The network should maintain for a while the transaction context in order to allow call re-establishment. The length of timer is for further study.

When a mobile station which has performed the GPRS suspension procedure (section 3.3.1.1.4.2) detects a radio link failure, the RR sublayer of the mobile station shall indicate a RR GPRS resumption failure to the MM sublayer, see section 4.

3.4.13.3 RR connection abortion in dedicated mode

The mobile station 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.

When a mobile station which has performed the GPRS suspension procedure (section 3.3.1.1.4.2) aborts the RR connection, the RR sublayer of the mobile station shall indicate a RR GPRS resumption failure to the MM sublayer, see section 4.

3.4.13.4 Uplink release procedure in group transmit mode

If the uplink release is requested by the upper layer the mobile station shall send an UPLINK RELEASE message on the voice group call channel uplink, perform a release of the main signalling link and go back to the group receive mode.

If the UPLINK RELEASE message is received from the network on the voice group call channel downlink, the MS shall perform a release of the main signalling link and go back to the group receive mode.

3.4.13.5 Radio link failure in group transmit mode

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 the cases of loss of communication, called a radio link failure. In group transmit mode, in most of the cases the reaction of the mobile station or the network is the same. Those reactions are described in this section to avoid repetitions.

A radio link failure can be detected by several ways:

1) By analysis of reception at layer 1, as specified in GSM 05.08 and section 3.4.1.1.

2) By a data link layer failure as specified in GSM 04.06, on the main signalling link. A data link failure on any other data link shall not be considered as a radio link failure.

3) When a lower layer failure happens while the mobile station attempts to connect back to the old channels in a channel assignment procedure or handover procedure.

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

The two first cases are known by the term "lower layer failure".

3.4.13.5.1 Mobile side

When a radio link failure is detected by the mobile station,

- the MS shall perform a local end release on all signalling links;

- the mobile station shall go back to idle mode and, when possible, to group receive mode;

- the RR sublayer of the mobile station shall indicate an RR connection failure to the MM sublayer unless otherwise specified.

3.4.13.5.2 Network side

When the uplink has been allocated and the network detects a lower layer failure, the network shall set the uplink free and provide an UPLINK FREE message on the main signalling channel, when appropriate.

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

3.4.14 Receiving a RR STATUS message by a RR entity.

If the RR entity of the mobile station receives a 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 actions to be taken on receiving a RR STATUS message in the network are an implementation dependent option see also section 8.

3.4.15 Group receive mode procedures

Only applicable for support of VGCS listening or VBS listening.

3.4.15.1 Mobile station side

3.4.15.1.1 Reception of the VGCS or VBS channel

In group receive mode, the mobile station receives the downlink of the voice broadcast channel or voice group call channel for which the channel description was provided within the notification message or in the related command message. The mobile station should also listen to the CCCH of the serving cell. Moreover, it measures the received levels on the serving cell and on the neighbour cells to assess the need for a cell reselection as specified in GSM 05.08. The general cell reselection procedure for the mobile station in group receive mode is described in TS 23.022.

Information on neighbour cells used for cell reselection and reception of the VGCS or VBS channel in the neighbour cells may be provided on the downlink messages (see section 3.4.15.1.2). If no such information is provided or information is missing, the mobile station shall try to read this information on the BCCH and NCH of the neighbour cells.

3.4.15.1.2 Monitoring of downlink messages and related procedures

Mobile stations in group receive mode shall monitor messages related to the following procedures on the VGCS or VBS channel downlink and act appropriately in order to be able to keep receiving the VGCS or VBS channel downlink.

All messages for mobile stations in group receive mode shall be sent in UI format on the VGCS or VBS channel downlink. Mobile stations in group receive mode shall ignore all messages which are not sent in UI format or which are not related to the following mentioned procedures.

The mobile should also monitor messages on the PCH or NCH of the current cell.

3.4.15.1.2.1 Spare

3.4.15.1.2.2 Spare

3.4.15.1.2.3 Channel mode modify procedure

The mobile station shall receive CHANNEL MODE MODIFY messages. The mobile station shall use the new channel mode but shall not transmit any response to the network.

3.4.15.1.2.4 Notification and paging information

The mobile station shall monitor messages related to notification and paging procedures.

The RR entity shall provide indications on all received notifications for voice group calls or voice broadcast calls to the upper layer. The indication shall include the notified group or broadcast call reference and, if provided, and if the mobile station supports eMLPP the related priority.

On request by the upper layer to join another voice broadcast call or voice group call for which a corresponding notification has been received on the VGCS or VBS channel downlink, the RR entity shall read the corresponding notification on the NCH.

If the mobile station has received a paging message with its own mobile station identity on the PCH or on the voice broadcast channel or voice group call channel downlink, the RR entity shall provide an indication to the upper layers, together with the related priority, if applicable.

3.4.15.1.2.4.1 Use of Reduced NCH monitoring

This section applies to mobile stations which are in group receive mode or group transmit mode of dedicated mode and which in addition want to receive notification messages for other voice broadcast calls or voice group calls and which aim at reducing the reception load.

If the reduced NCH monitoring mechanism is used on the NCH as defined in section 3.3.3.3, when the MS in group receive mode or group transmit mode enters a cell, it should read the NCH until it has received at least two messages on the NCH indicating NLN, with the two last received NLN being identical. Then it should stop reading the NCH until it receives on the SACCH an NLN(SACCH) different from the last previously received NLN.

For this, a parameter is provided on the SACCH in the SYSTEM INFORMATION TYPE 6 message:

- NLN(SACCH): Notification List Number (received on the SACCH).

If a mobile station receives on the SACCH an NLN(SACCH) different from the last received NLN it may read the NCH until it has received at least two messages on the NCH indicating NLN with the two last received NLN being identical.

If a message in the SACCH is not received correctly the MS may read the NCH until it has received at least two messages on the NCH indicating NLN, with the two last received NLN being identical.

NOTE: If the NLN(SACCH) is not provided on the SACCH, the mobile station, depending on its particular implementation, may either read the NCH while being in group receive mode or group transmit mode or may not be able to receive notifications for other voice group calls or voice broadcast calls other than those notifications provided on the FACCH.

3.4.15.1.2.5 Uplink status messages

Mobile stations supporting VGCS talking shall monitor the VGCS uplink control related messages UPLINK FREE and UPLINK BUSY.

3.4.15.1.2.6 Channel release message

The mobile station shall receive CHANNEL RELEASE messages. On receipt of a CHANNEL RELEASE message, the RR entity shall go to idle mode and give an indication to the upper layer. (See also section 3.4.15.1.4.1, 4^{th} paragraph.)

3.4.15.1.2.7 Information on paging channel restructuring

On receipt of a SYSTEM INFORMATION TYPE 6 message indicating that paging channel restructuring has taken place, if the mobile station wants to be able to read its paging subchannel while in group receive mode or group transmit mode, the mobile station should read the related messages on the BCCH to know the position of its paging group.

3.4.15.1.3 Uplink reply procedure

In Group Receive mode, on receipt of an UPLINK FREE message with an uplink access request indication from the network on the voice group call channel downlink, the mobile station shall send two UPLINK ACCESS messages on the voice group call channel with establishment cause “Reply on uplink access request” and then stop immediately transmitting on the uplink.

The first UPLINK ACCESS message shall be transmitted by the mobile station with a random delay between 0 and 20 ms. The second UPLINK ACCESS messages shall be repeated after a further period of 100 ms plus a random delay between 0 and 20 ms.

If an uplink identity code (UIC) of the current cell has been provided by the network in the UPLINK FREE message, the mobile station shall use this UIC for the coding of the UPLINK ACCESS messages. If no UIC is provided, the mobile station shall use the BSIC received of the serving cell, for instance as received from the initial synchronization.

3.4.15.1.4 Leaving the group receive mode

3.4.15.1.4.1 Returning to idle mode

If the mobile station enters a new cell in which:

- notifications for the current group or broadcast call are sent; but
- no VGCS or VBS channel description for the current group or broadcast call is provided;

the mobile station shall go to idle mode and give an indication to the upper (sub-)layers.

NOTE: Upper (sub-)layers then can request the establishment of an RR connection in order to be informed about the channel description by the network.

If the mobile station enters a cell in which notifications for the current group or broadcast call are not sent, the mobile station shall disconnect locally the TCH, go to idle mode and give an indication to the upper (sub-)layers.

On request by the upper layer in order to respond to a paging message the RR entity shall go to the idle mode in order to establish a dedicated RR connection.

On receipt of a CHANNEL RELEASE message in UI format from the network the RR entity shall go to idle mode and give an indication to the upper layer.

If the upper layer requests to abort the group receive mode, the mobile station shall go back to idle mode.

3.4.15.1.4.2 Going to group transmit mode

Only applicable for mobile stations supporting VGCS talking.

If the upper layer requests an uplink access, the mobile station shall perform the uplink investigation procedure as defined in section 3.3.1.2.1.1.

If the uplink investigation procedure is not successful, the mobile station shall give an indication to the upper layers and remain in group receive mode.

If the uplink investigation procedure is successful, the uplink access procedure is initiated as defined in section 3.3.1.2.1.2.

If the uplink access procedure is successful, the mobile station shall give an indication to the upper layers and enter the group transmit mode.

If the uplink access procedure is not successful, the mobile station shall give an indication to the upper layers and remain in group receive mode.

3.4.15.2 Network side

3.4.15.2.1 Provision of messages on the VGCS or VBS channel downlink

3.4.15.2.1.1 General

The network shall provide all messages directed to mobile stations in group receive mode (see section 3.4.15.1.2) in unacknowledged mode. Those messages which are also sent to the mobile station in group transmit mode in acknowledged mode have therefore to be repeated in addition as UI messages on the VGCS channel downlink if they shall also be received by mobile stations in group receive mode.

3.4.15.2.1.2 Provision of general information messages

In the case where the group call area exceeds one cell, the network should provide the SYSTEM INFORMATION TYPE 6 message on the SACCH related to the voice broadcast channel or voice group call channel.

In addition, if the group call area exceeds one cell, the network should provide SYSTEM INFORMATION TYPE 5 (possibly together with TYPE 5bis and 5ter) on the SACCH related to the voice broadcast channel or voice group call channel.

- The SYSTEM INFORMATION TYPE 5, TYPE 5bis and TYPE 5ter messages provide information on the BCCH frequency of the neighbour cells.

- The SYSTEM INFORMATION TYPE 6 message provides information on the location area of the current cell, possibly the status of the NCH, and an indication of whether paging channel restructuring has taken place.

- $(ASCI)$ Optional messages of the SYSTEM INFORMATION TYPE 10 message type provide information improving cell re-selection in group receive mode.

The network may also provide layer 3 messages for notification on the VGCS or VBS channel downlink FACCH.

3.4.15.2.1.3 Provision of messages related to the voice group call uplink channel

Only applicable for the support of VGCS talking.

The network shall provide UPLINK FREE messages on the main signalling link of all voice group call channels when the uplink is set free. The provision of UPLINK FREE messages shall be repeated as long as no uplink is granted to a mobile station.

The network shall provide an UPLINK BUSY message on the main signalling link of all voice group call when the uplink has been granted to a mobile station.

The network may send UPLINK FREE messages containing an uplink access request on the main signalling channel of the VGCS channels in order to obtain knowledge on whether any listening mobile is present in a cell or not. If there is no mobile station responding to the uplink access request, the network may decide to clear the VGCS channel in that cell.

3.4.15.2.2 Release of the VGCS or VBS Channels

If a release request for a voice group call is received from the upper layer, the network, after having released the RR connection with the mobile station in group transmit mode, shall stop the notification procedures for that voice group call and clear all related voice group call channels.

If a release request for a voice broadcast call is received from the upper layer, the network shall stop the notification procedures for that voice broadcast call and locally disconnect any channel related to the voice broadcast call.

3.4.15.3 Failure cases

If the mobile station looses the voice group call channel or voice broadcast channel, the mobile station shall search all possible channel positions on the current cell and the neighbour cells for which a channel description is known for that call.

3.4.16 Configuration change procedure

This is only applicable for multislot configuration.

The configuration change procedure is used by the network to change the number of timeslots used in a multislot configuration. The procedure can also be used to change the channel mode of one or several channels and change their allocation. The main signalling link however, cannot be changed by the configuration change procedure. If a change of the main signalling link is needed, the assignment or handover procedures shall be used.

The network shall not initiate a new configuration change procedure before a response to the previous CONFIGURATION CHANGE COMMAND message has been received from the mobile station.

3.4.16.1 Configuration change initiation

The procedure starts when the network sends a CONFIGURATION CHANGE COMMAND to the mobile station on the main DCCH. The message indicates:

- which timeslots to use in uplink;
- which timeslots to use in downlink; and
- which channel set each timeslot belongs to.

The message may also contain definitions of the channel mode to be applied for one or several channel sets. If a previously undefined channel set is defined by the CONFIGURATION CHANGE COMMAND a definition of the channel mode for the new channel set shall be included in the message.

3.4.16.2 Configuration change completion

When the mobile station receives the CONFIGURATION CHANGE COMMAND it changes its configuration in accordance with the message contents and returns a CONFIGURATION CHANGE ACKNOWLEDGE on the same channel as the command message was received, confirming the new channel configuration. This applies irrespective of whether the new configuration is different from the one already in use by the mobile station or if it is the same.

3.4.16.3 Abnormal cases

If the CONFIGURATION CHANGE COMMAND message instructs the mobile station to use a Channel Configuration or Mode(s) that it does not support, or if the channel mode to use is not defined for all channel sets, the mobile station shall return a CONFIGURATION CHANGE REJECT message with cause 'channel mode unacceptable', and the mobile station shall remain on the current channel(s) and use the old Channel Configuration and Channel Mode(s).

3.4.17 Mapping of user data substreams onto timeslots in a multislot configuration

For multislot configurations the following rules for mapping of the user data substreams onto timeslots shall apply for each channel set:

- at initial assignment (using assignment procedure), the lowest numbered user data substream shall be mapped to the lowest numbered timeslot etc. in ascending order (the user data substreams are numbered 0 to (n-1), where n is the number of substreams)
- at channel changes using handover procedure or assignment procedure (where none of the timeslots are present in both the old and the new configuration), the lowest numbered user data substream shall be mapped to the lowest numbered timeslot etc. in ascending order (the user data substreams are numbered 0 to (n-1), where n is the number of substreams)
- at channel changes using assignment procedure (where at least one of the timeslots is the same in both the old and the new configuration) or configuration change procedure:
    - user data substream(s) mapped to timeslot(s) that are present in both the old and the new configuration shall continue to be mapped to the same timeslot(s) as before the channel change; and
    - possibly added timeslot(s) shall carry the lowest numbered available user data substream so that the lowest numbered data substream among the added is mapped to the lowest numbered added timeslot and so on in ascending order.

NOTE: The user data substream number is a number that need not be the same as the inband number used for transparent services. The user data substream number is only used as a point of reference to a specific user data substream.

3.4.18 Handling of classmark information at band change

The coding of some fields in the *Mobile Station Classmark 1* and in the *Mobile Station Classmark 2* information elements depends on the band in use as described in subclause 10.5.1.5 and subclause 10.5.1.6. When a command to change the frequency band (GSM 900, DCS 1800) has been received (by, e.g., an IMMEDIATE ASSIGNMENT message, an ASSIGNMENT COMMAND message, a HANDOVER COMMAND message or a FREQUENCY REDEFINITION message) the following applies:

- When an IMMEDIATE ASSIGNMENT message is received, “the band used” for the purpose of coding the classmark information in the service request message, see subclause 3.1.5, shall be understood as the band used for the CHANNEL REQUEST message or (one of) the band(s) indicated by the IMMEDIATE ASSIGNMENT message.
- For other cases “the band used” for the purpose of coding the classmark information shall be understood as one of the bands used or attempted to be used within the 2 seconds preceding the passing of the layer 3 message containing the classmark information to the layer 2 send queue as described in GSM 04.06.

NOTE: This definition means that when a band change is being done the network must take appropriate actions to handle possible ambiguities in the frequency band related information in the classmark.

3.4.19 Assignment to a Packet Data channel

This section is only applicable to mobile stations supporting the <<GPRS>> option.

When in dedicated mode or in group transmit mode, the network may wish to change the resources used by a mobile station that supports the <<GPRS option>>. This change may be performed through the assignment to a Packet Data Channel procedure.

The purpose of the assignment to PDCH channel procedure is to completely modify the physical channel configuration of the mobile station without frequency redefinition or change in synchronization while staying in the same cell.

The assignment to PDCH procedure only commences in dedicated mode or in group transmit mode. This procedure cannot be used in the idle mode.

The assignment to PDCH procedure includes:

- the suspension of normal operation;
- the release of the main signalling link, and of the other data links as defined in section 3.1.4, and the disconnection of TCHs if any;
- the deactivation of previously assigned channels (layer 1);
- The triggering of the establishment of a Temporary Block Flow.

The assignment to PDCH procedure is always initiated by the network.

3.4.19.1 Assignment to PDCH initiation

The network initiates the assignment to PDCH procedure by sending a PDCH ASSIGNMENT COMMAND message to the mobile station on the main signalling link. It then starts timer T3117.

NOTE: The network should take into account limitations of certain mobile stations to understand formats used in the Frequency List IE and Cell Channel Description IE used in the PDCH ASSIGNMENT COMMAND message, see section 10.5.2.13 and section 10.5.2.1b.

When sending this message on the network side, and when receiving it on the mobile station 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. These RR messages can be deduced from sections 3.4.3 and 8.8 Radio Resource management.

Upon receipt of the PDCH ASSIGNMENT COMMAND message, the mobile station initiates a local end release of dedicated mode link layer connections, disconnects the physical channels, commands the switching to the identified channels and obeys the procedures relevant to the establishment of the Temporary Block Flow. The mobile station starts timer T3190.

The PDCH ASSIGNMENT COMMAND message contains the description of either the uplink TBF or the downlink TBF.

The information on the power to be used on the target TBF shall not affect the power used on the old channel(s).

A PDCH ASSIGNMENT COMMAND message may indicate a frequency change in progress, with a starting time and possibly alternative channel descriptions.

In the case of the reception of a PDCH ASSIGNMENT COMMAND message which contains only the description of a TBF to be used after the starting time, the mobile station shall wait up to the starting time before using the TBF. If the starting time has already elapsed, the mobile shall use the TBF as an immediate reaction to the reception of the message (see GSM 05.10 for the timing constraints).

If the message contains both the description of a TBF to be used after the indicated time and of a TBF to be used before, the mobile station uses the TBF as an immediate reaction to the reception of the message. If the moment the mobile station is ready to access is before the indicated time, the mobile station uses the TBF described for before the starting time. The mobile station then changes to the TBF described for after the starting time at the indicated time. New parameters can be frequency list, MAIO and HSN. Other parameters describing the allocated channels shall be identical to the parameters described for before the starting time. If the moment the mobile station is ready to access is after the starting time, the mobile station uses the TBF described for after the starting time.

If frequency hopping is applied, the cell allocation if present in the message is used to decode the mobile allocation. If the cell allocation is not included, the mobile station uses its current cell allocation, the current CA is the last CA received on the BCCH. Afterward, the current CA may be changed by some messages sent on the main signalling link containing a CA (the possible messages are: ASSIGNMENT COMMAND, HANDOVER COMMAND and FREQUENCY REDEFINITION). Note that there are cases in which the current CA is undefined, see section 3.4.3.3.

The PDCH ASSIGNMENT COMMAND does not contain a cipher mode setting IE. Any RR layer ciphering that may have been applied in dedicated mode shall not be applied to the target TBF.

3.4.19.2 Completion of the Assignment to PDCH procedure

The network regards the procedure as successfully completed when RLC/MAC blocks are received from the mobile station on the target TBF. The network then stops timer T3117.

The mobile station regards the procedure as successfully completed when RLC/MAC blocks with any TFI are received on the new PDCH.

3.4.19.3 Abnormal cases

If the mobile station has no current CA and if it needs a CA to analyse the PDCH ASSIGNMENT COMMAND message, it stays on the current channel(s) and sends an ASSIGNMENT FAILURE message with cause "no cell allocation available".

If the PDCH ASSIGNMENT COMMAND message instructs the mobile station to use a Coding Scheme that it does not support then the mobile station shall return an ASSIGNMENT FAILURE message with cause "channel mode unacceptable", and the mobile station shall remain on the current channel(s) and uses the old Channel Description or Channel Mode(s).

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

If the mobile station receives a PDCH ASSIGNMENT COMMAND message with a Frequency List IE indicating frequencies that are not all in one band, then the mobile station shall stay on the current channel(s) and send an ASSIGNMENT FAILURE message with cause "frequency not implemented". If the mobile station receives a PDCH ASSIGNMENT COMMAND message with a Mobile Allocation IE indexing frequencies that are not all in one band, then the mobile station shall stay on the current channel(s) and send an ASSIGNMENT FAILURE message with cause "frequency not implemented".

NOTE: A PDCH ASSIGNMENT COMMAND message sent to a multi band mobile station shall not be considered invalid because it indicates frequencies that are all in a different frequency band to that of the current channel.

On the mobile station side, if RLC/MAC blocks are not successfully received within T3190 seconds, the mobile station reactivates the old channels, reconnects the TCHs if any and triggers the establishment of the main signalling link. It then sends an ASSIGNMENT FAILURE message, 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) when returning on the old channel are those applied before the procedure.

When receiving the ASSIGNMENT FAILURE message, the network stops T3117.

If a lower layer failure happens while attempting to connect back to the old channels, the radio link failure procedure is applied (see section 3.4.13.2).

On the network side, if timer T3117 elapses before either the network receives an RLC/MAC block from the mobile station on the new channel, or, an ASSIGNMENT FAILURE message is received on the old channels, then the old channels and the new resources are released, except that, if the old channel was a VGCS channel, the old channel shall be maintained and the uplink shall be set free.

On the network side, lower layer failure occurring on the old channels after the sending of the PDCH ASSIGNMENT COMMAND message are ignored.

3.4.20 RR-Network Commanded Cell Change Order

This section is only applicable to mobiles supporting the <<GPRS>> option.

In dedicated mode or in group transmit mode, intracell or intercell change of channel(s) can be requested by the network RR sublayer. This change may be performed through the RR-network commanded cell change order procedure.

The purpose of the RR-network commanded cell change order procedure is to permit the complete modification of the channels allocated to the mobile station e.g. when the cell is changed. This procedure only commences while in dedicated mode or in group transmit mode.

The RR-network commanded cell change order procedure includes:

- The suspension of normal operation except for RR management (layer 3).
- The disconnection of the main signalling link, and of the other links via local end release (layer 2), and the disconnection of the TCH(s) if any.
- The disconnection and the deactivation of previously assigned channels and their release (layer 1).

  The complete acquisition of BCCH or PBCCH messages of the target cell.
- The triggering of the establishment of a Temporary Block Flow.

The RR-network controlled cell change order procedure is always initiated by the network.

3.4.20.1 RR-network commanded cell change order initiation

The network initiates the RR-network controlled cell change order procedure by sending a RR-CELL CHANGE ORDER message to the mobile station on the main DCCH. The network then starts timer T3119.

When a handover has taken place during dedicated connection, the network shall send a RR-CELL CHANGE ORDER message to the mobile station in order to establish TBF. In this case the target cell is equal to the old cell.

When sending this message on the network side, and when receiving it on the mobile station side, all transmission of signalling layer messages except for those RR messages needed for this procedure and for abnormal cases, is suspended until resuming is indicated. These RR messages can be deduced from section 3.4.3 and 8.5.1 "Radio Resource management".

Upon receipt of the RR-CELL CHANGE ORDER message, the mobile station starts timer T3134, and initiates, as described in section 3.1.4, the release of link layer connections, disconnects the physical channels, commands the switching to the identified cell, performs a complete acquisition of BCCH or PBCCH messages (see GSM 04.60), and obeys the procedures relevant to the establishment of the Temporary Block Flow. The mobile station shall obey the RR-CELL CHANGE ORDER irrespective of whether or not the mobile station has any knowledge of the relative synchronisation of the target cell to the serving cell.

The RR-CELL CHANGE ORDER message contains:

- The characteristics of the new cell that are necessary to identify it (i.e. BSIC + BCCH frequency);
- the NC mode to be initially applied on the new cell.

The RR-CELL CHANGE ORDER does not contain a cipher mode setting IE. Any RR layer ciphering that may have been applied in dedicated mode shall not be applied to the target TBF or with the target cell.

3.4.20.2 Network controlled cell reselection completion

The network regards the procedure as successfully completed when it knows that communication has been established with that mobile station via the new cell (e.g. the network has received a RLC/MAC Block containing the mobile station's identity). The network then stops timer T3119.

The mobile station regards the procedure as successfully completed when it has received a response to a (PACKET) CHANNEL REQUEST message on the new cell which allocates it a resource on the new cell.

3.4.20.3 Abnormal cases

If the RR-CELL CHANGE ORDER message instructs the mobile station to use a frequency that it is not capable of, then the mobile station shall return a HANDOVER FAILURE message with cause "frequency not implemented", and the mobile station shall remain on the current channel(s).

On the mobile station side, if timer T3134 times out before a response to the (PACKET) CHANNEL REQUEST message has been received, or, if an IMMEDIATE ASSIGNMENT REJECT message or a PACKET ACCESS REJECT is received from the new cell, or, if the contention resolution procedure fails on the new cell then the mobile station shall reactivate the old channels, reconnect the TCHs if any and trigger the establishment of the main signalling link. It then sends a HANDOVER FAILURE message on the main signalling link and resumes normal operation as if no handover attempt had occurred. The operational parameters (e.g. ciphering mode) when returning on the old channel are those applied before the RR-CELL CHANGE ORDER message was received.

When the HANDOVER FAILURE message has been received, the network stops T3119.

If a lower layer failure happens while attempting to connect back to the old channels, the standard rules are applied (cf. section 3.4.13.2).

On the network side, if timer T3119 elapses before either the mobile station has been recognised on the new cell, or a HANDOVER FAILURE message is received on the old channels, then the old channels are released, except that, if the old channel was a VGCS channel, the old channel shall be maintained and the uplink shall be set free.

On the network side, lower layer failures occurring on the old channels after the sending of the RR-CELL CHANGE ORDER message are ignored.

3.4.21 Application Procedures

3.4.21.1 General

While in dedicated mode, the following applications associated with the Radio Resource management layer may be supported in the network and MS:

3.4.21.2 Location Services (LCS)

Common procedures are defined in the Radio Resource management layer to assist these applications.

3.4.21.3 Application Information Transfer

The Application Information Transfer procedure enables an Application on the network side and a peer application in the MS to exchange Application Protocol Data Units (APDUs).

3.4.21.3.1 Normal Procedure without Segmentation

The maximum size of an APPLICATION INFORMATION message is 251 octets as defined in GSM 04.06. Segmentation shall not be used when an APDU fits into a single APPLICATION INFORMATION message of maximum or smaller size.

```
Mobile Station                        Network

     APPLICATION INFORMATION [APDU, C/R ]
         <--------------------------

    APPLICATION INFORMATION [APDU, C/R]
         -------------------------->
```

Figure 3.4/GSM 04.18: Application Information Transfer without segmentation

Either the network or MS may send an APPLICATION INFORMATION message once the MS is in dedicated mode. The APDU Data in the APPLICATION INFORMATION message shall contain a complete APDU according to the protocol in use. The APDU ID IE identifies the protocol and associated application. The APDU Flags IE indicates "First or Only Segment", "Last or Only Segment" and conveys a C/R flag transparently between the communicating applications. The C/R Flag may be used to distinguish a command from other messages and a final response from a non-final response. The use of the C/R flag is defined with respect to each application. On receiving an APPLICATION INFORMATION message, the receiving layer 3 entity shall deliver the message contents to the identified local application.

3.4.21.3.2 Normal Procedure with Segmentation

Segmentation is applicable when an APDU is too large to fit into a single APPLICATION INFORMATION message. The procedure is applicable for either direction of transfer.

```
 Mobile Station or Network                       Network or Mobile Station

   APPLICATION INFORMATION [APDU segment, First Segment, not Last Segment]
                          <--------------------------

 APPLICATION INFORMATION [APDU segment, not First Segment, not Last Segment]
                          <--------------------------

APPLICATION INFORMATION [APDU segment, not First Segment, Last Segment, C/R]
                          <--------------------------
```

Figure 3.5/GSM 04.18: Application Information Transfer with segmentation

The sending layer 3 entity shall segment an APDU by dividing it into one or more segments exactly fitting into maximum sized APPLICATION INFORMATION messages plus a final segment fitting into an APPLICATION INFORMATION message of maximum size or smaller. Once segmented, the resulting APPLICATION INFORMATION messages shall be transferred in sequence to the data link layer for transmission, without being interspersed by other level 3 messages. The first APPLICATION INFORMATION message in the sequence shall indicate "First Segment" and "Not Last Segment". Subsequent APPLICATION INFORMATION messages except for the last shall indicate "Not First Segment" and "Not Last Segment". The last APPLICATION INFORMATION message shall indicate "Not First Segment" and "Last Segment" and shall include a C/R flag as provided by the sending application.

The receiving layer 3 entity shall reassemble any segmented APDU before transfer to the local application. The receiver may employ a timer to detect possible loss of APDU segments. If employed, the timer shall be started when the first APDU segment is received and cancelled after the last segment is received.

3.4.21.3.3 Abnormal Cases

APPLICATION INFORMATION messages are sent using "low" priority at the data link layer. This can lead to message loss or truncation when preempted by other "high" priority messages. A receiving layer 3 entity shall detect APDU truncation if an APPLICATION INFORMATION message is received carrying an APDU or APDU segment that is shorter than indicated by the length indicator for the APDU Data IE. This test is reliable because preemption in the data link layer guarantees that at least the first 2*N201 octets of any truncated message will be reliably transferred.

An APPLICATION INFORMATION transfer error shall be detected due to any of the following:

(a) Receipt of a truncated APDU or APDU segment;

(b) While performing APDU reassembly

- receipt of any other layer 3 message defined to use SAPI 0 on the main DCCH;
- receipt of an APDU or APDU segment indicating "First or Only Segment";
- expiration of the reassembly timer (if supported);

(c) While not performing APDU reassembly, receipt of an APDU segment indicating "not First or only segment";

(d) Detection of any other error for a received message as defined in clause 8.

If APDU reassembly was in process when the error occurred, the receiving layer 3 entity shall discard the partially reassembled APDU and reprocess any received APDU or APDU segment that caused the error provided not an error defined in clause 8. In all other cases, any received APDU or APDU segment shall be discarded.

3.4.22 RR procedures related to packet resource establishment while in dedicated mode

The establishment of a packet resource is supported by procedures on the main DCCH when the mobile station is in dedicated mode. The procedures are only applicable to a mobile station supporting both GPRS and DTM. The procedures are optional for the network.

These procedures constitute a complement to the corresponding procedures for temporary block flow establishment using CCCH or PCCCH while in idle mode defined in GSM 04.18 and 04.60, respectively.

The packet request procedure is initiated by the MS and it is described in clause 3.4.22.1. The packet notification procedure is initiated by the network and it is described in 3.4.22.2. The packet downlink assignment is initiated by the network and it is described in clause 3.4.22.3.

3.4.22.1 Packet request procedure while in dedicated mode

The packet request procedure using the main DCCH may be used to establish a packet resource to support the transfer of LLC PDUs in the direction from the mobile station to the network.

3.4.22.1.1 Entering the dual transfer mode

While in dedicated mode, the establishment of an uplink packet resource may be initiated by the RR entity of the mobile station using the packet request procedure. The procedure is triggered by a request from upper layers to transfer an LLC PDU; see TS 24.007. The request from upper layers specifies:

- TLLI

-radio priority,

- RLC mode associated with the packet transfer,
- LLC frame type,
- establishment cause and
- QoS information for the requested packet session.

Upon such a request, the RR entity of the mobile station

- if access to the network is allowed (section 3.4.22.1.1.1), it initiates the packet request procedure as defined in section 3.4.22.1.1.2;
- otherwise, it rejects the request.

If the request from upper layers indicates any signalling procedure the acknowledged RLC mode shall be used.

3.4.22.1.1.1 Permission to access the network

Access to the network is allowed:

- if dual transfer mode is supported in the cell, as indicated by the DTM_CELL_SUPPORT field included in SI messages.

NOTE: belonging to an authorised access class or special class, radio priority level and LSA permission are not considered since they only apply to a mobile station in idle mode.

3.4.22.1.1.2 Initiation of establishment of the packet request procedure

The mobile station initiates the establishment the packet resource by sending a DTM REQUEST message on the main DCCH.

The DTM REQUEST message contains:

- TLLI;
- MS GPRS Radio Access Capabilities;
- Channel Request Description;

Having sent the DTM REQUEST message, the mobile station starts timer T3148.

3.4.22.1.1.3 Answer from the network

3.4.22.1.1.3.1 Packet assignment

On receipt of a DTM REQUEST message the network may allocate an uplink packet resource. The packet uplink resource is assigned to the mobile station in one of the DTM assignment messages:

- DTM ASSIGNMENT COMMAND,
- PACKET ASSIGNMENT COMMAND or
- MAIN DCCH ASSIGNMENT COMMAND.

These messages are sent in acknowledged mode on the main DCCH. If frequency hopping is applied, the mobile station shall use the cell allocation defined for the cell to decode the mobile allocation.

The allocation of the uplink packet resource may imply the reallocation of the resource for the RR connection. In this case, the DTM ASSIGNMENT COMMAND message is used and the timer T3107 is started on the network side. The DTM ASSIGNMENT COMMAND message shall not be used to change to a dependent configuration.

The PACKET ASSIGNMENT COMMAND message is only used when the packet resource is a PDCH and no reallocation of the RR connection is needed.

The MAIN DCCH ASSIGNMENT COMMAND message is only sent to allocate the main DCCH as the requested packet resource. This messages indicates the maximum number of octets in length that further LLC frames can be in order to be able to use the main DCCH without a request. A new packet request procedure shall be initiated when the length of the LLC frame is above this value or when there is a change in any of the other parameters sent in the DTM REQUEST message.

On receipt of a:

- DTM ASSIGNMENT COMMAND message,
- PACKET ASSIGNMENT COMMAND message or
- MAIN DCCH ASSIGNMENT COMMAND message,

the mobile station shall stop T3148 and T3142 (if running), and switch to the assigned resources. The mobile station has then entered the dual transfer mode.

3.4.22.1.1.3.2 RR reallocation only

During the packet request procedure the network may send a

- HANDOVER COMMAND message or
- ASSIGNMENT COMMAND message,

upon whose receipt the timers T3148 and T3142 are stopped (if running), any allocated packet resource is released and the handover or assignment procedure is performed.

3.4.22.1.1.3.3 Packet request rejection

If the network cannot allocate the requested packet resource it may send the mobile station a DTM REJECT message in acknowledged mode on the main DCCH. This message contains a wait time ("wait indication" information element). The mobile station is not allowed to make a new attempt for packet request during the waiting time.

The DTM REJECT message also contains an indication of whether the waiting time applies after a successful handover procedure or a re-attempt of packet resource establishment can be made immediately after it. The waiting time shall always end when theMS enters the idle mode.

On receipt of the DTM REJECT message, the mobile station stops T3148 if it has not already been stopped, notifies upper layers of a packet resource establishment failure and starts timer T3142 with the indicated value.

During the validity of the waiting time, additional DTM REJECT messages are ignored, but any DTM assignment message make the mobile station follow the procedure in section 3.4.22.1.1.3.1. If no such assignment message is received, after the validity of the waiting time, the mobile station may re-attempt the packet request procedure.

3.4.22.1.1.4 Packet request completion

The completion of the packet request procedure depends on the actual assignment message used by the network:

- when the network sends a DTM ASSIGNMENT COMMAND message (i.e. reallocation of the CS resource is required), after the main signalling link is successfully established, the mobile station returns an ASSIGNMENT COMPLETE message, specifying cause "normal event", to the network on the main DCCH. The packet request procedure is completed for the mobile station when the ASSIGNMENT COMPLETE message is sent and for the network when it is received. The network then stops timer T3107.
- when the network sends a PACKET ASSIGNMENT COMMAND or a MAIN DCCH ASSIGNMENT COMMAND message, the packet request procedure is completed for the network when assignment message is sent and for the mobile station when it is received.

When the packet request procedure is completed, the mobile station has entered the dual transfer mode.

3.4.22.1.1.5 Abnormal cases

If a failure occurs on the mobile station side before the packet request procedure is completed, all the allocated packet resources are released, the mobile station returns to dedicated mode and upper layers are notified (packet resource establishment failure).In the following cases a packet resource establishment failure has occurred and the mobile station sends a DTM ASSIGNMENT FAILURE message on the old main DCCH:

- if a DTM assignment message indicates packet resources in a non-supported frequency;
- if the information available in the mobile station after the reception of a DTM assignment message does not satisfactorily define uplink packet resources;
- if the mobile allocation indexes frequencies in more than one frequency;
- if a DTM assignment message assigns resources not compliant with the multislot capabilities of the mobile station.

In addition:

- If the network commands the mobile station to reallocate the RR connection and the establishment of the main DCCH fails, the mobile station shall revert to the old channel and send an ASSIGNMENT FAILURE message on the old main DCCH.
- At expiry of timer T3148, the packet request procedure is aborted and a packet resource establishment failure is indicated to the upper layers.

3.4.22.2 Packet notification procedure in dedicated mode

The packet notification procedure is initiated by the RR entity of the network side. It is triggered by a page request from the GMM sublayer, see TS 24.007.

3.4.22.2.1 Packet notification initiation by the network

The network initiates the packet notification procedure by sending the mobile station a PACKET NOTIFICATION message on the main DCCH.

The network shall not send the PACKET NOTIFICATION message to a mobile station that does not support dual transfer mode operation. If a mobile station not supporting dual transfer mode receives this message, it shall ignore it and remain in dedicated mode.

3.4.22.2.2 Packet notification response

Upon receipt of the PACKET NOTIFICATION message, the RR sublayer of the mobile station indicates the receipt of a packet paging request to the GMM sublayer; see TS 24.007.

3.4.22.3 Packet downlink assignment in dedicated mode

The packet downlink assignment procedure in dedicated mode may be used to establish a packet resource to support the transfer of LLC PDUs in the direction from the network to the mobile station.

This procedure is only applicable to a mobile station in dedicated mode and with no TBF allocated. If the mobile station already has an ongoing TBF, the establishment of the downlink packet resource is performed on the PACCH; see 04.60.

The establishment of a downlink packet resource is initiated by the RR entity on the network side using the packet downlink assignment procedure in dedicated mode. The procedure is triggered by a request from upper layers to transfer an LLC PDU; see TS 24.007. The request from upper layers specifies a QoS profile, an *RLC mode*, *DRX parameters* and an *MS classmark* associated with the packet transfer.

3.4.22.3.1 Initiation of the packet downlink assignment procedure in dedicated mode

The network initiates the packet downlink assignment procedure in dedicated mode by sending a DTM assignment message (i.e. DTM ASSIGNMENT COMMAND, a PACKET ASSIGNMENT COMMAND or a MAIN DCCH ASSIGNMENT COMMAND) in acknowledged mode on the main DCCH.

The network shall not send any of the DTM assignment messages to a mobile station that does not support dual transfer mode operation. If a mobile station not supporting dual transfer mode receives any of these messages, it shall ignore it and remain in dedicated mode.

When a TBF is assigned:

- The assignment message may indicate a TBF starting time.
- If the mobile station receives the message before the TBF starting time has expired, it shall wait until the frame number indicated by the TBF starting time and switch to the assigned PDCH.
- If the mobile station receives the message after the TBF starting time has expired, it shall ignore the indicated TBF starting time and switch to the assigned PDCH.
- If the Polling bit is set to 1, MS shall send a PACKET CONTROL ACKNOWLEDGEMENT message (see 04.60) on the assigned PDCH, in the uplink block specified by the TBF Starting Time. In this case, the TBF Starting Time is used both to indicate when the assigned PDCH becomes valid and to specify the uplink block. If the TBF Starting Time is not present or has expired, the MS shall ignore the polling request. The PACKET CONTROL ACKNOWLEDGEMENT message shall be sent as normal bursts irrespective of the value of the CONTROL_ACK_TYPE field.

3.4.22.3.2 Packet downlink assignment completion

The completion of the packet downlink assignment procedure while in dedicated mode depends on the actual assignment message used by the network:

- when the network sends a DTM ASSIGNMENT COMMAND message (i.e. reallocation of the RR connection is required), after the main signalling link is successfully established, the mobile station returns an ASSIGNMENT COMPLETE message, specifying cause "normal event", to the network on the main DCCH. The packet downlink assignment procedure is completed for the mobile station when the ASSIGNMENT COMPLETE message is sent and for the network when it is received.
- when the network sends a PACKET ASSIGNMENT COMMAND or a MAIN DCCH ASSIGNMENT COMMAND message, the packet downlink assignment procedure is completed for the network when assignment message is sent and for the mobile station when it is received.

3.4.22.3.3 Abnormal cases

If a failure occurs on the mobile station side before the packet downlink assignment procedure is completed, all the allocated packet resources are released, the mobile station returns to dedicated mode and upper layers are notified (packet resource establishment failure).

In the following cases a packet resource establishment failure has occurred and the mobile station sends a DTM ASSIGNMENT FAILURE message on the old main DCCH:

if a DTM assignment message indicates packet resources in a non-supported frequency;

if the information available in the mobile station after the reception of a DTM assignment message does not satisfactorily define uplink packet resources;

if the mobile allocation indexes frequencies in more than one frequency;

if a DTM assignment message assigns resources not compliant with the multislot capabilities of the mobile station.

In addition:

If the network commands the mobile station to reallocate the RR connection and the establishment of the main DCCH fails, the mobile station shall revert to the old channel and send an ASSIGNMENT FAILURE message on the old main DCCH.

At expiry of timer T3148, the packet request procedure is aborted and a packet resource establishment failure is indicated to the upper layers.

3.4.22.4 Modification of packet resources while in DTM

When the mobile station is in dual transfer mode, the network or mobile station may wish to modify the allocated packet resource. When the mobile station has an ongoing TBF, the procedures described in 04.60 shall be used. When the main DCCH is the only packet resource that the mobile station has, the RR procedures related to packet resource establishment while in dedicated mode shall be used.

3.4.23 RR procedures related to packet resource maintenance while in dual transfer mode

Once the mobile station enters the dual transfer mode, the existent procedures apply (see 04.60). Some exceptions to the existent procedures while in dedicated mode are:

- When all packet resources have been released (or aborted), the mobile station returns to dedicated mode.
- When the mobile station is in dual transfer mode, it shall ignore any RR-CELL CHANGE ORDER or PACKET CELL CHANGE ORDER message and shall remain in dual transfer mode.
- When the mobile station receives a HANDOVER COMMAND or an ASSIGNMENT COMMAND message, it shall abandon the packet resource immediately, enter dedicated mode and perform the handover or assignment procedure, respectively.
- As stated in 05.08, no GPRS measurement reporting is performed.

The mobile station remains in dual transfer mode until the RR connection or all the packet resources are released.

3.4.24 RR procedures related to packet resource release while in dual transfer mode

The release of a TBF shall follow the procedures in 04.60.

The use of the main DCCH as a packet resource is stopped at the release of the signalling connection (during a handover or assignment procedure) or at the reception of a DTM assignment message allocating other packet resources.

In the case of the release of the RR connection while in dual transfer mode, the mobile station shall abandon the packet resource and, once in idle mode and packet idle mode, it may start a new establishment as described in 04.60.

3.5 RR procedures on CCCH related to temporary block flow establishment

The establishment of a temporary block flow (TBF) on a packet data physical channel is supported by procedures on CCCH when PCCCH is not provided in the cell. The procedures for temporary block flow establishment using CCCH are only applicable to a mobile station supporting GPRS. The procedures are optional for the network.

These procedures constitute a complement to the corresponding procedures for temporary block flow establishment using PCCCH, defined in GSM 04.60, and include the procedures using CCCH for *packet paging* (section 3.5.1), *packet access* (section 3.5.2) and *packet downlink assignment* (section 3.5.3).

3.5.1 Packet paging procedure using CCCH

The network can initiate the packet paging procedure in order to cause upper layers in the mobile station to respond, see section 4. The packet paging procedure can only be initiated by the network.

3.5.1.1 Packet paging initiation by the network

The packet paging procedure is initiated by the RR entity of the network side. It is triggered by a page request from the MM sublayer, see TS 24.007.

The network initiates the paging procedure by sending a paging request message on an appropriate paging subchannel on CCCH or PCCCH. Paging initiation using a paging subchannel on CCCH is used when sending paging information to a mobile station and PCCCH is not present in the cell.

NOTE 1: There are three types of paging request messages that are applicable:

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

In a PAGING REQUEST message used for the packet paging procedure, the mobile station shall be identified by the P-TMSI (GPRS TMSI) or its IMSI. If the mobile station is identified by the P-TMSI, it shall proceed as specified in section 3.5.1.2.

If the mobile station identified by its IMSI, it shall parse the message for a corresponding *Packet Page Indication* field:

- if the *Packet Page Indication* field indicates a paging procedure for RR connection establishment, or the field is not present in the message, the mobile station shall proceed as specified in section 3.3.2.2;
- if the *Packet Page Indication* field indicates a packet paging procedure, the mobile station shall proceed as specified in section 3.5.1.2.

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

The mobile station in packet idle mode is required to receive and analyse the paging messages and immediate assignment messages sent on the paging subchannels on CCCH corresponding to the paging groups determined for it in packet idle mode, as specified in GSM 05.02. These messages contain a page mode information element.

NOTE 2: The possible immediate assignment messages are: the IMMEDIATE ASSIGNMENT, the IMMEDIATE ASSIGNMENT EXTENDED and the IMMEDIATE ASSIGNMENT REJECT messages.

The treatment of page mode information, including the procedure when the mobile station selects a new PCH, and the procedure if a message in a paging subchannel is not received correctly are defined in section 3.3.2.1.1.

3.5.1.2 On receipt of a packet paging request

On the receipt of a paging request message, the RR sublayer of addressed mobile station indicates the receipt of a paging request to the MM sublayer, see TS 24.007;

3.5.2 Packet access procedure using CCCH

The packet access procedure using CCCH may be used to establish a temporary block flow to support the transfer of LLC PDUs in the direction from the mobile station to the network. Establishment using one phase and two phase packet access, see GSM 04.60, are supported. The two phase packet access is supported by means of the single block or multiple block packet access option in this procedure, allowing the transfer of a PACKET RESOURCE REQUEST and possibly an ADDITIONAL MS RADIO ACCESS CAPABILITIES message to the network.

The single block packet access option in this procedure may also be used by a mobile station in packet idle mode to transfer an RLC/MAC control message other than the PACKET RESOURCE REQUEST message to the network, see section 3.5.2.2.

3.5.2.1 Entering the packet transfer mode: packet access procedure

The establishment of an uplink temporary block flow may be initiated by the RR entity of the mobile station using the packet access procedure. The procedure is triggered by a request from upper layers to transfer a LLC PDU, see TS 24.007. The request from upper layers specifies *radio priority* and an *RLC mode* associated with the packet transfer or it indicates that the packet to be transferred contains signalling.

Upon such a request,

- if access to the network is allowed (section 3.5.2.1.1), the RR entity of the mobile station initiates the packet access procedure as defined in section 3.5.2.1.2;

- otherwise, it rejects the request.

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

3.5.2.1.1 Permission to access the network

Access to the network is allowed:

- if the mobile station is a member of at least one authorized access class or special access class as defined in section 3.3.1.1.1, and

- if packet access is allowed in the cell for the *radio priority* level associated with the packet transfer, as indicated by the PRIORITY_ACCESS_THR parameter broadcast in SI 13 message.

- if the cell belongs to one of the allowed LSAs for the mobile station, as indicated on the SIM, in the case where the mobile station is a LSA only access subscriber.

3.5.2.1.2 Initiation of the packet access procedure: channel request

The mobile station initiates the packet access procedure by scheduling the sending of CHANNEL REQUEST messages on RACH.

Alternatively, if the SI13 indicates that the cell is EGPRS capable and EGPRS PACKET CHANNEL REQUEST on RACH is supported in the cell, an EGPRS mobile station shall send the 11 bits EGPRS PACKET CHANNEL REQUEST messages at one-phase access attempts, two-phase access attempts and short access attempts (see GSM 04.60); if the SI 13 indicates that the cell is EGPRS capable and EGPRS PACKET CHANNEL REQUEST on RACH is not supported in the cell, the EGPRS mobile station shall use the 8 bit CHANNEL REQUEST message and shall initiate a two phase access request.

The mobile station then leaves the packet idle mode. In particular, the mobile station station shall ignore PAGING REQUEST messages indicating a packet paging procedure.

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

The mobile station schedules CHANNEL REQUEST or EGPRS PACKET CHANNEL REQUEST messages on RACH as defined in section 3.3.1.1.2.

The CHANNEL REQUEST or EGPRS PACKET CHANNEL REQUEST messages are sent on RACH and contain the parameters:

- an establishment cause which indicates packet access, and as applicable, a request for one phase packet access or single block packet access for a CHANNEL REQUEST (section 9.1.8), or a request for one phase access or two phase access or short access for a EGPRS PACKET CHANNEL REQUEST (see GSM 04.60);
- a random reference which is drawn randomly from an uniform probability distribution for every new transmission.

If the requested RLC mode is *unacknowledged mode*, the mobile station shall request a single block packet access and attempt a two phase packet access. If the requested RLC mode is *unacknowledged EGPRS mode TBF*, the mobile station shall request and attempt a two phase packet access.

If the purpose of the packet access procedure is to send a Page Response, Cell update, for a GPRS Mobility Management or a GPRS Session Management procedure, (i.e. the access is for Layer 3 signalling only, and not for a Layer 3 data transfer), the mobile station shall request a one phase packet access by sending a CHANNEL REQUEST message.

If the purpose of the packet access procedure is to send a PACKET PAUSE message the mobile station shall request a single block packet access. Upon sending the first CHANNEL REQUEST or EGPRS PACKET CHANNEL REQUEST message the mobile station shall start timer T3204. If timer T3204 expires before an IMMEDIATE ASSIGNMENT message granting a single block period on an assigned packet uplink resource is received, the packet access procedure is aborted. If the mobile station receives an IMMEDIATE ASSIGNMENT message during the packet access procedure indicting a packet downlink assignment procedure, the mobile station shall ignore the message.

After sending the first CHANNEL REQUEST or EGPRS PACKET CHANNEL REQUEST message, the mobile station shall start listening to the BCCH; it shall also listen to the full downlink CCCH timeslot corresponding to its CCCH group. The mobile station shall perform signal strength measurements as they are defined for packet idle mode, see GSM 05.08.

Having sent the maximum number of CHANNEL REQUEST messages, the mobile station starts timer T3146. At expiry of timer T3146, the packet access procedure is aborted and a packet access failure is indicated to upper layers.

If the mobile station receives an IMMEDIATE ASSIGNMENT message during the packet access procedure indicating a packet downlink assignment procedure, the mobile station shall abort the packet access procedure and respond to the IMMEDIATE ASSIGNMENT message as specified in section 3.5.3.1.2. The mobile station shall then attempt an establishment of uplink TBF, using the procedure specified in GSM 04.60 which is applicable in packet transfer mode.

3.5.2.1.3 Packet immediate assignment

3.5.2.1.3.1 On receipt of a CHANNEL REQUEST or EGPRS PACKET CHANNEL REQUEST message

On receipt of a CHANNEL REQUEST message indicating a packet access, the network may allocate a temporary flow identity and assign a packet uplink resource comprising one PDCH for an uplink temporary block flow in GPRS TBF mode. On receipt of a EGPRS PACKET CHANNEL REQUEST message, the network may allocate a temporary flow identity and assign a packet uplink resource comprising one PDCH for an uplink temporary block flow in EGPRS TBF mode or GPRS TBF mode.

If the establishment cause in the CHANNEL REQUEST message indicates a request for a single block packet access, the network shall grant only the single block period on the assigned packet uplink resource if the network allocates resource for the mobile station. If the establishment cause in the EGPRS PACKET CHANNEL REQUEST message indicates a request for a two phase access, the network shall grant one or two radio blocks for the mobile station (within a Multi Block allocation) to send a PACKET RESOURCE REQUEST and possibly an ADDITIONAL MS RADIO ACCESS CAPABILITIES messages on the assigned packet uplink resource if the network allocates resource for the mobile station.

If the establishment cause in the CHANNEL REQUEST message indicates a request for one phase packet access, the network may grant either a one phase packet access or a single block packet access for the mobile station. If a single block packet access is granted, it forces the mobile station to perform a two phase packet access. If the establishment cause in the EGPRS PACKET CHANNEL REQUEST message indicates a request for one phase packet access, the network may grant either a one phase packet access or a two phase access (within a Multi Block allocation). If a multiple block packet access is granted, it forces the mobile station to perform a two phase packet access.

The packet uplink resource is assigned to the mobile station in an IMMEDIATE ASSIGNMENT message sent in unacknowledged mode on the same CCCH timeslot on which the network has received the CHANNEL REQUEST or the EGPRS PACKET CHANNEL REQUEST message. There is no further restriction on what part of the downlink CCCH timeslot the IMMEDIATE ASSIGNMENT message can be sent. Timer T3141 is started on the network side.

The IMMEDIATE ASSIGNMENT message contains:

- the information field of the CHANNEL REQUEST or the EGPRS PACKET CHANNEL REQUEST message and the frame number of the frame in which the CHANNEL REQUEST or the EGPRS PACKET CHANNEL REQUEST message was received;
- the packet channel description;
- the initial timing advance;
- the packet uplink assignment or EGPRS packet uplink assignment construction.

If frequency hopping is applied, the network may use the indirect encoding or the direct encoding of the frequency configuration in the *Packet Channel Description* information element. If the indirect encoding is used, the mobile station uses information received in system information or stored from a previous assignment to determine the frequency parameters, see GSM 04.60. If the direct encoding is used, the mobile station uses the cell allocation defined for the cell to decode the mobile allocation.

If the *indirect encoding* is used, the IMMEDIATE ASSIGNMENT message may contain a CHANGE_MARK_1 field. If that is present, the mobile station shall verify the validity of the SI13_CHANGE_MARK associated with the GPRS mobile allocation to which the message refers, see GSM 04.60. If the CHANGE_MARK_1 field and the SI13_CHANGE_MARK do not match, the message does not satisfactorily define a PDCH.

If the mobile station receives an IMMEDIATE ASSIGNMENT message and the *Dedicated mode or TBF* information element indicates that this is the first message in a two-message assignment, the mobile station shall continue to listen to the full CCCH. The network may send a second IMMEDIATE ASSIGNMENT message to the mobile station within two multiframe periods following the first IMMEDIATE ASSIGNMENT message, specifying the packet channel description and, if required, a mobile allocation for the assignment. The two IMMEDIATE ASSIGNMENT messages in a two-message assignment shall have the same contents of the *Request Reference* information elements.

If the mobile station does not receive the second IMMEDIATE ASSIGNMENT messages in a two-message assignment within two multiframe periods following the first message, the mobile station shall discard the first IMMEDIATE ASSIGNMENT message received.

On receipt of an IMMEDIATE ASSIGNMENT message or, in case of a two-message assignment, a matching pair of IMMEDIATE ASSIGNMENT messages corresponding to one of its 3 last CHANNEL REQUEST or EGPRS PACKET CHANNEL REQUEST messages, the mobile station stops T3146 (if running), stops sending CHANNEL REQUEST or EGPRS PACKET CHANNEL REQUEST messages, and switches to the assigned PDCH.

The content of the packet uplink assignment construction (respectively EGPRS packet uplink assignment construction indicates which type of packet access is granted: *one phase packet access* or *single (respectively multiple) block packet access*

3.5.2.1.3.2 One phase packet access

In the case the one phase packet access is granted, the packet uplink assignment construction contains:

- the temporary flow identity;
- the USF value, if the medium access method is dynamic allocation;
  or
  the fixed allocation bitmap, if the medium access method is fixed allocation;
- the channel coding scheme for RLC data blocks;
- the power control parameters;
- the polling bit ;- optionally, the timing advance index (see GSM 05.10);
- optionally, the TBF starting time (note: TBF starting time is mandatory if medium access method is fixed allocation).

In addition, the EGPRS packet uplink assignment construction also contains :

- the EGPRS modulation and coding scheme ;
- information whether retransmitted uplink data blocks shall be resegmented or not ;
- the EGPRS window size to be used within the transmission ;
- optionally a request for the mobile station to send its radio access capability information.

The medium access method is *dynamic allocation* or *fixed allocation* and the RLC mode is *acknowledged mode*, see GSM 04.60.

If the medium access method is *fixed allocation*, and the number of blocks allocated in the ALLOCATION_BITMAP is not sufficient to transfer all the RLC/MAC blocks that the MS has to transmit at the time the packet uplink assignment construction is received, the MS shall request additional resources by sending a PACKET RESOURCE REQUEST on one of the allocated blocks.

If the timing advance index (TAI) is included in the packet uplink assignment construction, the mobile station shall use the continuous update timing advance mechanism, see GSM 05.10, using PTCCH in the same timeslot as the assigned PDCH. If a timing advance index (TAI) field is not included, the continuous update timing advance mechanism shall not be used.

In case the packet uplink assignment or EGPRS packet uplink assignment construction contains a TBF starting time and the mobile station receives the message before the TBF starting time has expired, it shall wait until the frame number indicated by the TBF starting time before accessing the channel. If the mobile station receives the message after the TBF starting time has expired, it shall ignore the TBF starting time and may immediately access the channel. If the medium access method is *dynamic allocation*, the mobile station shall start timer T3164. Regardless of which allocation mode is used, the mobile station shall proceed with the contention resolution at one phase access defined in GSM 04.60.

If the Polling bit is set to 1, MS shall send a PACKET CONTROL ACKNOWLEDGEMENT message (see 04.60) on the assigned PDCH, in the uplink block specified by the TBF Starting Time. In this case the TBF Starting Time is used both to indicate when the assigned PDCH becomes valid and to specify the uplink block. If the TBF Starting Time is not present or has expired, the MS shall ignore the polling request.

When the mobile station switches to the assigned PDCH, it shall take the power control parameters received in the IMMEDIATE ASSIGNMENT message into account, perform signal strength measurements and apply output power control procedures as they are defined for packet transfer mode, see GSM 05.08.

When assigning an EGPRS TBF, the network may request information about radio access capabilities of the mobile station on one or several frequency bands within the IMMEDIATE ASSIGNMENT message ; the list of frequency bands is ordered by the network starting with the most important and ending with the least important one. The mobile station shall provide the network with its radio access capabilities for the frequency bands it supports, in the same priority order as the one specified by the network, by sending a PACKET RESOURCE REQUEST message, and an ADDITIONAL MS RADIO ACCESS CAPABILITIES if all the requested informations do not fit in the PACKET RESOURCE REQUEST. If the mobile station does not support any frequency band requested by the network, it shall report its radio access capabilities for the BCCH frequency band. The mobile station shall indicate in the PACKET RESOURCE REQUEST if it will send more information about its radio access capabilities in the ADDITIONAL MS RADIO ACCESS CAPABILITIES message. The PACKET RESOURCE REQUEST and the ADDITIONAL MS RADIO ACCESS CAPABILITIES shall be sent within the one or two first radio blocks allocated for the mobile station on the assigned PDCH.

The network may request a retransmission of the PACKET RESOURCE REQUEST and the ADDITIONAL MS RADIO ACCESS CAPABILITIES messages. A request for retransmission of one or both of these messages shall be indicated in the PACKET UPLINK ACK/NACK message. The mobile station has to indicate within the PACKET RESOURCE REQUEST if the message is a retransmitted one.

3.5.2.1.3.3 Single block packet access

In the case the single block packet access is granted, the packet uplink resource description contains:

- the power control parameter setting;
- the TBF starting time.

If the mobile station receives the IMMEDIATE ASSIGNMENT message before the TBF starting time has expired, it shall wait until the block period indicated by the TBF starting time. The network shall use the TBF starting time to indicate the first frame number belonging to the single block period granted for packet access. The mobile station may either use the assigned block period to send a PACKET RESOURCE REQUEST message to initiate the two phase packet access procedure defined in GSM 04.60, or to send an RLC/MAC control message other than the PACKET RESOURCE REQUEST message to the network, see section 3.5.2.2.

If the mobile station receives the IMMEDIATE ASSIGNMENT message after the TBF starting time has expired, a failure has occurred.

If a failure occurs and the packet access attempt was due to a request from upper layers to transfer a LLC PDU, a TBF establishment failure has occurred and the mobile station proceeds as specified in section 3.5.2.1.5. If a failure occurs and the packet access attempt was due to the sending of an RLC/MAC control message, the packet access is aborted, the mobile station returns to packet idle mode.

3.5.2.1.3.3a Multiblock packet access

In the case the multiblock packet access is granted, the EGPRS packet uplink assignment description contains:

- timeslot number of the allocation and the number of blocks allocated;
- the power control parameter setting;
- the TBF starting time.

When assigning a multiblock packet access, the network may request information about radio access capabilities of the mobile station on one or several frequency bands within the IMMEDIATE ASSIGNMENT message and allocate one or two radio blocks for uplink control messages accordingly ; the list of frequency bands is ordered by the network starting with the most important and ending with the least important one . The mobile station shall then provide the network with its radio access capabilities for the frequency bands it supports, in the same priority order as the one specified by the network, by sending a PACKET RESOURCE REQUEST message in the first radio block on the assigned PDCH, and an ADDITIONAL MS RADIO ACCESS CAPABILITIES immediately after the PACKET RESOURCE REQUEST message on the assigned PDCH if all the requested informations do not fit in the PACKET RESOURCE REQUEST and two radio blocks have been allocated by the network. If the mobile station does not support any frequency band requested by the network, it shall report its radio access capabilities for the BCCH frequency band in the PACKET RESOURCE REQUEST message. The mobile station shall indicate in the PACKET RESOURCE REQUEST if it will send more information about its radio access capabilities in the ADDITIONAL MS RADIO ACCESS CAPABILITIES message. If the mobile station has been allocated two radio blocks and all the requested informations fit in the PACKET RESOURCE REQUEST message, no ADDITIONAL MS RADIO ACCESS CAPABILITIES message shall be sent (see 04.60). Instead, some uplink control block (e.g. packet measurement report, packet uplink dummy control block) may be sent by the mobile station.

The network may indicate in the next PACKET UPLINK ASSIGNMENT message a request for retransmission of the ADDITIONAL MS RADIO ACCESS CAPABILITIES message (see GSM 04.60).

If the mobile station receives the IMMEDIATE ASSIGNMENT message before the TBF starting time has expired, it shall wait until the block period indicated by the TBF starting time. The network shall use the TBF starting time to indicate the first frame number belonging to the multi block period granted for packet access. If the mobile station receives the IMMEDIATE ASSIGNMENT message after the TBF starting time has expired, a failure has occurred.

If a failure occurs and the packet access attempt was due to a request from upper layers to transfer a LLC PDU, a TBF establishment failure has occurred and the mobile station proceeds as specified in section 3.5.2.1.5. If a failure occurs and the packet access attempt was due to the sending of an RLC/MAC control message, the packet access is aborted, the mobile station returns to packet idle mode.

3.5.2.1.3.4 Packet access rejection

The network may send to the mobile station an IMMEDIATE ASSIGNMENT REJECT message in unacknowledged mode on the same CCCH timeslot on which the channel request message was received. There is no further restriction on what part of the downlink CCCH timeslot an IMMEDIATE ASSIGNMENT REJECT message can be sent. This message contains the request reference and a wait indication.

On receipt of an IMMEDIATE ASSIGNMENT REJECT message corresponding to one of its 3 last CHANNEL REQUEST messages, the mobile station stops sending CHANNEL REQUEST messages, starts timer T3142 with the indicated value, ("wait indication" information element), starts T3146 if it has not already been started, and listens to the downlink CCCH until T3146 expires. During this time, additional IMMEDIATE ASSIGNMENT REJECT messages are ignored, but any immediate assignment corresponding to any other of its 3 last CHANNEL REQUEST messages make the mobile station follow the procedure in section 3.5.2.1.3.1. If no such immediate assignment is received, the mobile station returns to packet idle mode and notify higher layers (TBF establishment failure) and notify higher layers (TBF establishment failure).

If the purpose of the packet access procedure is to send a PACKET PAUSE message and an IMMEDIATE ASSIGNMENT REJECT message is received, the packet access procedure is aborted.

If the mobile station has received responses from the network on all, or in case more than 3 were sent the last 3, of its CHANNEL REQUEST messages, it shall immediately return to packet idle mode and notify higher layers.

The mobile station is not allowed to make a new attempt for packet access in the same cell until T3142 expires, but may attempt packet access in an other cell after successful cell reselection for radio conditions reasons (see GSM 05.08). The value of the wait indication (i.e. T3142) relates to the cell from which it was received.

The mobile station may initiate RR connection establishment in the same cell before T3142 has expired, see section 3.3.1.1.3.2.

3.5.2.1.4 Packet access completion

The one phase packet access procedure is completed at a successful contention resolution. The mobile station has entered the packet transfer mode. Timer T3141 is stopped on the network side. Timer T3164 is stopped on the mobile station side.

3.5.2.1.5 Abnormal cases

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

- If a TLLI mismatch has occurred during the contention resolution procedure, and the repetition of the packet access has been repeated the maximum number of times as defined in GSM 04.60, a TBF establishment failure has occurred.

- If the information available in the mobile station, after the reception of an IMMEDIATE ASSIGNMENT message or the second IMMEDIATE ASSIGNMENT message of a two-message assignment, does not satisfactorily define a PDCH, a TBF establishment failure has occurred.

- If the mobile allocation indexes frequencies in more than one frequency band then a TBF establishment failure has occurred.

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

On the network side, if timer T3141 elapses before a successful contention resolution procedure is completed, the newly allocated temporary block flow is released as specified in GSM 04.60 and the packet access is forgotten.

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

The sending of an RLC/MAC control message other than the PACKET RESOURCE REQUEST message from a mobile station in packet idle mode to the network may be initiated by the RR entity on the mobile station side using the packet access procedure. If access to the network is allowed (section 3.5.2.1.1), the packet access is done according to the procedures defined in sections 3.5.2.1.2 and 3.5.2.1.3, using the single block packet access option defined in section 3.5.2.1.3.3.

Further action depends on the RLC/MAC control message sent by the mobile station, see GSM 04.60. Unless otherwise indicated by the RLC/MAC control message, the mobile station remains in packet idle mode.

3.5.3 Packet downlink assignment procedure using CCCH

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

This procedure may also be used to assign a single downlink block on a PDCH to support the transfer of an RLC/MAC control message from the network to a mobile station in packet idle mode, see 3.5.3.2.

3.5.3.1 Entering the packet transfer mode: packet downlink assignment procedure

The establishment of a downlink temporary block flow may be initiated by the RR entity on the network side using the packet downlink assignment procedure. The procedure is triggered by a request from upper layers to transfer a LLC PDU, see TS 24.007. The request from upper layers specifies an optional *Priority* level, a QoS profile including thean requested *RLC mode*, optional *DRX parameters*, and optional *IMSI* and an optional *MS Radio Access Capability* associated with the packet transfer.

Upon such a request, the network shall determine whether the mobile station is in packet idle mode or packet transfer mode. The packet downlink assignment procedure using CCCH is applicable when the mobile station is in packet idle mode and when there is no PCCCH present in the cell.

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

3.5.3.1.2 Initiation of the packet downlink assignment procedure

The network initiates the packet downlink assignment procedure by sending an IMMEDIATE ASSIGNMENT message in unacknowledged mode on the CCCH timeslot corresponding to CCCH group the mobile station belongs to. appropriate CCCH group is calculated from the IMSI, see 05.02. The behaviour of the network when the RR entity does not receive the IMSI from the upper layers is implementation dependent for the calculation of the CCCH group where the IMMEDIATE ASSIGNMENT message has to be sent. If the mobile station is in non-DRX mode or if the RR entity does not receive the IMSI or the DRX parameters from the upper layers, there is no further restriction on what part of the downlink CCCH timeslot the IMMEDIATE ASSIGNMENT message, or the first part of the IMMEDIATE ASSIGNMENT message (in the case of a two-message assignment), can be sent. If the mobile station applies DRX, the

IMMEDIATE ASSIGNMENT message, or the first part of the IMMEDIATE ASSIGNMENT message (in the case of a two-message assignment), shall be sent in a CCCH block corresponding to a paging group determined for the mobile station in packet idle mode, see GSM 05.02.

The IMMEDIATE ASSIGNMENT message contains:

- the packet channel description;
- the initial timing advance;
- the packet downlink assignment construction

The contents of the packet downlink assignment construction determines the further action. At the establishment of a downlink temporary block flow, the packet downlink assignment construction shall contain:

- the TLLI;
- the temporary flow identity;
- the RLC mode;
- the power control parameters;
- the polling bit ;
- the initial timing advance validity flag;
- optionally, EGPRS Window Size (see GSM 04.60) and Link Quality Measurement Mode (see GSM 04.60);
- optionally, the timing advance index (see GSM 05.10);
- optionally, the TBF starting time.

If frequency hopping is applied, the network may use the indirect encoding or the direct encoding of the frequency configuration in the *Packet Channel Description* information element. If the indirect encoding is used, the mobile station uses information received in system information or stored from a previous assignment to determine the frequency parameters, see GSM 04.60. If the direct encoding is used, the mobile station uses the cell allocation defined for the cell to decode the mobile allocation.

If the *indirect encoding* is used, the IMMEDIATE ASSIGNMENT message may contain a CHANGE_MARK_1 field. If that is present, the mobile station shall verify the validity of the SI *change mark* associated with the GPRS mobile allocation to which the message refers, see GSM 04.60. If the CHANGE_MARK_1 field and the SI *change mark* do not match, the message does not satisfactorily define a PDCH.

If the mobile station receives an IMMEDIATE ASSIGNMENT message and the *Dedicated mode or TBF* information element indicates that this is the first message in a two-message assignment, the mobile station shall start listen to the full CCCH. The network may send a second IMMEDIATE ASSIGNMENT message to the mobile station within two multiframe periods following the first IMMEDIATE ASSIGNMENT message, specifying the packet channel description and, if required, a mobile allocation for the assignment. The two IMMEDIATE ASSIGNMENT messages in a two-message assignment shall have the same contents of the *Request Reference* information elements.

If the mobile station was operating in DRX mode when it received the first message of a two-message assignment, the network shall not send the second IMMEDIATE ASSIGNMENT message within the two block periods immediately following the first message.

If the mobile station does not receive the second IMMEDIATE ASSIGNMENT messages in a two-message assignment within two multiframe periods following the first message, the mobile station shall discard the first IMMEDIATE ASSIGNMENT message received. After the two multiframe periods following the first message, the mobile station may resume to DRX mode.

On receipt of an IMMEDIATE ASSIGNMENT message or, in case of a two-message assignment, a matching pair of IMMEDIATE ASSIGNMENT messages, the mobile station stops monitoring downlink CCCH and switches to the assigned PDCH and starts listening for downlink RLC/MAC blocks identified by the assigned TFI; it starts timer T3190.

The IMMEDIATE ASSIGNMENT message may indicate a TBF starting time. If the mobile station receives the message before the TBF starting time has expired, it shall wait until the frame number indicated by the TBF starting time, start timer T3190 and switch to the assigned PDCH. If the mobile station receives the message after the TBF starting time has expired, it shall ignore the indicated TBF starting time, immediately start timer T3190 and switch to the assigned PDCH.

When the mobile station switches to the assigned PDCH, it shall take the power control parameters received in the IMMEDIATE ASSIGNMENT message into account, perform signal strength measurements and apply output power control procedures as they are defined for packet transfer mode, see GSM 05.08.

If the Polling bit is set to 1, MS shall send a PACKET CONTROL ACKNOWLEDGEMENT message (see 04.60) on the assigned PDCH, in the uplink block specified by the TBF Starting Time. In this case the TBF Starting Time is used both to indicate when the assigned PDCH becomes valid and to specify the uplink block. If the TBF Starting Time is not present or has expired, the MS shall ignore the polling request.

An IMMEDIATE ASSIGNMENT message may indicate a timing advance index (TAI) in the packet timing advance IE. The mobile station shall then use the continuous update timing advance mechanism, see GSM 05.10, using PTCCH in the same timeslot as the assigned PDCH. If there is no indication of a timing advance index, the continuous update timing advance mechanism shall not be used.

The TA_VALID flag indicates if the value of the *Timing Advance* IE is valid or not.

If the network does not have a valid timing advance value for the mobile station to include in the IMMEDIATE ASSIGNMENT message, the network shall use the procedures defined in GSM 04.60 on the assigned TBF, or the polling mechanism defined in the above paragraph if the PACKET CONTROL ACKNOWLEDGEMENT format is set to four access bursts, to obtain a timing advance value and to update the initially assigned timing advance value before the mobile station is required to transmit other than access burst on the newly assigned channel.

The packet downlink construction may optionally contain the EGPRS Window Size (see GSM 04.60) and Link Quality Measurement Mode (see GSM 04.60). The presence of these fields indicates EGPRS TBF mode (see GSM 04.60). If these fields are not present, this indicates GPRS TBF mode.

3.5.3.1.3 Packet downlink assignment completion

After having sent the packet downlink assignment, the network starts sending downlink RLC/MAC blocks on the assigned packet downlink resource and the packet downlink assignment procedure is completed at the network side.

On the mobile station side, the procedure is completed when the mobile station receives an RLC/MAC block identified by the assigned temporary flow identity. The mobile station stops timer T3190. The mobile station has entered packet transfer mode.

3.5.3.1.4 Abnormal cases

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

- If the mobile station does not receive a RLC/MAC block on the assigned PDCHs before timer T3190 expires, then a TBF establishment failure has occurred.
- If the information available in the mobile station, after the reception of an IMMEDIATE ASSIGNMENT message or the second IMMEDIATE ASSIGNMENT message of a two-message assignment, does not satisfactorily define a PDCH, then a TBF establishment failure has occurred.
- If the mobile allocation in the frequency parameters indexes frequencies in more than one frequency band, then a TBF establishment failure has occurred.

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

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

The sending of an RLC/MAC control message to a mobile station in packet idle mode may be initiated by the RR entity on network side using the packet downlink assignment procedure. The procedure is used to assign a single downlink block on a PDCH for the transfer of the RLC/MAC control message. Using this procedure, the network shall not apply segmentation of the RLC/MAC control message.

The single downlink block assignment is done according to the procedure defined in 3.5.3.1.2, with the following exceptions:

The packet downlink assignment construction in the IMMEDIATE ASSIGNMENT message shall contain only:

- the TLLI; and
- the TBF starting time.

If the mobile station receives the IMMEDIATE ASSIGNMENT message before the TBF starting time has expired, it shall wait until the frame number indicated by the TBF starting time. The network shall use the TBF starting time to indicate the first frame number belonging to the single block period assigned to the mobile station. The mobile station shall switch to the assigned PDCH and attempt to decode an RLC/MAC control message in the assigned downlink block. Further action depends on the RLC/MAC control message sent by the network, see GSM 04.60. Unless otherwise indicated by the RLC/MAC control message, the mobile station remains in packet idle mode. If the mobile station remains in packet idle mode, it shall continue to monitor downlink CCCH once the block period indicated by the TBF starting time has passed.

If the mobile station fails to decode or does not receive an RLC/MAC control message in the assigned downlink block, it shall remain in packet idle mode and continue to monitor downlink CCCH once the block period indicated by the TBF starting time has passed.

If the mobile station receives the IMMEDIATE ASSIGNMENT message after the TBF starting time has expired, it shall ignore the assignment.

If a failure occurs on the mobile station side due to any other reason, the mobile station shall ignore the assignment.

4 Elementary procedures for Mobility Management

See TS 24.008.

5 Elementary procedures for circuit-switched Call Control

See TS 24.008.

6 Support for packet services

See TS 24.008.

7 Examples of structured procedures

See TS 24.008.

8 Handling of unknown, unforeseen, and erroneous protocol data

8.1 General

The procedures specified in GSM 04.18 and call-related supplementary service handling in TS 24.010 apply to those messages which pass the checks described in this section.

This section also specifies procedures for the handling of unknown, unforeseen, and erroneous protocol data by the receiving entity. These procedures are called "error handling procedures", but in addition to providing recovery mechanisms for error situations they define a compatibility mechanism for future extensions of the protocols.

Error handling concerning the value part of the Facility IE and of the SS Version Indicator IE are not in the scope of this technical specification. It is defined in TS 24.010 and the GSM 04.8x series.

Subsections 8.1 to 8.8 shall be applied in order of precedence.

Most error handling procedures are mandatory for the mobile station.

Detailed error handling procedures in the network are implementation dependent and may vary from PLMN to PLMN. However, when extensions of this protocol are developed, networks will be assumed to have the error handling that is indicated in this section as mandatory ("shall") and that is indicated as strongly recommended ("should"). Sections 8.2, 8.3, 8.4, 8.5 and 8.7.2 do not apply to the error handling in the network applied to the receipt of initial layer 3 message: If the network diagnoses an error described in one of these sections in the initial layer 3 message received from the mobile station, it shall either:

- try to recognize the classmark and then take further implementation dependent actions; or
- release the RR-connection.

Also, the error handling of the network is only considered as mandatory or strongly recommended when certain thresholds for errors are not reached during a dedicated connection.

In this section the following terminology is used:

- An IE is defined to be syntactically incorrect in a message if it contains at least one value defined as "reserved" in section 10, or if its value part violates rules of section 10. However it is not a syntactical error that a type 4 IE specifies in its length indicator a greater length than defined in section 10.
- A message is defined to have semantically incorrect contents if it contains information which, possibly dependent on the state of the receiver, is in contradiction to the resources of the receiver and/or to the procedural part (i.e. sections 3, 4, 5) of GSM 04.18, TS 24.010, or relevant GSM 04.8X series.

8.2 Message too short

When a message is received that is too short to contain a complete message type information element, that message shall be ignored, cf. TS 24.007.

8.3 Unknown or unforeseen transaction identifier

See TS 24.008.

8.4 Unknown or unforeseen message type

If a mobile station receives an RR message with message type not defined for the PD or not implemented by the receiver in unacknowledged mode, it shall ignore the message.

If a mobile station receives an RR message with message type not defined for the PD or not implemented by the receiver in acknowledged mode, it shall return a status message (RR STATUS) with cause # 97 "message type non-existent or not implemented".

If the network receives an RR message with message type not defined for the PD or not implemented by the receiver in a protocol state where reception of an unsolicited message with the given PD from the mobile station is not foreseen in the protocol, the network actions are implementation dependent. Otherwise, if the network receives a message with message type not defined for the PD or not implemented by the receiver, it shall ignore the message except that it should return a status message (RR STATUS) with cause #97 "message type non-existent or not implemented".

NOTE: A message type not defined for the PD in the given direction is regarded by the receiver as a message type not defined for the PD, see TS 24.007 [20].

If the mobile station receives a message not compatible with the protocol state, the mobile station shall ignore the message except for the fact that, if an RR connection exists, it returns a status message (RR STATUS) with cause #98 "Message type not compatible with protocol state".

If the network receives a message not compatible with the protocol state, the network actions are implementation dependent.

8.5 Non-semantical mandatory information element errors

When on receipt of a message,

- an "imperative message part" error; or
- a "missing mandatory IE" error

is diagnosed or when a message containing:

- a syntactically incorrect mandatory IE; or
- an IE unknown in the message, but encoded as "comprehension required" (see section TS 24.007); or
- an out of sequence IE encoded as "comprehension required" (see section TS 24.007)

is received,

- the mobile station shall proceed as follows:

  If the message is not one of the messages listed in sections 8.5.1, 8.5.2, 8.5.3 the mobile station shall ignore the message except for the fact that, if an RR connection exists, it shall return a status message (RR STATUS) with cause # 96 "Invalid mandatory information".

- the network shall proceed as follows:

  When the message is not one of the messages listed in section 8.5.3 b), c), d) or e) and 8.5.5 a), b), d) or e), the network shall either

  - try to treat the message (the exact further actions are implementation dependent), or
  - ignore the message except that it should return a status message (RR STATUS) with cause # 96 "Invalid mandatory information".

8.5.1 Radio resource management

For the mobile station the following procedures shall apply:

a) If the message is a CHANNEL RELEASE message, the actions taken shall be the same as specified in 3.5 "RR connection release".

b) If the message is a PARTIAL RELEASE message, the reactions of the MS are for further study.

8.6 Unknown and unforeseen IEs in the non-imperative message part

8.6.1 IEIs unknown in the message

The MS shall ignore all IEs unknown in a message which are not encoded as "comprehension required" (see TS 24.007).

The network shall take the same approach.

8.6.2 Out of sequence IEs

The MS shall ignore all out of sequence IEs in a message which are not encoded as "comprehension required" (see TS 24.007).

The network should take the same approach.

8.6.3 Repeated IEs

If an information element with format T, TV, or TLV is repeated in a message in which repetition of the information element is not specified in section 9 of this technical specification, only the contents of the information element appearing first shall be handled and all subsequent repetitions of the information element shall be ignored. When repetition of information elements is specified, only the contents of specified repeated information elements shall be handled. If the limit on repetition of information elements is exceeded, the contents of information elements appearing first up to the limit of repetitions shall be handled and all subsequent repetitions of the information element shall be ignored.

The network should follow the same procedures.

8.7 Non-imperative message part errors

This category includes:

- syntactically incorrect optional IEs;
- conditional IE errors.

8.7.1 Syntactically incorrect optional IEs

The MS shall treat all optional IEs that are syntactically incorrect in a message as not present in the message.

The network shall take the same approach.

8.7.2 Conditional IE errors

When the MS upon receipt of an RR message diagnoses a "missing conditional IE" error or an "unexpected conditional IE" error or when it receives an RR message containing at least one syntactically incorrect conditional IE, it shall ignore the message except for the fact that, if an RR connection exists, it shall return a status message (RR STATUS) with cause value # 100 "conditional IE error".

When the MS upon receipt of a GMM or SM message diagnoses a "missing conditional IE" error or an "unexpected conditional IE" error or when it receives a GMM or SM message containing at least one syntactically incorrect conditional IE, it shall ignore the message and it shall return a status message (GMM STATUS or SM STATUS depending on the PD) with cause value # 100 "conditional IE error".

When the network receives a message and diagnose a "missing conditional IE" error or an "unexpected conditional IE" error or when it receives a message containing at least one syntactically incorrect conditional IE, the network shall either:

- try to treat the message (the exact further actions are implementation dependent), or
- ignore the message except that it should return a status message (RR STATUS) with cause # 100 "conditional IE error".

8.8 Messages with semantically incorrect contents

When a message with semantically incorrect contents is received, the foreseen reactions of the procedural part of GSM 04.18 (i.e. of sections 3) are performed. If however no such reactions are specified, the MS shall ignore the message except for the fact that, if an RR connection exists, it returns a status message (RR STATUS) with cause value # 95 "semantically incorrect message".

The network should follow the same procedure except that a status message is not normally transmitted.

Semantic checking of the Facility information element value part (defined in TS 24.080) is the subject of the technical specifications TS 24.010 and the GSM 04.8x series.

8.9 Incomplete rest octets

When the number of octets in a rest octets information element is too low to contain the complete set of components, these components may be truncated by the sending entity (i.e the network) to fit into the rest octets information element. Whether or not truncation is allowed depends on the construction of the rest octets information element and must be explicit specified in the relevant rest octet definition.
If truncation is allowed, the mobile station shall assume the value ‘L’ for the missing components.
If the trunctation is not specified for the relevant rest octet definition, the sending entity must ensure that the complete set of components fit into the rest octets.

```
{ < a > < b > < c > }
```

The above set may be truncated into

```
{ < a > < b > < c > } or
{ < a > < b > }    or
{ < a > }   or
null
```

9 Message functional definitions and contents

This section defines the structure of the messages of those layer 3 protocols defined in GSM 04.18. These are standard L3 messages as defined in TS 24.007 with the exception of those sent on the SCH, RACH, and the HANDOVER ACCESS message.

Each definition given in the present section includes:

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

   1. Local significance, i.e. relevant only on the originating or terminating access;
   2. Access significance, i.e. relevant in the originating and terminating access, but not in the network;
   3. Dual significance, i.e. relevant in either the originating or terminating access and in the network; or
   4. Global significance, i.e. relevant in the originating and terminating access and in the network.

b) a table listing the information elements known in the message and their order of their appearance in the message. In messages for circuit-switched call control also a *shift* information element shall be considered as known even if not included in the table. All information elements 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 non-imperative part of the message, cf. TS 24.007.) In a (maximal) sequence of consecutive information elements with half octet length, the first information element 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 information element the table indicates:

   1. the information element identifier, in hexadecimal notation, if the IE has format T, TV, or TLV. Usually, there is a default IEI for an information element type; default IEIs of different 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 a "-" (example: B-).

NOTE The same IEI may be used for different information element types in different messages of the same protocol.

   2. the name of the information element (which may give an idea of the semantics of the element). The name of the information element (usually written in italics) followed by "IE" or "information element" is used in GSM 04.18 as reference to the information element within a message.

   3. the name of the type of the information element (which indicates the coding of the value part of the IE), and generally, the referenced subsection of section 10 of GSM 04.18 describing the value part of the information element.

   4. the presence requirement indication (M, C, or O) for the IE as defined in TS 24.007.

   5. The format of the information element (T, V, TV, LV, TLV) as defined in TS 24.007.

   6. The length of the information element (or permissible range of lengths), in octets, in the message, where "?" means that the maximum length of the IE is only constrained by link layer protocol, and in the case of the Facility IE by possible further conditions specified in TS 24.010. This indication is non-normative.

c) subsections specifying, where appropriate, conditions for IEs with presence requirement C or O in the relevant message which together with other conditions specified in GSM 04.18 define when the information elements shall be included or not, what non-presence of such IEs means, and - for IEs with presence requirement C - the static conditions for presence and/or non-presence of the IEs (cf. TS 24.007).

9.1 Messages for Radio Resources management

Table 9.1/GSM 04.18 summarizes the messages for Radio Resources management.

Table 9.1/GSM 04.18: Messages for Radio Resources management

Channel establishment messages:	Reference
ADDITIONAL ASSIGNMENT	9.1.1
IMMEDIATE ASSIGNMENT	9.1.18
IMMEDIATE ASSIGNMENT EXTENDED	9.1.19
IMMEDIATE ASSIGNMENT REJECT	9.1.20
DTM ASSIGMENT FAILURE	9.1.12f
DTM REJECT	9.1.12g
DTM REQUEST	9.1.12h
MAIN DCCH ASSIGNMENT COMMAND	9.1.20a
PACKET ASSIGNMENT COMMAND	9.1.21f
RR INITIALISATION REQUEST	9.1.28a
Ciphering messages:	**Reference**
CIPHERING MODE COMMAND	9.1.9
CIPHERING MODE COMPLETE	9.1.10
Handover messages:	**Reference**
ASSIGNMENT COMMAND	9.1.2
ASSIGNMENT COMPLETE	9.1.3
ASSIGNMENT FAILURE	9.1.4
DTM ASSIGMENT COMMAND	9.1.12e
INTER SYSTEM HANDOVER TO UTRAN COMMAND	9.1.15a
INTER SYSTEM HANDOVER TO cdma2000 COMMAND	9.1.15a
PDCH ASSIGNMENT COMMAND	9.1.13a
HANDOVER ACCESS	9.1.14
HANDOVER COMMAND	9.1.15
HANDOVER COMPLETE	9.1.16
HANDOVER FAILURE	9.1.17
RR-CELL CHANGE ORDER	9.1.21e
PHYSICAL INFORMATION	9.1.28
Channel release messages:	**Reference**
CHANNEL RELEASE	9.1.7
PARTIAL RELEASE	9.1.26
PARTIAL RELEASE COMPLETE	9.1.27
Paging messages:	**Reference**
PACKET NOTIFICATION	9.1.21g
PAGING REQUEST TYPE 1	9.1.22
PAGING REQUEST TYPE 2	9.1.23
PAGING REQUEST TYPE 3	9.1.24
PAGING RESPONSE	9.1.25
System information messages:	**Reference**
SYSTEM INFORMATION TYPE 1	9.1.31
SYSTEM INFORMATION TYPE 2	9.1.32
SYSTEM INFORMATION TYPE 2bis	9.1.33
SYSTEM INFORMATION TYPE 2ter	9.1.34
SYSTEM INFORMATION TYPE 2quater	9.1.34a
SYSTEM INFORMATION TYPE 3	9.1.35
SYSTEM INFORMATION TYPE 4	9.1.36
SYSTEM INFORMATION TYPE 5	9.1.37
SYSTEM INFORMATION TYPE 5bis	9.1.38
SYSTEM INFORMATION TYPE 5ter	9.1.39
SYSTEM INFORMATION TYPE 6	9.1.40
SYSTEM INFORMATION TYPE 7	9.1.41
SYSTEM INFORMATION TYPE 8	9.1.42
SYSTEM INFORMATION TYPE 9	9.1.43
SYSTEM INFORMATION TYPE 13	9.1.43a
SYSTEM INFORMATION TYPE 16	9.1.43d
SYSTEM INFORMATION TYPE 17	9.1.43e
SYSTEM INFORMATION TYPE 18	9.1.43.g
SYSTEM INFORMATION TYPE 19	9.1.43f
SYSTEM INFORMATION TYPE 20	9.1.43.h
Specific messages for VBS/VGCS:	**Reference**
NOTIFICATION/FACCH	9.1.21a
NOTIFICATION/NCH	9.1.21b

Channel establishment messages:	Reference
NOTIFICATION RESPONSE	9.1.21d
TALKER INDICATION	9.1.44
UPLINK ACCESS	9.1.45
UPLINK BUSY	9.1.46
UPLINK FREE	9.1.47
UPLINK RELEASE	9.1.48
VGCS UPLINK GRANT	9.1.49
Measurement specific messages:	**Reference**
..EXTENDED MEASUREMENT ORDER	9.1.51
..EXTENDED MEASUREMENT REPORT	9.1.52
MEASUREMENT REPORT	9.1.21
MEASUREMENT INFORMATION	9.1.53
ENHANCED MEASUREMENT REPORT	9.1.54
Miscellaneous messages:	**Reference**
CHANNEL MODE MODIFY	9.1.5
CHANNEL MODE MODIFY ACKNOWLEDGE	9.1.6
CHANNEL REQUEST	9.1.8
CLASSMARK CHANGE	9.1.11
CLASSMARK ENQUIRY	9.1.12
UTRAN CLASSMARK CHANGE	9.1.11a
cdma2000 CLASSMARK CHANGE	9.1.11a
UE RAB PRE-CONFIGURATION	9.1.11c
FREQUENCY REDEFINITION	9.1.13
MEASUREMENT REPORT	9.1.21
SYNCHRONIZATION CHANNEL INFORMATION	9.1.30
RR STATUS	9.1.29
GPRS SUSPENSION REQUEST	9.1.13b
Configuration Change messages:	**Reference**
CONFIGURATION CHANGE COMMAND	9.1.12b
CONFIGURATION CHANGE ACKNOWLEDGE	9.1.12c
CONFIGURATION CHANGE REJECT	9.1.12d
Application messages:	**Reference**
APPLICATION INFORMATION	9.1.53

9.1.1 Additional assignment

This message is sent on the main DCCH by the network to the mobile station to allocate an additional dedicated channel while keeping the previously allocated channels. See table 9.2/GSM 04.18.

Message type: ADDITIONAL ASSIGNMENT

Significance: dual

Direction: network to mobile station

Table 9.2/GSM 04.18: ADDITIONAL ASSIGNMENT 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 10.3.1	M	V	½
	Additional Assignment Message Type	Message Type 10.4	M	V	1
	Channel Description	Channel Description 10.5.2.5	M	V	3
72	Mobile Allocation	Mobile Allocation 10.5.2.21	C	TLV	3-10
7C	Starting Time	Starting Time 10.5.2.38	O	TV	3

9.1.1.1 Mobile Allocation

This information element shall appear if the *Channel Description* information element indicates frequency hopping.

If the *Channel Description* IE does not indicate frequency hopping and the information element is present it shall be considered as an IE unnecessary in the message.

9.1.1.2 Starting Time

This information element appears in particular if e.g., a change of frequency is planned.

9.1.2 Assignment command

This message is sent on the main DCCH by the network to the mobile station to change the channel configuration to another independent dedicated channel configuration, when no timing adjustment is needed. See table 9.3/GSM 04.18

Message type: ASSIGNMENT COMMAND

Significance: dual

Direction: network to mobile station

Table 9.3/GSM 04.18: ASSIGNMENT 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 10.3.1	M	V	½
	Assignment command Message Type	Message Type 10.4	M	V	1
	Description of the First Channel, after time	Channel Description 2 10.5.2.5a	M	V	3
	Power Command	Power Command 10.5.2.28	M	V	1
05	Frequency List, after time	Frequency List 10.5.2.13	C	TLV	4-132
62	Cell Channel Description	Cell Channel Description 10.5.2.1b	O	TV	17
10	Description of the multislot configuration	Multislot Allocation 10.5.2.21b	C	TLV	3-12
63	Mode of the First Channel (Channel Set 1)	Channel Mode 10.5.2.6	O	TV	2
11	Mode of Channel Set 2	Channel Mode 10.5.2.6	O	TV	2
13	Mode of Channel Set 3	Channel Mode 10.5.2.6	O	TV	2
14	Mode of Channel Set 4	Channel Mode 10.5.2.6	O	TV	2
15	Mode of Channel Set 5	Channel Mode 10.5.2.6	O	TV	2
16	Mode of Channel Set 6	Channel Mode 10.5.2.6	O	TV	2
17	Mode of Channel Set 7	Channel Mode 10.5.2.6	O	TV	2
18	Mode of Channel Set 8	Channel Mode 10.5.2.6	O	TV	2
64	Description of the Second Channel, after time	Channel Description 10.5.2.5	O	TV	4
66	Mode of the Second Channel	Channel Mode 2 10.5.2.7	O	TV	2
72	Mobile Allocation, after time	Mobile Allocation 10.5.2.21	C	TLV	3-10
7C	Starting Time	Starting Time 10.5.2.38	O	TV	3
19	Frequency List, before time	Frequency List 10.5.2.13	C	TLV	4-132
1C	Description of the First Channel, before time	Channel Description 2 10.5.2.5a	O	TV	4
1D	Description of the Second Channel, before time	Channel Description 10.5.2.5	O	TV	4
1E	Frequency channel sequence before time	Frequency channel sequence 10.5.2.12	C	TV	10
21	Mobile Allocation, before time	Mobile Allocation 10.5.2.21	C	TLV	3-10
9-	Cipher Mode Setting	Cipher Mode Setting 10.5.2.9	O	TV	1
01	VGCS target mode Indication	VGCS target mode Indication 10.5.2.42a	O	TLV	3
03	Multi-Rate configuration	MultiRate configuration 10.5.2.21aa	O	TLV	4-8

9.1.2.1 Mode of the First Channel (Channel Set 1) and Mode of Channel Set "X" (2=<X=<8)

If this information element is not present the channel mode of the previously allocated channel or channels for Channel Set "X" (1=<X<=8) shall be assumed.

If Channel Set "X" is not defined for the configuration, the *Mode of Channel Set "X"* IE shall be considered as an IE unnecessary in the message.

NOTE: Clause 3.4.3.1 defines cases when one or several *Mode of Channel Set "X"* IEs shall be included in the message.

9.1.2.2 Description of the Second Channel

These information elements appear in the case of an assignment occurring if the mobile station carries two connections (on two dedicated channels, for the TCH/H + TCH/H configuration).

The connection using the channel previously defined in the *Description of the First Channel* IEs of an ASSIGNMENT COMMAND or HANDOVER COMMAND message shall use the channel defined in the *Description of the First Channel* IEs of the ASSIGNMENT COMMAND message defining the new configuration.

The channel described in the *Description of the First Channel* IEs carries the main DCCH. The SACCH used is the one associated with that channel.

9.1.2.3 Mode of the Second Channel

If no *Description of the Second Channel* IE is present but the information element is present it shall be considered as an IE unnecessary in the message.

This information element appears at least when the channel mode is changed for the channel defined in the second channel description information elements.

9.1.2.4 Mobile Allocation and Frequency List, after the starting time

If at least one of the channel descriptions for the starting time indicates frequency hopping, one and only one of the following information elements shall be present and apply to all assigned channels:

- *Mobile Allocation, after time;*
- *Frequency List, after time*.

If neither of the Channel Description IEs for after time indicate frequency hopping, if decoding of Channel Description IEs for before time does not require a frequency list for after time (see next section), and one or both of the two information elements are present they shall be considered as IEs unnecessary in the message.

9.1.2.5 Starting Time

The *starting time* information element is included when the network wants the mobile station to change the frequency parameters of the channels more or less at the moment a change of channel occurs. In this case a number of information elements may be included to give the frequency parameters to be used before the starting time.

If the *starting time* information element is present and none of the information elements referring to before the starting time are present, the mobile station waits and accesses the channels at the indicated time.

If the *starting time* information element is present and at least one of the information elements referring to before the starting time is present, the mobile station does not wait for the indicated time and accesses the channel using the frequency parameters for before the starting time.

If the *starting time* information element is not present and at some of the information elements referring to before the starting time is present, these information elements shall be considered as IEs unnecessary in the message.

If the *description of the first channel, before time* IE is not present, the channel description to apply for before the time, if needed, is given by the *description of the first channel, after time* IE.

If the *description of the second channel, after time* IE is present, the *description of the second channel, before time* IE not present, and a description of the configuration for before the time needed, the channel configuration before the starting time is nevertheless of two traffic channels, and the channel description to apply to the second channel before the starting time is given by the *description of the second channel, after time* IE.

If the *starting time* IE is present and at least one of the channel descriptions for before the starting time indicates frequency hopping, one and only one of the following information elements may be present and applies before the starting time to all assigned channels:

- *Mobile Allocation, before time* IE;
- *Frequency list, before time* IE;
- *Frequency channel sequence, before time* IE.

If the *starting time* IE is present and at least one of the channel descriptions for before the starting time indicates frequency hopping, and none of the above mentioned IE is present, a frequency list for after the starting time must be present (see 9.1.2.4), and this list applies also for the channels before the starting time.

9.1.2.6 Reference cell frequency list

If any of the *mobile allocation* information elements is present, then the network must ensure that either the mobile station has received in a previous message the proper reference cell frequency list (CA), or that the *cell channel description* IE is present.

If the *cell channel description* IE is present, it is used to decode the *mobile allocation* IEs in the message, as well as in later messages until reception of a new reference cell frequency list or the cell is left.

9.1.2.7 Cell Channel Description

If present, this information element shall be used to decode the *Mobile Allocation* IE in the same message and in subsequent messages.

9.1.2.8 Cipher Mode Setting

If this information element is omitted, the mode of ciphering is not changed after the mobile station has switched to the assigned channel.

9.1.2.9 VGCS target mode Indication

This information element is identified as "comprehension required". Only mobile stations supporting « VGCS talking » are required to accept the presence of the element. The presence of the element shall trigger an exception handling if received by a mobile station not supporting « VGCS talking ».

This IE indicates which mode is to be used on the new channel (i.e. dedicated mode or group transmit mode). If this information element is not present, the mode shall be the same as on the previous channel.

The IE also indicates the group cipher key number for the group cipher key to be used on the new channel or if the new channel is non ciphered. If the information element is not present, the ciphering mode shall be the same as on the previous channel.

NOTE: A mobile station supporting VGCS talking shall not consider a syntactical error when this IE is present and the channel mode is not speech.

9.1.2.10 Description of the multislot allocation

This information element is included if so indicated by the channel type and TDMA offset field in the *Channel Description* information element and is used to assign channels that do not carry a main signalling link in a multislot configuration. It indicates how the used timeslots are divided into separate channel sets.

If the *Channel Description* IE does not require the presence of the information element the *Description of the multislot allocation* IE shall be considered as an IE unnecessary in the message.

If multislot configuration is indicated by the *Channel Description* IE but the *Multislot Allocation* IE is not present, all channels in the configuration belong to one channel set, “Channel Set 1”.

NOTE: As a change of timeslot number cannot occur for the channel described after the starting time, the *Multislot Allocation* IE does not have to be included more than once.

9.1.2.11 Multi Rate configuration

This information element appears if the Mode of the First Channel indicates a multi-rate speech codec, and if the assigned configuration is new, i.e. it is different from the MultiRateconfiguration of a previously allocated channel in the cell.

9.1.3 Assignment complete

This message is sent on the main DCCH from the mobile station to the network to indicate that the mobile station has established the main signalling link successfully. See table 9.4/GSM 04.18.

Message type: ASSIGNMENT COMPLETE

Significance: dual

Direction: mobile station to network

Table 9.4/GSM 04.18: ASSIGNMENT COMPLETE message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Assignment Complete Message Type	Message Type 10.4	M	V	1
	RR Cause	RR Cause 10.5.2.31	M	V	1

9.1.4 Assignment failure

This message is sent on the main DCCH on the old channel from the mobile station to the network to indicate that the mobile station has failed to seize the new channel. See table 9.5/GSM 04.18.

Message type: ASSIGNMENT FAILURE

Significance: dual

Direction: mobile station to network

Table 9.5/GSM 04.18: ASSIGNMENT FAILURE message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Assignment Failure Message Type	Message Type 10.4	M	V	1
	RR cause	RR Cause 10.5.2.31	M	V	1

9.1.5 Channel mode modify

This message is sent on the main DCCH by the network to the mobile station to request the setting of the mode for the indicated channel(s). The message can be used to change the channel mode of a Multislot Configuration which only contains one channel set. See table 9.6/GSM 04.18.

Message type: CHANNEL MODE MODIFY

Significance: local

Direction: network to mobile station

Table 9.6/GSM 04.18: CHANNEL MODE MODIFY message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Channel Mode Modify Message Type	Message Type 10.4	M	V	1
	Channel Description	Channel Description 2 10.5.2.5a	M	V	3
	Channel Mode	Channel Mode 10.5.2.6	M	V	1
01	VGCS target mode Indication	VGCS target mode Indication 10.5.2.42a	O	TLV	3
03	Multi-Rate configuration	MultiRate configuration 10.5.2.21aa	O	TLV	4-8

9.1.5.1 Channel Description

This is sufficient to identify the channel in the case of a TCH/H + TCH/H configuration. If used for a multislot configuration, the IE shall describe the present channel configuration with TN indicating the main channel. The IE shall not indicate a new channel configuration when included in the Channel Mode Modify message.

9.1.5.2 VGCS target mode Indication

This information element is identified as "comprehension required". Only mobile stations supporting « VGCS talking » are required to accept the presence of the element. The presence of the element shall trigger an exception handling if received by a mobile station not supporting « VGCS talking ».

This IE indicates which RR mode is to be used with the new channel mode (i.e. dedicated mode or group transmit mode). If this information element is not present, the RR mode shall be the same as with the previous channel mode.

The IE also indicates the group cipher key number for the group cipher key to be used on the new channel or if the new channel is non ciphered. If the information element is not present, the ciphering mode shall be the same as with the previous channel mode.

NOTE: A mobile station supporting VGCS Talking shall not consider a syntactical error if this IE is present and the channel mode is not speech.

9.1.5.3 Multi Rate configuration

This information element appears if the Channel Mode IE indicates a multi-rate speech codec.

9.1.6 Channel mode modify acknowledge

This message is sent on the main DCCH by the mobile station to the network to indicate the successful or unsuccessful execution of a channel mode modify request. See table 9.7/GSM 04.18.

Message type: CHANNEL MODE MODIFY ACKNOWLEDGE

Significance: local

Direction: mobile station to network

Table 9.7/GSM 04.18: CHANNEL MODE MODIFY ACKNOWLEDGE message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Channel Mode Modify Acknowledge Message Type	Message Type 10.4	M	V	1
	Channel Description	Channel Description 2 10.5.2.5a	M	V	3
	Channel Mode	Channel Mode 10.5.2.6	M	V	1

9.1.7 Channel release

This message is sent on the main DCCH from the network to the mobile station to initiate deactivation of the dedicated channel used. See table 9.8/GSM 04.18

Message type: CHANNEL RELEASE

Significance: dual

Direction: network to mobile station

Table 9.8/GSM 04.18: CHANNEL RELEASE message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Channel Release Message Type	Message Type 10.4	M	V	1
	RR Cause	RR Cause 10.5.2.31	M	V	1
73	BA Range	BA Range 10.5.2.1a	O	TLV	6 - ?
74	Group Channel Description	Group Channel Description 10.5.2.14b	O	TLV	4-13
8x	Group Cipher Key Number	Group Cipher Key Number 10.5.1.10	C	TV	1
Cx	GPRS Resumption	GPRS Resumption 10.5.2.14c	O	TV	1
75	BA List Pref	BA List Pref 10.5.2.1c	O	TLV	3-?
76	UMTS Freq List	UMTS Freq List 10.5.2.1d	O	TLV	3-?

9.1.7.1 Channel description and mobile allocation

If a CHANNEL RELEASE is send to a mobile station which is in dedicated mode and which is involved in a voice group call or has responded to a notification to a voice group call or voice broadcast call, a group channel description may be included, describing the voice group call channel or voice broadcast channel to which the mobile station shall go after the channel release procedure.

Mobile stations not supporting VGCS listening or VBS listening shall consider this information element as unnecessary.

9.1.7.2 Group Cipher Key Number

This IE may be present only if the Group channel description IE is provided. The presence of this IE indicates that the mobile station shall use the Group Cipher Key indicated by the Group Cipher Key Number IE for deciphering on the VGCS or VBS channel. If this IE is not present, no ciphering is applied on the VGCS or VBS channel.

Mobile stations not supporting VGCS listening or VBS listening shall ignore this information element.

9.1.7.3 UMTS Frequency List

This IE should only be sent to UMTS capable mobile station when the message is able to describe all the UMTS frequencies of the network.

9.1.8 Channel request

This message is sent in random mode on the RACH. It does not follow the basic format. The possible formats are presented directly below, without reference to information fields. The order of bit transmission is defined in GSM 04.04.

The message is only one octet long, coded as shown in figure 9.1/GSM 4.08 and table 9.9/GSM 04.18.

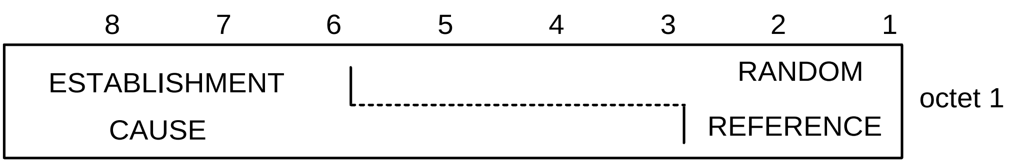


Figure 9.1/GSM 04.18: CHANNEL REQUEST message content

ESTABLISHMENT CAUSE (octet 1)

This information field indicates the reason for requesting the establishment of a connection. This field has a variable length (from 3 bits up to 6 bits).

RANDOM REFERENCE (octet 1)

This is an unformatted field with variable length (from 5 bits down to 2 bits).

The Channel Request message is coded as follows:
(Random Reference field is filled with "x").

Table 9.9/GSM 04.18: CHANNEL REQUEST message content

MS codes According to Establishment cause:	
bits 8 1	
101xxxxx	Emergency call
110xxxxx	Call re-establishment; TCH/F was in use, or TCH/H was in use but the network does not set NECI bit to 1
011010xx	Call re-establishment; TCH/H was in use and the network sets NECI bit to 1
011011xx	Call re-establishment; TCH/H + TCH/H was in use and the network sets NECI bit to 1
100xxxxx 0010xxxx 0011xxxx 0001xxxx	Answer to paging See table 9.9a/GSM 04.18
111xxxxx 1	Originating call and TCH/F is needed, or originating call and the network does not set NECI bit to 1, or procedures that can be completed with a SDCCH and the network does not set NECI bit to 1. note
0100xxxx	Originating speech call from dual-rate mobile station when TCH/H is sufficient and supported by the MS for speech calls and the network sets NECI bit to 1 note 5
0101xxxx	Originating data call from dual-rate mobile station when TCH/H is sufficient and supported by the MS for data calls and the network sets NECI bit to 1 note 5
000xxxxx	Location updating and the network does not set NECI bit to 1
0000xxxx	Location updating and the network sets NECI bit to 1
0001xxxx	Other procedures which can be completed with note 1an SDCCH and the network sets NECI bit to 1
011110xx 01111x0x 01111xx0	One phase packet access with request for single timeslot uplink transmission; one PDCH is needed.
01110xxx	Single block packet access; one block period on a PDCH is needed for two phase packet access or other RR signalling purpose.
01100111	LMU establishment note 2
01100xx0 01100x01 01100011	Reserved for future use note 2a
01111111	Reserved for future use. note 2b

NOTE 1: Examples of these procedures are: IMSI detach, Short Message Service (SMS), Supplementary Service management, Location Services.

NOTE 2: If such messages are received by a network, an SDCCH shall be allocated.

NOTE 2a: If such messages are received by a network, an SDCCH may be allocated.

NOTE 2b: This value shall not be used by the mobile station on RACH. If such message is received by the network, it may be ignored.

Table 9.9a/GSM 04.18: CHANNEL REQUEST message (when answering to paging for RR connection establishment)

MS Capability / Paging Indication (NOTE 3)	Full rate only	Dual rate (NOTE 5)	SDCCH only
Any channel	100xxxxx	100xxxxx	100xxxxx
SDCCH	0001xxxx	0001xxxx	0001xxxx
TCH/F	100xxxxx	0010xxxx	0001xxxx
TCH/H or TCH/F	100xxxxx	0011xxxx	0001xxxx

NOTE 3: The Paging Indication is provided by the Channel Needed IE (or the Channel Needed field) associated with the page which triggered the sending of the CHANNEL REQUEST message.

NOTE 4: In some cases the established connection will be used only to allow a default rejection mechanism to take place (typically the mobile station will send a RELEASE COMPLETE message with cause #88 "incompatible destination" as an answer to the incoming SETUP message).

NOTE 5: In this section, “dual rate capability” means that the MS supports both full rate and half-rate channels at least for the signalling channel mode. In addition, it may support either speech channel mode, or data channel modes, or both on half-rate channels.

9.1.9 Ciphering mode command

This message is sent on the main DCCH from the network to the mobile station to indicate that the network has started deciphering and that enciphering and deciphering shall be started in the mobile station, or to indicate that ciphering will not be performed. See table 9.10/GSM 04.18.

Message type: CIPHERING MODE COMMAND

Significance: dual

Direction: network to mobile station

Table 9.10/GSM 04.18: CIPHERING MODE COMMAND message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Cipher Mode Command Message Type	Message Type 10.4	M	V	1
	Ciphering Mode Setting	Cipher Mode Setting 10.5.2.9	M	V	1/2
	Cipher Response	Cipher Response 10.5.2.10	M	V	1/2

9.1.10 Ciphering mode complete

This message is sent on the main DCCH from the mobile station to the network to indicate that enciphering and deciphering has been started in the MS. See table 9.11/GSM 04.18.

Message type: CIPHERING MODE COMPLETE

Significance: dual

Direction: mobile station to network

Table 9.11/GSM 04.18: CIPHERING MODE COMPLETE message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Cipher Mode Complete Message Type	Message Type 10.4	M	V	1
17	Mobile Equipment Identity	Mobile Identity 10.5.1.4	O	TLV	3-11

9.1.10.1 Mobile Equipment Identity

This information element is included if and only if the mobile station shall include its IMEISV (see section 3.4.7). This information element shall only refer to IMEISV.

9.1.11 Classmark change

This message is sent on the main DCCH by the mobile station to the network to indicate a classmark change or as a response to a classmark enquiry. See table 9.12/GSM 04.18.

Message type: CLASSMARK CHANGE

Significance: dual

Direction: mobile station to network

Table 9.12/GSM 04.18: CLASSMARK CHANGE message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Classmark Change Message Type	Message Type 10.4	M	V	1
	Mobile Station Classmark	Mobile Station Classmark 2 10.5.1.6	M	LV	4
20	Additional Mobile Station Classmark Information	Mobile Station Classmark 3 10.5.1.7	C	TLV	3-14

9.1.11.1 Additional Mobile Station Classmark Information

This IE shall be included if and only if the CM3 bit in the *Mobile Station Classmark* IE is set to 1.

9.1.11.2 Mobile Station Classmark

This IE shall include for multiband MS the Classmark 2 corresponding to the frequency band in use.

9.1.11a UTRAN Classmark Change

This message is sent on the main DCCH by the mobile station to the network to indicate a UTRAN Classmark Change or as an response to a UTRAN classmark enquiry. See table 9.11a/GSM 04.18.

Message type: UTRAN CLASSMARK CHANGE

Significance: dual

Direction: mobile station to network

Table 9.11a/GSM 04.18: UTRAN CLASSMARK CHANGE message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	UTRAN Classmark Change Message Type	Message Type 10.4	M	V	1
	UE Capability	UE Capability TS 25.331	M	LV	2-19
06	UTRAN pre-configuration set indication	UTRAN pre-configuration indication set 10.5.2.7a	O	TV	2

9.1.11b cdma2000 Classmark Change

This message is sent on the main DCCH by the mobile station to the network to indicate a cdma2000 Classmark Change or as a response to a classmark enquiry with cdma2000 Capabilities specified in the Classmark Enquiry Mask. See table 9.11b/GSM 04.18.

Message type: CDMA2000 CLASSMARK CHANGE

Significance: dual

Direction: mobile station to network

Table 9.11b/GSM 04.18: CDMA2000 CLASSMARK CHANGE message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	cdma2000 Classmark Change Message Type	Message Type 10.4	M	V	1
	Terminal Information	Terminal Information TIA/EIA/IS-2000-5-A and TIA/EIA/IS-833	M (1)	LV	1-n
	Security Status	Security Status TIA/EIA/IS-2000-5-A and TIA/EIA/IS-833	M (1)	LV	1-n
	Band Class Information	Band Class Information TIA/EIA/IS-2000-5-A and TIA/EIA/IS-833	M (1)	LV	1-n
	Power Class Information	Power Class Information TIA/EIA/IS-2000-5-A and TIA/EIA/IS-833	M (1)	LV	1-n
	Operating Mode Information	Operating Mode Information TIA/EIA/IS-2000-5-A and TIA/EIA/IS-833	M (1)	LV	1-n
	Service Option Information	Service Option Information TIA/EIA/IS-2000-5-A and TIA/EIA/IS-833	M (1)	LV	1-n
	Multiplex Option Information	Multiplex Option Information TIA/EIA/IS-2000-5-A and TIA/EIA/IS-833	M (1)	LV	1-n
	Power Control Information	Power Control Information TIA/EIA/IS-2000-5-A and TIA/EIA/IS-833	M (1)	LV	1-n
	Capability Information	Capability Information TIA/EIA/IS-2000-5-A and TIA/EIA/IS-833	M (1)	LV	1-n
	Channel Configuration Capability Information	Channel Configuration Capability Information TIA/EIA/IS-2000-5-A and TIA/EIA/IS-833	M (1)	LV	1-n
	Extended Multiplex Option Information	Extended Multiplex Option Information TIA/EIA/IS-2000-5-A and TIA/EIA/IS-833	M (1)	LV	1-n
	Band Subclass Information	Band Subclass Information TIA/EIA/IS-2000-5-A and TIA/EIA/IS-833	M (1)	LV	1-n

IEI	Information element	Type / Reference	Presence	Format	length
	Encryption Capability	Encryption Capability TIA/EIA/IS-2000-5-A and TIA/EIA/IS-833	M (1)	LV	1-n
NOTE 1: The variable part of the Information Element is coded as the corresponding Information Record defined in TIA/EIA/IS-2000-5-A and TIA/EIA/IS-833. The bit number 1 of the first octet of each Information Element shall be coded as the first bit of the first field of the corresponding Information Record defined in TIA/EIA/IS-2000-5-A and in TIA/EIA/IS-833, reading the fields defined in TIA/EIA/IS-2000-5-A and in TIA/EIA/IS-833 from left to right.					

9.1.11c UE RAB PRE-CONFIGURATION

This message is sent on the main DCCH by the network to the mobile station to pre-configure the radio access bearer configuration in the the mobile as an response to UTRAN Classmark Change message or at reception of SI5quater (enhanced measurement order).The network may also send the UE RAB PRE-CONFIGURATION in conjunction to location updating. See table 9.11c/GSM 04.18.

Message type: UE RAB PRE-CONFIGURATION

Significance: dual

Direction: network to mobile station

Table 9.11c/GSM 04.18: UE RAB PRE-CONFIGURATION message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	UTRAN Classmark Change Message Type	Message Type 10.4	M	V	1
	UTRAN pre-configuration set	UTRAN pre-configuration set 10.5.2.7b	M	LV	2-19

9.1.12 Classmark enquiry

This message is sent on the main DCCH by the network to the mobile station to request classmark information. See table 9.12a/GSM 04.18.

Message type: CLASSMARK ENQUIRY

Significance: dual

Direction: network to mobile station

Table 9.12a/GSM 04.18: CLASSMARK ENQUIRY message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Classmark Enquiry Message Type	Message Type 10.4	M	V	1
10	Classmark Enquiry Mask	Classmark Enquiry Mask 10.5.2.7c	O	TLV	3

9.1.12a Spare

9.1.12b Configuration change command

This message is sent on the main DCCH from the network to the mobile station to change the channel configuration of a multislot configuration. See table 9.12b/GSM 04.18.

Message type: CONFIGURATION CHANGE COMMAND

Significance: dual

Direction: network to mobile station

Table 9.12b/GSM 04.18: CONFIGURATION CHANGE COMMAND message contents

IEI	Information element	Type/Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Configuration change Message Type	Message Type 10.4	M	V	1
	Description of the multislot configuration	Multislot Allocation 10.5.2.21b	M	LV	2-11
63	Mode of Channel Set 1	Channel Mode 10.5.2.6	O	TV	2
11	Mode of Channel Set 2	Channel Mode 10.5.2.6	O	TV	2
13	Mode of Channel Set 3	Channel Mode 10.5.2.6	O	TV	2
14	Mode of Channel Set 4	Channel Mode 10.5.2.6	O	TV	2
15	Mode of Channel Set 5	Channel Mode 10.5.2.6	O	TV	2
16	Mode of Channel Set 6	Channel Mode 10.5.2.6	O	TV	2
17	Mode of Channel Set 7	Channel Mode 10.5.2.6	O	TV	2
18	Mode of Channel Set 8	Channel Mode 10.5.2.6	O	TV	2

9.1.12b.1 Description of the multislot allocation

This information element is used to assign channels that do not carry the main signalling link in a multislot configuration. It indicates if multiple channel sets are used.

9.1.12b.2 Mode of Channel Set “X” (1=<X<=8)

If this information element is not present the channel mode of the previously allocated channel or channels for Channel Set “X” shall be assumed.

If Channel Set “X” is not defined for the configuration, the *Mode of Channel Set “X”* IE shall be considered as an IE unnecessary in the message.

NOTE: Clause 3.4.16.1 defines cases when one or several *Mode of Channel Set “X”* IEs shall be included in the message.

9.1.12c Configuration change acknowledge

This message is sent on the main DCCH from the mobile station to the network to indicate that the mobile station has changed to the ordered channel configuration successfully. See table 9.12c/GSM 04.18.

Message type: CONFIGURATION CHANGE ACKNOWLEDGE

Significance: dual

Direction: mobile station to network

Table 9.12c/GSM 04.18: CONFIGURATION CHANGE ACKNOWLEDGE message contents

IEI	Information element	Type/Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Configuration Change Acknowledge Message Type	Message Type 10.4	M	V	1

9.1.12d Configuration change reject

This message is sent on the main DCCH from the mobile station to the network to indicate that the mobile station has not managed to switch to the channel configuration ordered by the configuration change command and is still using the previous configuration. See table 9.12d/GSM 04.18.

Message type: CONFIGURATION CHANGE REJECT

Significance: dual

Direction: mobile station to network

Table 9.12d/GSM 04.18: CONFIGURATION CHANGE REJECT message contents

IEI	Information element	Type/Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Configuration Change Reject Message Type	Message Type 10.4	M	V	1
	RR Cause	RR Cause 10.5.2.31	M	V	1

9.1.12e DTM Assignment Command

This message is sent on the main DCCH by the network to the mobile station to change the channel configuration to a configuration with CS and packet connections when no timing adjustment is needed and reallocation of the CS timeslot is required. See table 9.12e/GSM 04.08.

Message type: DTM ASSIGNMENT COMMAND

Significance: dual

Direction: network to mobile station

Table 9.12e/GSM 04.18: DTM ASSIGNMENT COMMAND message content

IEI	Information element	Type / Reference	Presence	Format	Length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	DTM Assignment Command Message Type	Message Type 10.4	M	V	1
	CS Power Command	Power Command 10.5.2.28	M	V	1
	Description of the CS Channel	Channel Description 10.5.2.5	M	V	3
10	Cell Channel Description	Cell Channel Description 10.5.2.1b	O	TV	17
11	Channel mode	Channel mode 10.5.2.6	O	TV	2
12	Frequency List	Frequency List 10.5.2.13	C	TLV	4-132
13	Mobile Allocation	Mobile Allocation 10.5.2.21	C	TLV	3-10
14	TBF starting time	Starting time 10.5.2.38	O	TV	3
15	Description of the Uplink Packet Channel Assignment	RR Packet Uplink Assignment 10.5.2.25c	O	TLV	3-n
16	Description of the Downlink Packet Channel Assignment	RR Packet Downlink Assignment 10.5.2.25d	O	TLV	3-n

9.1.12e.1 TBF starting time

If this information element is not present or has elapsed, the mobile station shall switch to the assigned PDCH(s). Otherwise, the mobile station shall wait until the point in time denoted by the TBF Starting Time and then switch to the assigned PDCH(s).

The mobile station shall establish the RR connection immediately, irrespective of the TBF starting time.

9.1.12e.2 RR Packet Uplink Assignment and RR Packet Downlink Assignment IEs

These information elements are optional, but at least one of them shall be present. If none of them is present, the mobile station shall establish the assigned CS resource and send a DTM ASSIGNMENT FAILURE message on the new main DCCH.

9.1.12f DTM Assignment Failure

This message is sent on the main DCCH from the mobile station to the network to indicate that the mobile station has failed to seize the new packet channel. See table 9.12f/GSM 04.18.

Message type: DTM ASSIGNMENT FAILURE

Significance: dual

Direction: mobile station to network

Table 9.12f/GSM 04.18: DTM ASSIGNMENT FAILURE message content

IEI	Information element	Type / Reference	Presence	Format	Length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	DTM Assignment Failure Message Type	Message Type 10.4	M	V	1
	RR cause	RR Cause 10.5.2.31	M	V	1

9.1.12g DTM Reject

This message is sent on the main DCCH by the network to the mobile station to indicate that no radio resources are available for assignment. See table 9.12g/GSM 04.18.

Message type: DTM REJECT

Significance: dual

Direction: network to mobile station

Table 9.12g/GSM 04.18: DTM REJECT message content

IEI	Information element	Type / Reference	Presence	Format	Length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	DTM Reject Message Type	Message Type 10.4	M	V	1
	DTM Reject Information	DTM Reject Information 10.5.2.11a	M	V	1
	DTM wait indication	Wait indication 10.5.2.43	M	V	1

9.1.12h DTM Request

This message is sent on the main DCCH by the mobile station to request the establishment of dual transfer mode. See table 9.12h/GSM 04.18.

Message type: DTM Request

Significance: dual

Direction: mobile station to network

Table 9.12h/GSM 04.18: DTM Request message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	DTM Request Message Type	Message Type 10.4	M	V	1
	TLLI	TLLI 10.5.2.41a	M	V	4
	Channel Request Description	Channel Request Description 2 10.5.2.8b	M	V	5 - n

NOTE: the MS Radio Access capabilities IE is not present since all the relevant information has already been received by the network in Classmark 3.

9.1.13 Frequency redefinition

This message is sent on the main DCCH from the network to the MS to indicate that the frequencies and the hopping sequence of the allocated channels shall be changed. See table 9.13/GSM 04.18

Message type: FREQUENCY REDEFINITION

Significance: dual

Direction: network to MS

Table 9.13/GSM 04.18: FREQUENCY REDEFINITION message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Frequency Redefinition Message Type	Message Type 10.4	M	V	1
	Channel Description	Channel Description 10.5.2.5	M	V	3
	Mobile Allocation	Mobile Allocation 10.5.2.21	M	LV	1-9
	Starting Time	Starting Time 10.5.2.38	M	V	2
62	Cell Channel Description	Cell Channel Description 10.5.2.1b	O	TV	17

9.1.13.1 Cell Channel Description

If it does not appear, the cell channel description is assumed to be unchanged.

9.1.13a PDCH Assignment command

This message is sent on the main DCCH by the network to the mobile station to change the channel configuration to a PDCH, when no timing adjustment is needed. See table 9.13a/GSM 04.18.

A mobile station that does not support the <<GRPS>> option shall regard this message as an unknown message.

Message type: PDCH ASSIGNMENT COMMAND

Significance: dual

Direction: network to mobile station

Table 9.13a/GSM 04.18: PDCH ASSIGNMENT COMMAND message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	PDCH Assignment command Message Type	Message Type 10.4	M	V	1
	Description of the Channel, after time	Channel Description 10.5.2.5	M	V	3
62	Cell Channel Description	Cell Channel Description 10.5.2.1b	O	TV	17
05	Frequency List, after time	Frequency List 10.5.2.13	C	TLV	4-132
72	Mobile Allocation, after time	Mobile Allocation 10.5.2.21	C	TLV	3-10
7C	Starting Time	Starting Time 10.5.2.38	O	TV	3
19	Frequency List, before time	Frequency List 10.5.2.13	C	TLV	4-132
1C	Description of the Channel, before time	Channel Description 10.5.2.5	O	TV	4
1E	Frequency channel sequence before time	Frequency channel sequence 10.5.2.12	C	TV	10
21	Mobile Allocation, before time	Mobile Allocation 10.5.2.21	C	TLV	3-10
22	RR Packet Uplink Assignment	RR Packet Uplink Assignment 10.5.2.25c	C	TLV	3-?
23	RR Packet Downlink Assignment	RR Packet Downlink Assignment 10.5.2.25d	C	TLV	3-?

9.1.13a.1 Mobile Allocation and Frequency List, after the starting time

If the channel description for after the starting time indicates frequency hopping, one and only one of the following information elements shall be present

- *Mobile Allocation, after time*
- *Frequency List, after time*.

If the Channel Description IE for after time does not indicate frequency hopping, if decoding of Channel Description IE for before time does not require a frequency list for after time (see next section), and one or both of the two information elements are present they shall be considered as IEs unnecessary in the message.

9.1.13a.2 Starting Time

The *starting time* information element is included when the network wants the mobile station to change the frequency parameters of the channels more or less at the moment the change to a TBF occurs. In this case a number of information elements may be included to give the frequency parameters to be used before the starting time.

If the *starting time* information element is present and none of the information elements referring to before the starting time are present, the mobile station waits and uses the TBFfrom the indicated time.

If the *starting time* information element is present and at least one of the information elements referring to before the starting time is present, the mobile station does not wait for the indicated time and uses the TBF using the frequency parameters for before the starting time.

If the *starting time* information element is not present and some of the information elements referring to before the starting time is present, these information elements shall be considered as IEs unnecessary in the message.

If the *description of the channel, before time* IE is not present, the channel description to apply for before the time, if needed, is given by the *description of the channel, after time* IE.

If the *starting time* IE is present and the channel description for before the starting time indicates frequency hopping, one and only one of the following information elements may be present and applies before the starting time

- *Mobile Allocation, before time* IE;
- *Frequency list, before time* IE;
- *Frequency channel sequence, before time* IE.

If the *starting time* IE is present and the channel description for before the starting time indicates frequency hopping, and none of the above mentioned IE is present, a frequency list for after the starting time must be present (see 9.1.2.4), and this list applies also for the TBF before the starting time.

9.1.13a.3 Reference cell frequency list

If any of the *mobile allocation* information elements are present, then the network shall ensure that either the mobile station has received in a previous message the proper reference cell frequency list (CA), or that the *cell channel description* IE is present.

If the *cell channel description* IE is present, it is used to decode the *mobile allocation* IEs in the message, as well as in later dedicated mode messages until reception of a new reference cell frequency list or the cell is left.

9.1.13a.4 Cell Channel Description

If present, this information element shall be used to decode the *Mobile Allocation* IE in the same message and in subsequent messages.

9.1.13a.5 Packet Assignment

One and only one of the following information elements shall be present:

- *RR Packet Uplink Assignment*
- *RR Packet Downlink Assignment*.

9.1.13b GPRS suspension request

This message is sent on the main DCCH by the mobile station to the network to request a suspension of GPRS services. See table 9.13b/GSM 04.18.

Message type: GPRS SUSPENSION REQUEST

Significance: dual

Direction: mobile station to network

Table 9.13b/GSM 04.18: GPRS SUSPENSION REQUEST message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	GPRS Suspension Request Message Type	Message Type 10.4	M	V	1
	Temporary Logical Link Identity	TLLI 10.5.2.41a	M	V	4
	Routeing Area Identification	Routeing Area Identification 10.5.5.15	M	V	6
	Suspension cause	Suspension cause 10.5.2.47	M	V	1

9.1.14 Handover access

This message is sent in random mode on the main DCCH during a handover procedure. It does not follow the basic format. The format is presented directly below without reference to information elements. The order of bit transmission is defined in GSM 04.04.

This message is only one octet long, coded as shown in figure 9.2/GSM 04.18 and table 9.14/GSM 04.18.

8	7	6	5	4	3	2	1	
handover reference								octet 1

Figure 9.2/GSM 04.18: HANDOVER ACCESS message content

Table 9.14/GSM 04.18: HANDOVER ACCESS message content

HANDOVER REFERENCE This is an unformatted 8 bit field. (also described in section 10.5.2.15)

9.1.15 Handover command

This message is sent on the main DCCH by the network to the mobile station to change the dedicated channel configuration, timing adjustment needed. See table 9.15/GSM 04.18.

Message type: HANDOVER COMMAND

Significance: dual

Direction: network to mobile station

Table 9.15/GSM 04.18: HANDOVER COMMAND message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Handover Command Message Type	Message Type 10.4	M	V	1
	Cell Description	Cell description 10.5.2.2	M	V	2
	Description of the first channel, after time	Channel Description 2 10.5.2.5a	M	V	3
	Handover Reference	Handover Reference 10.5.2.15	M	V	1
	Power Command and Access type	Power Command and Access type 10.5.2.28a	M	V	1
D-	Synchronization Indication	Synchronization Indication 10.5.2.39	O	TV	1
02	Frequency Short List, after time	Frequency Short List 10.5.2.14	C	TV	10
05	Frequency List, after time	Frequency List 10.5.2.13	C	TLV	4-131
62	Cell Channel Description	Cell Channel Description 10.5.2.1b	C	TV	17
10	Description of the multislot configuration	Multislot Allocation 10.5.2.21b	C	TLV	3-12
63	Mode of the First Channel(Channel Set 1))	Channel Mode 10.5.2.6	O	TV	2
11	Mode of Channel Set 2	Channel Mode 10.5.2.6	O	TV	2
13	Mode of Channel Set 3	Channel Mode 10.5.2.6	O	TV	2
14	Mode of Channel Set 4	Channel Mode 10.5.2.6	O	TV	2
15	Mode of Channel Set 5	Channel Mode 10.5.2.6	O	TV	2
16	Mode of Channel Set 6	Channel Mode 10.5.2.6	O	TV	2
17	Mode of Channel Set 7	Channel Mode 10.5.2.6	O	TV	2
18	Mode of Channel Set 8	Channel Mode 10.5.2.6	O	TV	2
64	Description of the Second Channel, after time	Channel Description 10.5.2.5	O	TV	4
66	Mode of the Second Channel	Channel Mode 2 10.5.2.7	O	TV	2
69	Frequency Channel Sequence, after time	Frequency Channel Sequence 10.5.2.12	C	TV	10
72	Mobile Allocation, after time	Mobile Allocation 10.5.2.21	C	TLV	3-10
7C	Starting Time	Starting Time 10.5.2.38	O	TV	3
7B	Real Time Difference	Time Difference 10.5.2.41	C	TLV	3
7D	Timing Advance	Timing Advance 10.5.2.40	C	TV	2
12	Frequency Short List, before time	Frequency Short List 10.5.2.14	C	TV	10
19	Frequency List, before time	Frequency List 10.5.2.13	C	TLV	4-131
1C	Description of the First Channel, before time	Channel Description 2 10.5.2.5a	O	TV	4

IEI	Information element	Type / Reference	Presence	Format	length
1D	Description of the Second Channel, before time	Channel Description 10.5.2.5	O	TV	4
1E	Frequency channel sequence before time	Frequency channel sequence 10.5.2.12	C	TV	10
21	Mobile Allocation, before time	Mobile Allocation 10.5.2.21	C	TLV	3-10
9-	Cipher Mode Setting	Cipher Mode Setting 10.5.2.9	O	TV	1
01	VGCS target mode Indication	VGCS target mode Indication 10.5.2.42a	O	TLV	3
03	Multi-Rate configuration	MultiRate configuration 10.5.2.21aa	O	TLV	4-8

9.1.15.1 Synchronization Indication

If this information element does not appear, the assumed value is "non-synchronized".

9.1.15.2 Mode of the First Channel (Channel Set 1) and Mode of Channel Set "X" (2=<X<=8)

If this information element is not present the channel mode of the previously allocated channel or channels for Channel Set “X” (1=<X<=8) shall be assumed.

If Channel Set “X” is not defined for the configuration, the *Mode of Channel Set “X”* IE shall be considered as an IE unnecessary in the message.

NOTE: Clause 3.4.4.1 defines cases when one or several *Mode of Channel Set “X”* IEs shall be included in the message.

9.1.15.3 Description of the Second Channel

These information element appear if the mobile station carries two connections (on two dedicated channels, for the TCH/H+TCH/H configuration).

The connection using the channel previously defined in the *Description of the First Channel* IE of an ASSIGNMENT COMMAND or HANDOVER COMMAND message shall use the channel defined in the first channel description IE of the HANDOVER COMMAND message defining the new configuration.

The channel described in the *Description of the First Channel* IE carries the main DCCH. The SACCH used is the one associated with that channel.

9.1.15.4 Mode of the Second Channel

If the *Description of the Second Channel* IE is not present and the information element is present it shall be considered as an IE unnecessary in the message.

This element appears at least when the channel mode is changed for the channel defined in the Description of the Second Channel information element.

9.1.15.5 Frequency Channel Sequence, Frequency List, Frequency short list and Mobile Allocation, after time

If at least one of the channel descriptions for after time indicates frequency hopping, one and only one of the following information elements shall be present:

- *Frequency Channel Sequence, after time*;
- *Frequency list, after time*;
- *Frequency Short List, after time*;
- *Mobile Allocation, after time*.

If neither of the Channel Description IEs indicate frequency hopping, if they are not required for the decoding of Channel Description IEs for before time, and if any of the four information elements are present they shall be considered as IEs unnecessary in the message.

The *Frequency Channel Sequence* information element shall not be used unless all the ARFCNs that it indicates are in the P-GSM band.

9.1.15.6 Starting Time

The *starting time* information element is included when the network wants the mobile station to change the frequency parameters of the channels more or less at the moment a change of channel occurs. In this case a number of information elements may be included to give the frequency parameters to be used before the starting time.

The *starting time* information element refers to the new cell time.

If the *starting time* information element is present and none of the information elements referring to before the starting time are present, the mobile station waits and accesses the channels at the indicated time.

If the *starting time* information element is present and at least one of the information elements referring to before the starting time is present, the mobile station does not wait for the indicated time and accesses the channel using the frequency parameters for before the starting time.

If the *starting time* information element is not present and some of the information elements referring to before the starting time is present, these information elements shall be considered as IEs unnecessary in the message.

If the *description of the first channel, before time* IE is not present, the channel description to apply for before the time, if needed, is given by the *description of the first channel, after time* IE.

If the *description of the second channel, after time* IE is present, the *description of the second channel, before time* IE not present, and a description of the configuration for before the time needed, the channel configuration before the starting time is nevertheless of two traffic channels, and the channel description to apply to the second channel before the starting time is given by the *description of the second channel, after time* IE.

If the *starting time* IE is present and at least one of the channel descriptions for before the starting time indicates frequency hopping, one and only one of the following information elements may be present and applies before the starting time to all assigned channels:

- *Mobile Allocation, before time* IE;
- *Frequency Short list, before time* IE;
- *Frequency list, before time* IE;
- *Frequency channel sequence, before time* IE.

If the *starting time* IE is present and at least one of the channel descriptions for before the starting time indicates frequency hopping, and none of the above mentioned IE is present, a frequency list for after the starting time must be present (see 9.1.2.4), and this list applies also for the channels before the starting time.

9.1.15.7 Reference cell frequency list

If any of the *mobile allocation* information elements is present, then the *cell channel description* IE must be present. It is used to decode the *mobile allocation* IEs in the message.

In addition, if no information elements pertaining to before the starting time is present in the message, the frequency list defined by the *cell channel description* IE is used to decode the *mobile allocation* IEs in later messages received in the new cell until reception of a new reference cell frequency list or the new cell is left.

9.1.15.8 Real Time Difference

This information element shall appear if the *Synchronization Indication* information element indicates a pseudo-synchronous handover otherwise it shall be considered as an unnecessary information element.

9.1.15.9 Timing Advance

This information element shall appear if the "synchronization indication" element indicates a presynchronized handover. If not included for a presynchronized handover, then the default value as defined in GSM 05.10 shall be used. For other types of handover it shall be considered as an unnecessary information element.

9.1.15.10 Cipher Mode Setting

If this information element is omitted, the mode of ciphering is not changed after the mobile station has switched to the assigned channel.

Only applicable for mobile stations supporting VGCS talking:

The cipher mode setting IE shall not be included if a HANDOVER COMMAND message is sent on a VGCS channel or in a HANDOVER COMMAND message on a dedicated channel for a handover to a VGCS channel.

9.1.15.11 VGCS target mode indication

This information element is identified as "comprehension required". Only mobile stations supporting « VGCS talking » are required to accept the presence of the element. The presence of the element shall trigger an exception handling if received by a mobile station not supporting « VGCS talking ».

This IE indicates which mode is to be used on the new channel (i.e. dedicated mode or group transmit mode). If this information element is not present, the mode shall be the same as on the previous channel.

The IE also indicates the group cipher key number for the group cipher key to be used on the new channel or if the new channel is non ciphered. If the information element is not present, the ciphering mode shall be the same as on the previous channel.

NOTE: A mobile station supporting VGCS Talking shall not consider a syntactical error if this IE is present and the channel mode is not speech.

9.1.15.12 Description of the multislot allocation

This information element is included if so indicated by the channel type and TDMA offset field in the *Channel Description* information element and is used to assign channels that do not carry a main signalling link in a multislot configuration. It indicates how the used timeslots are divided into separate channel sets.

If the *Channel Description* IE does not require the presence the information element it shall be considered as an IE unnecessary in the message.

If multislot configuration is indicated by the *Channel Description* IE but the *Multislot Allocation* IE is not present, all channels in the configuration belong to one channel set, “Channel Set 1”.

NOTE: As a change of timeslot number cannot occur for the channel described for after the starting time, the *Multislot Allocation* IE does not have to be included more than once.

9.1.15.13 MultiRateconfiguration

This information element appears if the Mode of the First Channel indicates a multi-rate speech codec, and if the assigned configuration is new, i.e. it is different from the MultiRateconfiguration used in the serving cell. If the Mode of the First Channel indicates a multi-rate speech codec, and this IE is not included, then the mobile station shall assume that the MultiRateconfiguration has not changed.

9.1.15a Inter System Handover TO UTRAN Command

This message is sent on the main DCCH by the network to the mobile station to change the dedicated channel in GSM to a dedicated channel configuration in UTRAN. See table 9.15a/GSM 04.18.

Message type: INTER SYSTEM HANDOVER COMMAND

Significance: dual

Direction: network to mobile station

Table 9.15a/GSM 04.18: INTER SYSTEM HANDOVER COMMAND message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Inter System to UTRAN Handover Command Message	Message Type 10.4	M	V	1
	Handover to UTRAN Command	Handover To UTRAN Command 10.5.2.48	M	V	19

9.1.15b Inter System Handover To cdma2000 Command

This message is sent on the main DCCH by the network to the mobile station to change the dedicated channel in GSM to a dedicated channel configuration in cdma2000 See table 9.15b/GSM 04.18.

Message type: INTER SYSTEM HANDOVER TO CDMA2000 COMMAND

Significance: dual

Direction: network to mobile station

Table 9.15b/GSM 04.18: INTER SYSTEM HANDOVER TO CDMA2000 COMMAND message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	½
	Inter System to cdma2000 Handover Command Message	Message Type 10.4	M	V	1
	Handover to cdma2000 Command	Handover To cdma2000 Command 10.5.2.52	M	LV	4 - n

9.1.16 Handover complete

This message is sent on the main DCCH from the mobile station to the network to indicate that the mobile station has established the main signalling link successfully. See table 9.16/GSM 04.18.

Message type: HANDOVER COMPLETE

Significance: dual

Direction: mobile station to network

Table 9.16/GSM 04.18: HANDOVER COMPLETE message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Handover Complete Message Type	Message Type 10.4	M	V	1
	RR Cause	RR Cause 10.5.2.31	M	V	1
77	Mobile Observed Time Difference	Mobile Time Difference 10.5.2.21a	O	TLV	5

9.1.16.1 Mobile Observed Time Difference

This information element is included if and only if the Synchronization Indication IE in the HANDOVER COMMAND message requests it to be sent.

9.1.17 Handover failure

This message is sent on the main DCCH on the old channel from the mobile station to the network to indicate that the mobile station has failed to seize the new channel. See table 9.17/GSM 04.18.

Message type: HANDOVER FAILURE

Significance: dual

Direction: mobile station to network

Table 9.17/GSM 04.18: HANDOVER FAILURE message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Handover Failure Message Type	Message Type 10.4	M	V	1
	RR Cause	RR Cause 10.5.2.31	M	V	1

9.1.18 Immediate assignment

This message is sent on the CCCH by the network to the mobile station in idle mode to change the channel configuration to a dedicated configuration while staying in the same cell or to the mobile station in packet idle mode to change the channel configuration to either an uplink or a downlink packet data channel configuration in the cell. See table 9.18/GSM 04.18.

The L2 pseudo length of this message is the sum of lengths of all information elements present in the message except the *IA Rest Octets* and *L2 Pseudo Length* information elements.

Message type: IMMEDIATE ASSIGNMENT

Significance: dual

Direction: network to mobile station

Table 9.18/GSM 04.18: IMMEDIATE ASSIGNMENT message content

IEI	Information element	Type / Reference	Presence	Format	length
	L2 Pseudo Length	L2 Pseudo Length 10.5.2.19	M	V	1
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Immediate Assignment Message Type	Message Type 10.4	M	V	1
	Page Mode	Page Mode 10.5.2.26	M	V	1/2
	Dedicated mode or TBF	Dedicated mode or TBF 10.5.2.25b	M	V	1/2
	Channel Description	Channel Description 10.5.2.5	C	V	3
	Packet Channel Description	Packet Channel Description 10.5.2.25a	C	V	3
	Request Reference	Request Reference 10.5.2.30	M	V	3
	Timing Advance	Timing Advance 10.5.2.40	M	V	1
	Mobile Allocation	Mobile Allocation 10.5.2.21	M	LV	1-9
7C	Starting Time	Starting Time 10.5.2.38	O	TV	3
	IA Rest Octets	IA Rest Octets 10.5.2.16	M	V	0-11

9.1.18.0a Dedicated mode or TBF

A mobile station not supporting GPRS may ignore the contents of this information element and regard it as an unnecessary IE. Such mobile station shall assume that this message assigns a dedicated mode resource.

9.1.18.0b Channel Description

If the *Dedicated mode or TBF* IE indicates that the message assigns a dedicated mode resource, the mobile station shall consider this information element present in the message.

9.1.18.0c Packet Channel Description

If the *Dedicated mode or TBF* IE indicates that the message assigns a Temporary Block Flow (TBF), the mobile station shall consider this information element present in the message. If the *Dedicated mode or TBF* IE indicates that this message is the first of two in a two-message assignment of an uplink or downlink TBF, the mobile station shall ignore the contents of this information element and regard it as an unnecessary IE.

9.1.18.0d Request Reference

If this message is used in an assignment of a downlink TBF, the network shall code this information element, e.g. by using a suitably offset frame number, such that the resource reference cannot be confused with any CHANNEL REQUEST message sent by a mobile station.

If the *IA Rest Octets* IE indicates that this message is the second message of a two-message assignment of an uplink or downlink TBF, this information element shall have the same contents as the first message of the assignment.

9.1.18.0e Timing Advance

If the *IA Rest Octets* IE indicates that this message is the second message of a two-message assignment of an uplink or downlink TBF, the mobile station shall ignore the contents of this information element and regard it as an unnecessary IE.

9.1.18.1 Mobile Allocation

If this message assigns a dedicated mode resource and the *Channel Description* IE does not indicate frequency hopping , the length indicator of this information element shall be set to zero, and the mobile station shall consider the IE as an unnecessary IE.

If this message assigns a TBF and the *Packet Channel Description* IE does not indicate frequency hopping or if it uses indirect encoding of a hopping RF channel configuration, the length indicator of this information element shall be set to zero, and the mobile station shall consider the IE as an unnecessary IE.

9.1.18.2 Starting Time

This information element appears if e.g. a frequency change is in progress.

If this message is used in an assignment of an uplink or downlink TBF, the mobile station shall ignore the contents of the Starting Time information element if included and consider it as an unnecessary IE.

9.1.18.3 IA Rest Octets (Frequency parameters, before time)

The sum of the length of this IE and the L2 Pseudo Length of the message equals 22.

If the *starting time* IE is present but not the *frequency parameters, before time* construction, the mobile stations must wait until the starting time before accessing the channel.

If the *starting time* IE is present and the *Channel Description* IE does not indicate frequency hopping the mobile station shall consider the *frequency parameters, before time* construction as unnecessary in the message and the mobile must wait until the starting time before accessing the channel.

If the *starting time* IE is not present, the mobile station shall consider the *frequency parameters, before time* construction as unnecessary in the message.

9.1.18.4 IA Rest Octets (assignment of uplink or downlink TBF)

If the *Dedicated mode or TBF* IE indicates that this message is used in an assignment of a TBF, this information element shall contain a *Packet Uplink Assignment*, *Packet Downlink Assignment* or *Second Part Packet Assignment* construction.

If the *Dedicated mode or TBF* IE indicates that this message assigns a dedicated mode resource, but not that the mobile station is identified in the *IA Rest Octets* IE information element, the mobile station shall consider the *Packet Uplink Assignment*, *Packet Downlink Assignment* and *Second Part Packet Assignment* constructions as unnecessary in the message.

9.1.19 Immediate assignment extended

This message is sent on the CCCH by the network to two mobile stations in idle mode to change their channel configurations to different dedicated configurations while they stay in the same cell. See table 9.19/GSM 04.18

The L2 pseudo length of this message is the sum of lengths of all information elements present in the message except the *IAX Rest Octets* and *L2 Pseudo Length* information elements.

Message type: IMMEDIATE ASSIGNMENT EXTENDED

Significance: dual

Direction: network to mobile station

Table 9.19/GSM 04.18: IMMEDIATE ASSIGNMENT EXTENDED message content

IEI	Information element	Type / Reference	Presence	Format	length
	L2 Pseudo Length	L2 Pseudo Length 10.5.2.19	M	V	1
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Immediate Assignment Ex tended Message Type	Message Type 10.4	M	V	1
	Page Mode	Page Mode 10.5.2.26	M	V	1/2
	Spare Half Octet	Spare Half Octet 10.5.1.8	M	V	1/2
	Channel Description 1	Channel Description 10.5.2.5	M	V	3
	Request Reference 1	Request Reference 10.5.2.30	M	V	3
	Timing Advance 1	Timing Advance 10.5.2.40	M	V	1
	Channel Description 2	Channel Description 10.5.2.5	M	V	3
	Request Reference 2	Request Reference 10.5.2.30	M	V	3
	Timing Advance 2	Timing Advance 10.5.2.40	M	V	1
	Mobile Allocation	Mobile Allocation 10.5.2.21	M	LV	1-5
7C	Starting Time	Starting Time 10.5.2.38	O	TV	3
	IAX Rest Octets	IAX Rest Octets 10.5.2.18	M	V	0-4

NOTE: Index 1 refers to the first mobile station, index 2 refers to the second mobile station.

9.1.19.1 Unnecessary IEs

A mobile station which reacts on the request reference 1 shall consider all information elements as unnecessary IEs except *for Requests Reference 1*, *Channel Description 1*, *Timing advance 1*, *Starting Time* and if *Channel Description 1* IE indicates frequency hopping mobile allocation.

A mobile station which reacts on the request reference 2 shall consider all information elements as unnecessary IE except *Requests Reference 2*, *Channel Description 2*, *Timing advance 2*, *Starting Time* and if *channel description 2* IE indicates frequency hopping mobile allocation.

A mobile station in idle mode shall consider all information elements as unnecessary IEs except for the *Page Mode* IE.

9.1.19.2 Mobile Allocation

If both channel description IE do not indicate frequency hopping, the length indicator shall be set to zero.

9.1.19.3 Starting Time

This information element appears if a frequency change is in progress. If included the starting time is common to the two referenced mobile stations.

9.1.19.4 Maximum message length

As the maximum length of the resulting layer 3 data cannot exceed 22 octets, it is not possible to use this message type if the total length of the value part of the *Mobile Allocation* plus, optionally, the length of the *Starting Time* IE exceeds 5 octets. In this case it is necessary to use the IMMEDIATE ASSIGNMENT message.

9.1.19.5 IAX Rest Octets

The sum of the length of this IE and the L2 Pseudo Length of the message equals 22.

9.1.20 Immediate assignment reject

This message is sent on the CCCH by the network to up to four mobile stations to indicate that no channel is available for assignment. See table 9.20/GSM 04.18. This message has L2 pseudo length 19.

Message type: IMMEDIATE ASSIGNMENT REJECT

Significance: dual

Direction: network to mobile station

Table 9.20/GSM 04.18: IMMEDIATE ASSIGNMENT REJECT message content

IEI	Information element	Type / Reference	Presence	Format	length
	L2 Pseudo Length	L2 Pseudo Length 10.5.2.19	M	V	1
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Immediate Assignment Reject Message Type	Message Type 10.4	M	V	1
	Page Mode	Page Mode 10.5.2.26	M	V	1/2
	Spare Half Octet	Spare Half Octet 10.5.1.8	M	V	1/2
	Request Reference 1	Request Reference 10.5.2.30	M	V	3
	Wait Indication 1	Wait Indication 10.5.2.43	M	V	1
	Request Reference 2	Request Reference 10.5.2.30	M	V	3
	Wait Indication 2	Wait Indication 10.5.2.43	M	V	1
	Request Reference 3	Request Reference 10.5.2.30	M	V	3
	Wait Indication 3	Wait Indication 10.5.2.43	M	V	1
	Request Reference 4	Request Reference 10.5.2.30	M	V	3
	Wait Indication 4	Wait Indication 10.5.2.43	M	V	1
	IAR Rest Octets	IAR Rest Octets 10.5.2.17	M	V	3

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

9.1.20.1 Use of the indexes

A request reference information element and the following wait indication information element refer to the same mobile station. So it is possible to reject up to four channel requests with this message.

9.1.20.2 Filling of the message

If necessary the request reference information element and the wait indication information element should be duplicated to fill the message.

9.1.20.3 Wait Indication

When IMMEDIATE ASSIGNMENT REJECT message is for RR connection establisment then this IE contains timeout value for T3122. If IMMEDIATE ASSIGNMENT REJECT message is for TBF establisment for GPRS MS then this IE contain timeout value for T3142.

9.1.20.4 IAR Rest Octets

The sum of the length of this IE and the L2 Pseudo Length of the message equals 22.

9.1.20a Main DCCH Assignment Command

This message is sent on the main DCCH by the network to the mobile station to allocate the main DCCH as the packet resource. See table 9.20a/GSM 04.18.

Message type: MAIN DCCH ASSIGNMENT COMMAND

Significance: dual

Direction: network to mobile station

Table 9.20a/GSM 04.18: MAIN DCCH ASSIGNMENT COMMAND message content

IEI	Information element	Type / Reference	Presence	Format	Length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Main DCCH Assignment Command Message Type	Message Type 10.4	M	V	1
	Packet Assignment of the main DCCH	Main DCCH Assignment Information 10.5.2.19a	M	V	3-n

9.1.21 Measurement report

This message is sent on the SACCH by the mobile station to the network to report measurement results about the dedicated channel and about neighbour cells. See table 9.21/GSM 04.18.

Message type: MEASUREMENT REPORT

Significance: dual

Direction: mobile station to network

Table 9.21/GSM 04.18: MEASUREMENT REPORT message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Measurement Report Message Type	Message Type 10.4	M	V	1
	Measurement Results	Measurement Results 10.5.2.20	M	V	16

9.1.21a Notification/FACCH

The understanding of this message is only required for mobile stations supporting VGCS listening or VBS listening.

This message is sent on the main DCCH, in unacknowledged mode using the RR short protocol discriminator by the network to notify the mobile stations in dedicated mode or in on-going voice broadcast calls or voice group calls on other voice broadcast calls or voice group calls in that cell.

Notification/FACCH messages for VBS or VGCS calls are differentiated by a flag in the call reference.

The message shall not exceed a maximum length of 20 octets.

Mobile stations not supporting VGCS listening or VBS listening shall ignore this message.

See table 9.21a/GSM 04.18.

Message type: NOTIFICATION/FACCH

Significance: dual

Direction: network to mobile station

Table 9.21a/GSM 04.18: NOTIFICATION/FACCH message content

```
<NOTIFICATION FACCH>    ::= <RR short PD : bit>              -- See 3G TS 24.007
                                 <message type : bit(5)>         -- See 10.4
                            <short layer 2 header : bit(2)>     -- See GSM 04.06
                        {0 <Group Call information>
                        |1 <Paging Information>}
                            <spare padding> ;
<Group Call information> ::=        <Group Call Reference : bit(36)>
                        {0|1 <Group Channel Description>} ;
```

<Group Call Reference>

This field is syntactically and semantically equivalent to octets 2-5 and bits 5 to 8 of octet 6 of the *Descriptive Group or Broadcast Call Reference* information element.

The <Group Channel Description> field is optionally present. When present only the Channel description is provided in the case of non hopping channels. In the case where the channel is hopping then either a mobile allocation or a frequency short list is provided.

```
<Group Channel Description> : :=        <Channel Description : bit(24)>
                            {0                   -- Non hopping case
                            |1 {0 <Mobile Allocation : <bit string>>
                            |1 <Frequency Short List : bit(64)>}} ;

<bit string> ::= null | bit <bit string> ;
```

<Channel Description>

This field is syntactically and semantically equivalent to octets 2-4 of the *Channel Description* information element. See 10.5.2.5

<Frequency Short List>

This field is syntactically and semantically equivalent to octets 1-8 of the *Frequency Short List 2* information element. See 10.5.2.14a

<Mobile Allocation>

This field is syntactically and semantically equivalent to octet 2 to n+2 of the *Mobile Allocation* information element. See 10.5.2.21

The <Paging Information> field may be used to inform the mobile station in Group Receive or in Group Transmit mode that the corresponding mobile identity is paged in that cell.

```
<Paging Information>    ::= <mobile identity : <bit string>>
                    <channel first: bit(2)>
                    {0|1 <eMLPP priority : bit(3)>} ;

<bit string> ::= null | bit <bit string> ;
```

<mobile identity>

This field is syntactically and semantically equivalent to octet 2-n of the *Mobile Identity* information element. See 10.5.1.4

<channel first>

This field is syntactically and semantically equivalent to bits 1 and 2 of the *Channel Needed* information element. See 10.5.2.8

<eMLPP priority>

This field is coded as the <Priority1> field in the *P1 Rest Octets* information element. See 10.5.2.23

9.1.21a.1 Spare

9.1.21a.2 Spare

9.1.21a.3 Spare

9.1.21a.4 Spare

9.1.21b Notification/NCH

The understanding of this message is only required for mobile stations supporting VGCS listening or VBS listening.

This message is sent on the NCH by the network to notify mobile stations of VBS or VGCS calls in the current cell. The VBS or VGCS calls are identified by their broadcast call reference or group call reference, respectively. For each reference, the corresponding VBS or VGCS call channel may be indicated. See table 9.21b/GSM 04.18.

Notification/NCH messages for VBS or VGCS calls are differentiated by a flag in the call reference.

The L2 pseudo length of this message has a value one

Mobile stations not supporting VGCS listening or VBS listening shall ignore this message.

Message type: NOTIFICATION/NCH

Significance: dual

Direction: network to mobile station

Table 9.21b/GSM 04.18: NOTIFICATION/NCH message content

IEI	Information element	Type / Reference	Presence	Format	length
	L2 Pseudo Length	L2 Pseudo Length 10.5.2.19	M	V	1
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Notification/NCH Message Type	Message Type 10.4	M	V	1
	NT/N Rest Octets	NT/N Rest Octets 10.5.2.22c	M	V	20

9.1.21b.1 Spare

9.1.21b.2 Spare

9.1.21.c Spare

9.1.21d Notification response

This message is sent by the mobile station to the network to respond on a notification for a voice group call or voice broadcast call. See table 9.21d/GSM 04.08.

Message type: NOTIFICATION RESPONSE

Significance: dual

Direction: mobile station to network

Table 9.21d/GSM 04.08: NOTIFICATION RESPONSE message content

IEI	Information element	Type / Reference	Presence	Format	Length
	RR management Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Notification response Message type	Message type 10.4	M	V	1
	Mobile station Classmark	Mobile station classmark 2 10.5.1.6	M	LV	4
	Mobile identity	Mobile identity 10.5.1.4	M	LV	2-9
	Group or broadcast Call reference	Call reference 10.5.1.9	M	V	5

9.1.21e RR-Cell Change Order

This message is sent on the main DCCH by the network to the mobile station to order it to reselect a cell. See table 9.21e/GSM 04.18.

A mobile station that does not support the <<GRPS>> option shall regard this message as an unknown message.

Message type: RR-CELL CHANGE ORDER

Significance: dual

Direction: network to mobile station

Table 9.21e/GSM 04.18: RR-CELL CHANGE ORDER message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	RR-Cell Change Order Message Type	Message Type 10.4	M	V	1
	Cell Description	Cell description 10.5.2.2	M	V	2
	NC mode for target cell	NC mode 10.5.2.21c	M	V	1/2
	Spare half octet	Spare half octet 10.5.1.8	M	V	1/2

9.1.21f Packet Assignment Command

This message is sent on the main DCCH by the network to the mobile station to change the channel configuration to a multislot configuration with CS and PS connections when neither timing adjustment nor reallocation of the CS timeslot is needed. See table 9.21f/GSM 04.18.

Message type: PACKET ASSIGNMENT COMMAND

Significance: dual

Direction: network to mobile station

Table 9.21f/GSM 04.18: PACKET ASSIGNMENT COMMAND message content

IEI	Information element	Type / Reference	Presence	Format	Length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Packet Assignment Command Message Type	Message Type 10.4	M	V	1
22	Description of the Uplink Packet Channel Assignment	RR Packet Uplink Assignment 10.5.2.25c	O	TLV	3-n
23	Description of the Downlink Packet Channel Assignment	RR Packet Downlink Assignment 10.5.2.25d	O	TLV	3-n

9.1.21f.1 RR Packet Uplink Assignment and RR Packet Downlink Assignment IEs

These information elements are optional, but at least one of them shall be present. If none of them is present, the mobile station shall send a DTM ASSIGNMENT FAILURE message on the main DCCH and remain in dedicated mode

9.1.21g Packet Notification

This message is sent on the main DCCH by the network to trigger the mobile station to perform a cell update procedure. See table 9.21g/GSM 04.18.

Message type: PACKET NOTIFICATION

Significance: dual

Direction: network to mobile station

Table 9.21G/GSM 04.18: PACKET NOTIFICATION message content

IEI	Information element	Type / Reference	Presence	Format	Length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Packet Notification Message Type	Message Type 10.4	M	V	1
10	Packet TMSI	P-TMSI 10.5.2.42	C	TV	5
11	Mobile identity	Mobile identity 10.5.1.4	C	TLV	3-11

9.1.22 Paging request type 1

This message is sent on the CCCH by the network to up to two mobile stations. It may be sent to a mobile station in idle mode to trigger channel access. It may be sent to a mobile station in packet idle mode to transfer MM information (i.e. trigger of cell update procedure). The mobile stations are identified by their TMSI/P-TMSI or IMSI. See table 9.22/GSM 04.18.

The L2 pseudo length of this message is the sum of lengths of all information elements present in the message except the *P1 Rest Octets* and *L2 Pseudo Length* information elements.

Message type: PAGING REQUEST TYPE 1

Significance: dual

Direction: network to mobile station

Table 9.22/GSM 04.18: PAGING REQUEST TYPE 1 message content

IEI	Information element	Type / Reference	Presence	Format	length
	L2 Pseudo Length	L2 Pseudo Length 10.5.2.19	M	V	1
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Paging Request Type 1 Message Type	Message Type 10.4	M	V	1
	Page Mode	Page Mode 10.5.2.26	M	V	1/2
	Channels Needed for Mobiles 1 and 2	Channel Needed 10.5.2.8	M	V	1/2
	Mobile Identity 1	Mobile Identity 10.5.1.4	M	LV	2-9
17	Mobile Identity 2	Mobile Identity 10.5.1.4	O	TLV	3-10
	P1 Rest Octets	P1 Rest Octets 10.5.2.23	M	V	0-17

9.1.22.1 Unnecessary IE

A mobile station in idle mode shall consider all information elements as unnecessary IEs except for the *Page Mode* IE.

9.1.22.2 Channels needed for Mobiles 1 and 2

The first CHANNEL field of *Channel Needed* IE is associated with *Mobile Identity 1*. The second CHANNEL field of *Channel Needed* IE is associated with *Mobile Identity 2*.

If this message is used in the packet paging procedure, the *Channel Needed* IE associated with the corresponding *Mobile Identity 1 or 2* shall be coded with the value 00 (any channel) by the network. The mobile station receiving a packet paging request shall treat this information element as unnecessary in the message.

9.1.22.3 Mobile Identities

The *Mobile Identity 1 and 2* IEs shall not refer to IMEI.

9.1.22.4 P1 Rest Octets

The sum of the length of this IE and the L2 Pseudo Length of the message equals 22.

This IE may contain a *notification list number* field and/or, referring to each one of the *Mobile Identity 1 and 2* IEs, a *Priority 1 and 2* field and/or a *Packet Page Indication 1 and 2* field.

9.1.23 Paging request type 2

This message is sent on the CCCH by the network to two or three mobile stations. It may be sent to a mobile station in idle mode to trigger channel access. It may be sent to a mobile station in packet idle mode to transfer MM information (i.e. trigger of cell update procedure). Two of the mobile stations are identified by their TMSI/P-TMSI while the third is identified by its TMSI/P-TMSI or IMSI. See table 9.23/GSM 04.18.

The L2 pseudo length of this message is the sum of lengths of all information elements present in the message except the *P2 Rest Octets* and *L2 Pseudo Length* information elements.

Message type: PAGING REQUEST TYPE 2

Significance: dual

Direction: network to mobile station

Table 9.23/GSM 04.18: PAGING REQUEST TYPE 2 message content

IEI	Information element	Type / Reference	Presence	Format	length
	L2 Pseudo Length	L2 Pseudo Length 10.5.2.19	M	V	1
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Paging Request Type 2 Message Type	Message Type 10.4	M	V	1
	Page Mode	Page Mode 10.5.2.26	M	V	1/2
	Channels Needed for Mobiles 1 and 2	Channel Needed 10.5.2.8	M	V	1/2
	Mobile Identity 1	TMSI/P-TMSI 10.5.2.42	M	V	4
	Mobile Identity 2	TMSI/P-TMSI 10.5.2.42	M	V	4
17	Mobile Identity 3	Mobile Identity 10.5.1.4	O	TLV	3-10
	P2 Rest Octets	P2 Rest Octets 10.5.2.24	M	V	1-11

9.1.23.1 Channels needed for Mobiles 1 and 2

The first CHANNEL field of Channel Needed IE is associated with Mobile Identity 1. The second CHANNEL field of *Channel Needed* IE is associated with *Mobile Identity 2*.

If this message is used in the packet paging procedure, the *Channel Needed* IE associated with the corresponding *Mobile Identity 1 or 2* shall be coded with the value 00 (any channel) by the network. The mobile station receiving a packet paging request shall treat this information element as unnecessary in the message.

9.1.23.2 Mobile Identity 3

The *Mobile Identity 3* information element shall not refer to IMEI.

9.1.23.3 P2 Rest Octets

The sum of the length of this IE and the L2 Pseudo Length of the message equals 22.

This IE contains the channel needed indication related to the paging of *Mobile Identity 3*. The treatment of this indication in the case this message is used in a packet paging procedure is specified in section 9.1.23.1.

This IE may further contain a *notification list number* field and/or, referring to each one of the *Mobile Identity 1, 2 and 3* IEs, a *Priority 1, 2 and 3* field and/or, referring to the *Mobile Identity 3* IE, a *Packet Page Indication 3* field.

9.1.24 Paging request type 3

This message is sent on the CCCH by the network to four mobile stations. It may be sent to a mobile station in idle mode to trigger channel access. It may be sent to a mobile station in packet idle mode to transfer MM information (i.e. trigger of cell update procedure). The mobile stations are identified by their TMSIs/P-TMSIs. See table 9.24/GSM 04.18.

This message has a L2 Pseudo Length of 19.

Message type: PAGING REQUEST TYPE 3

Significance: dual

Direction: network to mobile station

Table 9.24/GSM 04.18: PAGING REQUEST TYPE 3 message content

IEI	Information element	Type / Reference	Presence	Format	length
	L2 Pseudo Length	L2 Pseudo Length 10.5.2.19	M	V	1
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Paging Request Type 3 Message Type	Message Type 10.4	M	V	1
	Page Mode	Page Mode 10.5.2.26	M	V	1/2
	Channels Needed for Mobiles 1 and 2	Channel Needed 10.5.2.8	M	V	1/2
	Mobile Identity 1	TMSI/P-TMSI 10.5.2.42	M	V	4
	Mobile Identity 2	TMSI/P-TMSI 10.5.2.42	M	V	4
	Mobile Identity 3	TMSI/P-TMSI 10.5.2.42	M	V	4
	Mobile Identity 4	TMSI/P-TMSI 10.5.2.42	M	V	4
	P3 Rest Octets	P3 Rest Octets 10.5.2.25	M	V	3

9.1.24.1 Channels needed for Mobiles 1 and 2

The first CHANNEL field of *Channel Needed* IE is associated with *Mobile Identity 1*. The second CHANNEL field of *Channel Needed* IE is associated with *Mobile Identity 2*.

If this message is used in the packet paging procedure, the *Channel Needed* IE associated with the corresponding *Mobile Identity 1 or 2* shall be coded with the value 00 (any channel) by the network. The mobile station receiving a packet paging request shall treat this information element as unnecessary in the message.

9.1.24.2 P3 Rest Octets

This IE contains the channel needed indication related to the paging of *Mobile Identity 3 and 4*. The treatment of these indications in the case this message is used in a packet paging procedure is specified in section 9.1.24.1.

This IE may further contain a *notification list number* field and/or, referring to each one of the *Mobile Identity 1, 2, 3 and 4* IEs, a *Priority 1, 2, 3 and 4* field.

9.1.25 Paging response

This message is sent on the main DCCH by the mobile station to the network in connection with establishment of the main signalling link as a response to the paging request message. See table 9.25/GSM 04.18.

Message type: PAGING RESPONSE

Significance: dual

Direction: mobile station to network

Table 9.25/GSM 04.18: PAGING RESPONSE message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Paging Response Message Type	Message Type 10.4	M	V	1
	Ciphering Key Sequence Number	Ciphering Key Sequence Number 10.5.1.2	M	V	1/2
	Spare Half Octet	Spare Half Octet 10.5.1.8	M	V	1/2
	Mobile Station Classmark	Mobile Station Classmark 2 10.5.1.6	M	LV	4
	Mobile Identity	Mobile Identity 10.5.1.4	M	LV	2-9

9.1.25.1 Mobile Station Classmark

This IE shall include for multiband mobile station the Classmark 2 corresponding to the frequency band in use.

9.1.26 Partial release

This message is sent on the main DCCH by the network to the mobile station to deactivate part of the dedicated channels in use. See table 9.26/GSM 04.18.

Message type: PARTIAL RELEASE

Significance: dual

Direction: network to mobile station

Table 9.26/GSM 04.18: PARTIAL RELEASE message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Partial Release Message Type	Message Type 10.4	M	V	1
	Channel Description	Channel Description 10.5.2.5	M	V	3

9.1.26.1 Channel Description

This information element describes the channel to be released.

9.1.27 Partial release complete

This message is sent on the main DCCH by the mobile station to the network to indicate that a part of the dedicated channels has been deactivated. See table 9.27/GSM 04.18.

Message type: PARTIAL RELEASE COMPLETE

Significance: dual

Direction: mobile station to network

Table 9.27/GSM 04.18: PARTIAL RELEASE COMPLETE message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Partial release Complete Message Type	Message Type 10.4	M	V	1

9.1.28 Physical information

This message is sent on the main DCCH by the network to the mobile station to stop the sending of access bursts from the mobile station. See table 9.28/GSM 04.18.

Message type: PHYSICAL INFORMATION

Significance: dual

Direction: network to mobile station

Table 9.28/GSM 04.18: PHYSICAL INFORMATION message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Physical Information Message Type	Message Type 10.4	M	V	1
	Timing Advance	Timing Advance 10.5.2.40	M	V	1

9.1.28.a RR Initialisation Request

This message is sent on the main DCCH by the mobile station to request establishment of dedicated mode.

Message type: RR Initialisation Request

Significance: local

Direction: mobile station to network

Table 9.28a/GSM 04.18: RR Initialisation Request message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	RR Initialisation Request Message Type	Message Type 10.4	M	V	1
	Ciphering Key Sequence Number	Ciphering Key sequence Number 10.5.1.2	M	V	1/2
	MAC Mode and Channel Coding Requested	Channel Coding Requested 10.5.2.4a	M	V	1/2
	Mobile station classmark	Mobile station classmark 2 10.5.1.6	M	LV	4
	TLLI	TLLI 10.5.2.41a	M	V	4
	Channel Request Description	Channel Request Description 10.5.2.8a	M	V	5
	GPRS Measurement Results	GPRS Measurement Results 10.5.2.20a	M	V	2

9.1.29 RR Status

This message is sent by the mobile station or the network at any time to report certain error conditions as described in section 8. See table 9.28a/GSM 04.18.

Message type: RR STATUS

Significance: local

Direction: both

Table 9.28a/GSM 04.18: RR STATUS message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	RR Status Message Type	Message Type 10.4	M	V	1
	RR Cause	RR Cause 10.5.2.31	M	V	1

9.1.30a Synchronization channel information

This message is sent on the SCH, which is one of the broadcast channels (ref. GSM 05.02 section 3.3.2). Its purpose is to support the synchronization of a mobile station to a BSS. It does not follow the basic format. Its length is 25 bits. The order of bit transmission is defined in GSM 04.04. See figure 9.3a/GSM 04.18 and table 9.29/GSM 04.18.

Message type: SYNCHRONIZATION CHANNEL INFORMATION

Significance: dual

Direction: network to mobile station

8	7	6	5	4	3	2	1	
BSIC						T1 (high)		octet 1
T1 (middle)								octet 2
T1 (low)	T2					T3' (high)		octet 3
							T3' (low)	

Figure 9.3a/GSM 04.18: Frame synchronization information element

Table 9.29a/GSM 04.18: Synchronization channel information message contents

BSIC, the base station identity code of the base station T1, T2 and T3', the 3 parts of the reduced TDMA frame number (RFN) as specified in TS. GSM 05.02 section 3.3.2.

9.1.30b COMPACT Synchronization channel information

This message is sent on the CSCH, which is one of the broadcast channels (ref. GSM 05.02 section 3.3.2). Its purpose is to support the synchronization of a COMPACT mobile station to a BSS. It does not follow the basic format. Its length is 25 bits. The order of bit transmission is defined in GSM 04.04. See figure 9.3b/GSM 04.18 and table 9.29b/GSM 04.18.

Message type: COMPACT SYNCHRONIZATION CHANNEL INFORMATION

Significance: dual

Direction: network to mobile station

8	7	6	5	4	3	2	1	
BSIC						R1 (high)		octet 1
R1 (low)								octet 2
R2						TG		octet 3
							spare	

Figure 9.3b/GSM 04.18: COMPACT Frame synchronization information element

Table 9.29b/GSM 04.18: COMPACT Synchronization channel information message contents

```
BSIC, the base station identity code of the base station

R1 and R2, the 2 parts of the reduced TDMA frame number (RFN) as
specified in TS. GSM 05.02 section 3.3.2.

TG, the time group as specified in TS. GSM 05.02 section 4.3.4.
```

9.1.31 System information Type 1

This message is sent on the BCCH by the network to all mobile stations within the cell giving information of control of the RACH and of the cell allocation. See table 9.30/GSM 04.18. Special requirements for the transmission of this message apply, see GSM 05.02. This message has a L2 Pseudo Length of 21.

Message type: SYSTEM INFORMATION TYPE 1

Significance: dual

Direction: network to mobile station

Table 9.30/GSM 04.18: SYSTEM INFORMATION TYPE 1 message content

IEI	Information element	Type / Reference	Presence	Format	length
	L2 pseudo length	L2 pseudo length 10.5.2.19	M	V	1
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	System Information Type 1 Message Type	Message Type 10.4	M	V	1
	Cell Channel Description	Cell Channel Description 10.5.2.1b	M	V	16
	RACH Control Parameter	RACH Control Parameters 10.5.2.29	M	V	3
	SI 1 Rest Octets	SI 1 Rest Octets 10.5.2.32	M	V	1

9.1.32 System information type 2

This message is sent on the BCCH by the network to all mobile stations within the cell giving information of control of the RACH and of the BCCH allocation in the neighbour cells. See table 9.31/GSM 04.18. Special requirements for the transmission of this message apply, see GSM 05.02. This message has a L2 Pseudo Length of 22.

Message type: SYSTEM INFORMATION TYPE 2

Significance: dual

Direction: network to mobile station

Table 9.31/GSM 04.18: SYSTEM INFORMATION TYPE 2 message content

IEI	Information element	Type / Reference	Presence	Format	length
	L2 Pseudo Length	L2 Pseudo Length 10.5.2.19	M	V	1
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	System Information Type 2 Message Type	Message Type 10.4	M	V	1
	BCCH Frequency List	Neighbour Cell Description 10.5.2.22	M	V	16
	NCC Permitted	NCC permitted 10.5.2.27	M	V	1
	RACH Control Parameter	RACH Control Parameters 10.5.2.29	M	V	3

9.1.33 System information type 2bis

This message is sent optionally on the BCCH by the network to all mobile stations within the cell giving information on control of the RACH and of the extension of the BCCH allocation in the neighbour cells. See table 9.31a/GSM 04.18. Special requirements for the transmission of this message apply, see GSM 05.02.

A GSM 900 mobile station which only supports the primary GSM band P-GSM 900 (cf. GSM 05.05) may ignore this message, see section 3.2.2.1.

This message has a L2 pseudo length of 21.

Message type: SYSTEM INFORMATION TYPE 2bis

Significance: dual

Direction: network to mobile station

Table 9.31a/GSM 04.18: SYSTEM INFORMATION TYPE 2bis message content

IEI	Information element	Type / Reference	Presence	Format	length
	L2 Pseudo Length	L2 Pseudo Length 10.5.2.19	M	V	1
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	System Information Type 2bis Message Type	Message Type 10.4	M	V	1
	Extended BCCH Frequency List	Neighbour Cell Description 10.5.2.22	M	V	16
	RACH Control Parameters	RACH Control Parameters 10.5.2.29	M	V	3
	SI 2bis Rest Octets	SI 2bis Rest Octets 10.5.2.33	M	V	1

9.1.34 System information type 2ter

This message is sent optionally on the BCCH by the network to all mobile stations within the cell giving information on the extension of the BCCH allocation in the neighbour cells. See table 9.31b/GSM 04.18. Special requirements for the transmission of this message apply, see GSM 05.02.

A mobile station that supports either:

only the primary GSM band P-GSM 900 (cf. GSM 05.05), or

only the DCS 1800 band (cf. GSM 05.05)

may ignore this message, see section 3.2.2.1.

This message has a L2 pseudo length of 18. This message may be sent by the network with either a L2 pseudo length of 18 or some other value. A mobile station that does not ignore this message shall not discard the message due to a received L2 pseudo length different from 18.

Message type: SYSTEM INFORMATION TYPE 2ter

Significance: dual

Direction: network to mobile station

Table 9.31b/GSM 04.18: SYSTEM INFORMATION TYPE 2ter message content

IEI	Information element	Type / Reference	Presence	Format	length
	L2 Pseudo Length	L2 Pseudo Length 10.5.2.19	M	V	1
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	System Information Type 2ter Message Type	Message Type 10.4	M	V	1
	Extended BCCH Frequency List	Neighbour Cell Description 2 10.5.2.22a	M	V	16
	SI 2ter Rest Octets	SI 2ter Rest Octets 10.5.2.33a	M	V	4

9.1.34a System information type 2quater

This message is sent optionally on the BCCH by the network to all mobile stations within the cell giving information on UTRAN neighbour cells. The message may contain more than one instance. Special requirements for the transmission of this message apply on BCCH, see GSM 05.02.

A mobile station that does not support UTRAN should ignore this message.

This message has a L2 pseudo length of 1

Message type: SYSTEM INFORMATION TYPE 2quater

Significance: dual

Direction: network to mobile station

Table 9.31c/GSM 04.18: SYSTEM INFORMATION TYPE 2 quater message content

IEI	Information element	Type / Reference	Presence	Format	length
	L2 Pseudo Length	L2 Pseudo Length 10.5.2.19	M	V	1
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	System Information Type 2quater Message Type	Message Type 10.4	M	V	1
	SI 2 quater Rest Octets	SI 2quater Rest Octets 10.5.2.33b	M	V	20

9.1.35 System information type 3

This message is sent on the BCCH by the network giving information of control on the RACH, the location area identification, the cell identity and various other information about the cell. See table 9.32/GSM 04.18. Special requirements for the transmission of this message apply, see GSM 05.02. This message has a L2 Pseudo Length of 18.

Message type: SYSTEM INFORMATION TYPE 3

Significance: dual

Direction: network to mobile station

Table 9.32/GSM 04.18: SYSTEM INFORMATION TYPE 3 message content

IEI	Information element	Type / Reference	Presence	Format	length
	L2 Pseudo Length	L2 Pseudo Length 10.5.2.19	M	V	1
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	System Information Type 3 Message Type	Message Type 10.4	M	V	1
	Cell Identity	Cell Identity 10.5.1.1	M	V	2
	Location Area Identification	Location Area Identification 10.5.1.3	M	V	5
	Control Channel Description	Control Channel description 10.5.2.11	M	V	3
	Cell Options	Cell Options (BCCH) 10.5.2.3	M	V	1
	Cell Selection Parameters	Cell Selection Parameters 10.5.2.4	M	V	2
	RACH Control Parameters	RACH Control Parameters 10.5.2.29	M	V	3
	SI 3 Rest Octets	SI 3 Rest Octets 10.5.2.34	M	V	4

9.1.36 System information type 4

This message is sent on the BCCH by the network giving information on control of the RACH, the location area identification, the cell identity and various other information about the cell. See table 9.33/GSM 04.18. Special requirements for the transmission of this message apply, see GSM 05.02. The L2 pseudo length of this message is the sum of lengths of all information elements present in the message except the *SI 4 Rest Octets* and *L2 Pseudo Length* information elements.

Message type: SYSTEM INFORMATION TYPE 4

Significance: dual

Direction: network to mobile station

Table 9.33/GSM 04.18: SYSTEM INFORMATION TYPE 4 message content

IEI	Information element	Type / Reference	Presence	Format	length
	L2 Pseudo Length	L2 Pseudo Length 10.5.2.19	M	V	1
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	System Information Type 4 Message Type	Message Type 10.4	M	V	1
	Location Area Identification	Location Area Identification 10.5.1.3	M	V	5
	Cell Selection Parameters	Cell Selection Parameters 10.5.2.4	M	V	2
	RACH Control Parameters	RACH Control Parameters 10.5.2.29	M	V	3
64	CBCH Channel Description	Channel description 10.5.2.5	O	TV	4
72	CBCH Mobile Allocation	Mobile Allocation 10.5.2.21	C	TLV	3-6
	SI 4 Rest Octets	SI 4 Rest Octets 10.5.2.35	M	V	0-10

9.1.36.1 CBCH Channel description

This information element is present if SMSCB is active in the cell and indicates (together with the *CBCH Mobile Allocation* IE) where to find the CBCH.

9.1.36.2 CBCH Mobile Allocation

If the *CBCH Channel Description* Information Element indicates frequency hopping, the *CBCH Mobile Allocation* IE shall be present. If the *CBCH Channel Description* does not indicate frequency hopping, the *CBCH Mobile Allocation* IE shall be considered as an unnecessary IE in the message.

9.1.36.3 SI 4 Rest Octets

The sum of the length of this IE and the L2 pseudo length of the message equals 22.

9.1.37 System information type 5

This message is sent on the SACCH by the network to mobile stations within the cell giving information on the BCCH allocation in the neighbour cells. See table 9.34/GSM 04.18.

When received this information shall be used as the list of BCCH frequencies of the neighbouring cells to be reported on. Any change in the neighbour cells description must overwrite any old data held by the mobile station. The mobile station must analyse all correctly received system information type 5 messages. This message has a L2 Pseudo Length of 18.

Message type: SYSTEM INFORMATION TYPE 5

Significance: dual

Direction: network to mobile station

Table 9.34/GSM 04.18: SYSTEM INFORMATION TYPE 5 message content

IEI	Information element	Type / Reference	Presence	Format	length
	L2 pseudo length	L2 pseudo length 10.5.2.19	M	V	1
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	System Information Type 5 Message Type	Message Type 10.4	M	V	1
	BCCH Frequency List	Neighbour Cell Description 10.5.2.22	M	V	16

9.1.38 System information type 5bis

This message is sent optionally on the SACCH by the network to mobile stations within the cell giving information on the extension of the BCCH allocation in the neighbour cells. See table 9.34a/GSM 04.18.

A GSM 900 mobile station which only supports the primary GSM band P-GSM 900 (cf. GSM 05.05) may ignore this message, see section 3.2.2.1.

When received (and not ignored) this information must be used as the list of neighbouring cells to be reported on. Any change in the neighbour cells description must overwrite any old data held by the mobile station. The mobile station must, with the exception stated above, analyse all correctly received system information type 5 messages. This message has a L2 Pseudo Length of 18.

Message type: SYSTEM INFORMATION TYPE 5bis

Significance: dual

Direction: network to mobile station

Table 9.34a/GSM 04.18: SYSTEM INFORMATION TYPE 5bis message content

IEI	Information element	Type / Reference	Presence	Format	length
	L2 pseudo length	L2 pseudo length 10.5.2.19	M	V	1
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	System Information Type 5 bis Message Type	Message Type 10.4	M	V	1
	Extension of the BCCH Frequency List Description	Neighbour Cell Description 10.5.2.22	M	V	16

9.1.39 System information type 5ter

This message is sent optionally on the SACCH by the network to mobile stations within the cell giving information on the extension of the BCCH allocation in the neighbour cells. See table 9.34b/GSM 04.18.

A mobile station that supports either:

only the primary GSM band P-GSM 900 (cf. GSM 05.05), or

only the DCS 1800 band (cf. GSM 05.05)

may ignore this message, see section 3.2.2.1.

When received (and not ignored) this information must be used as part of the list of neighbouring cells to be reported on. Any change in the neighbour cells description must overwrite this part of any old data held by the mobile station. The mobile station shall, with the exception stated above, analyse all correctly received system information type 5ter messages. This message has a L2 Pseudo Length of 18.

Message type: SYSTEM INFORMATION TYPE 5ter

Significance: dual

Direction: network to mobile station

Table 9.34b/GSM 04.18: SYSTEM INFORMATION TYPE 5ter message content

IEI	Information element	Type / Reference	Presence	Format	length
	L2 pseudo length	L2 pseudo length 10.5.2.19	M	V	1
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	System Information Type 5ter Message Type	Message Type 10.4	M	V	1
	Extended BCCH Frequency List	Neighbour Cell Description 2 10.5.2.22a	M	V	16

9.1.40 System information type 6

This message is sent on the SACCH by the network to mobile stations within the cell giving information of location area identification, of cell identity and various other information. See table 9.35/GSM 04.18. If received correctly by the mobile station this message is treated as in Sections 9.1.40.1 to 9.1.40.4.

This message has a L2 Pseudo Length of 11.

Message type: SYSTEM INFORMATION TYPE 6

Significance: dual

Direction: network to mobile station

Table 9.35/GSM 04.18: SYSTEM INFORMATION TYPE 6 message content

IEI	Information element	Type / Reference	Presence	Format	length
	L2 pseudo length	L2 pseudo length 10.5.2.19	M	V	1
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	System Information Type 6 Message Type	Message Type 10.4	M	V	1
	Cell Identity	Cell Identity 10.5.1.1	M	V	2
	Location Area Identification	Location Area Identification 10.5.1.3	M	V	5
	Cell Options	Cell Options (SACCH) 10.5.2.3	M	V	1
	NCC Permitted	NCC Permitted 10.5.2.27	M	V	1
	SI 6 Rest Octets	SI6 Rest Octets 10.5.2.35a	M	V	7

9.1.40.1 Cell Identity

Only applicable for mobile stations supporting SIM Application Toolkit class 2 or higher :

if a new Cell Identity is identified, an indication shall be given to the upper layer together with the new identity.

Other mobile stations may ignore this IE.

9.1.40.2 Location Area Identification

Only applicable for mobile stations supporting VGCS listening and VBS listening or SIM Application Toolkit class 2 or higher :

if a new Location Area Identification is identified, an indication shall be given to the upper layer together with the new identification.

Other mobile stations may ignore this IE.

9.1.40.3 Cell Options

When correctly received, this information shall be used as the current Cell Options information. Any change in the Cell Options shall overwrite any old Cell Options data held by the mobile station.

9.1.40.4 NCC permitted

As for BCCH Frequency List in SYSTEM INFORMATION TYPE 5.

9.1.41 System information type 7

This message is sent on the BCCH by the network giving information about cell reselection parameters to be used in that cell. See table 9.36/GSM 04.18. Special requirements for the transmission of this message apply, see GSM 05.02. The L2 pseudo length of this message has the value 1.

Message type: SYSTEM INFORMATION TYPE 7

Significance: dual

Direction: network to mobile station

Table 9.36/GSM 04.18: SYSTEM INFORMATION TYPE 7 message content

IEI	Information element	Type / Reference	Presence	Format	length
	L2 pseudo length	L2 pseudo length 10.5.2.19	M	V	1
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	System Information Type 7 Message Type	Message Type 10.4	M	V	1
	SI 7 Rest Octets	SI 7 Rest Octets 10.5.2.36	M	V	20

9.1.42 System information type 8

This message is sent on the BCCH by the network giving information about cell reselection parameters to be used in that cell. See table 9.37/GSM 04.18. Special requirements for the transmission of this message apply, see GSM 05.02. The L2 Pseudo Length of this message has the value 1.

Message type: SYSTEM INFORMATION TYPE 8

Significance: dual

Direction: network to mobile station

Table 9.37/GSM 04.18: SYSTEM INFORMATION TYPE 8 message content

IEI	Information element	Type / Reference	Presence	Format	length
	L2 Pseudo Length	L2 Pseudo Length 10.5.2.19	M	V	1
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	System Information Type 8 Message Type	Message Type 10.4	M	V	1
	SI 8 Rest Octets	SI 8 Rest Octets 10.5.2.37	M	V	20

9.1.43 System information Type 9

This message is sent on the BCCH by the network to all mobile stations within the cell giving some, but not necessarily all information on the scheduling of information on the BCCH. See table 9.37a/GSM 04.18. Special requirements for the transmission of this message apply, see subclause 3.2.2.1 and GSM 05.02. This message has a L2 Pseudo Length of 1.

Message type: SYSTEM INFORMATION TYPE 9

Significance: dual

Direction: network to mobile station

Table 9.37a/GSM 04.18: SYSTEM INFORMATION TYPE 9 message content

IEI	Information element	Type / Reference	Presence	Format	length
	L2 pseudo length	L2 pseudo length 10.5.2.19	M	V	1
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	System Information Type 9 Message Type	Message Type 10.4	M	V	1
	RACH Control Parameter	RACH Control Parameters 10.5.2.29	M	V	3
	SI 9 Rest Octets	SI 9 Rest Octets 10.5.2.37a	M	V	17

9.1.43a System information Type 13

This message is sent on the BCCH if indicated in at least one of the SYSTEM INFORMATION TYPE 3, 4, 7 or 8 messages. The message is sent by the network to provide information related to GPRS in the cell. See table 9.37b/GSM04.18. Special requirements for the transmission of this message apply, see GSM 05.02.

A mobile station not supporting GPRS shall treat this message as an unknown message type.

The L2 Pseudo Length of this message has the value 0.

Message type: SYSTEM INFORMATION TYPE 13

Significance: dual

Direction: network to mobile station

Table 9.37b/GSM 04.18: SYSTEM INFORMATION TYPE 13 message content

IEI	Information element	Type / Reference	Presence	Format	length
	L2 Pseudo Length	L2 Pseudo Length 10.5.2.19	M	V	1
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	System Information Type 13 Message Type	Message Type 10.4	M	V	1
	SI 13 Rest Octets	SI 13 Rest Octets 10.5.2.37b	M	V	20

9.1.43b [Spare]

9.1.43c [Spare]

9.1.43d System information type 16

This message is sent on the BCCH if indicated in the SYSTEM INFORMATION TYPE 3 message. The message is sent by the network giving information about cell selection and reselection parameters to be used in that cell. See table 9.37e/GSM 04.18. Special requirements for the transmission of this message applies, see GSM 05.02.

The L2 pseudo length of this message has the value 1.

Message type: SYSTEM INFORMATION TYPE 16

Significance: dual

Direction: network to mobile station

Table 9.37e/GSM 04.18: SYSTEM INFORMATION TYPE 16 message content

IEI	Information element	Type / Reference	Presence	Format	length
	L2 pseudo length	L2 pseudo length 10.5.2.19	M	V	1
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	System Information Type 16 Message Type	Message Type 10.4	M	V	1
	SI 16 Rest Octets	SI 16 Rest Octets 10.5.2.37e	M	V	20

9.1.43e System information type 17

This message is sent on the BCCH if indicated in the SYSTEM INFORMATION TYPE 3 message. The message is sent by the network giving information about cell selection and reselection parameters to be used in that cell. See table 9.37f/GSM 04.18. Special requirements for the transmission of this message applies, see GSM 05.02.

The L2 pseudo length of this message has the value 1.

Message type: SYSTEM INFORMATION TYPE 17

Significance: dual

Direction: network to mobile station

Table 9.37f/GSM 04.18: SYSTEM INFORMATION TYPE 17 message content

IEI	Information element	Type / Reference	Presence	Format	length
	L2 Pseudo Length	L2 Pseudo Length 10.5.2.19	M	V	1
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	System Information Type 17 Message Type	Message Type 10.4	M	V	1
	SI 17 Rest Octets	SI 17 Rest Octets 10.5.2.37f	M	V	20

9.1.43f System information type 19

This message is sent optionally on the BCCH by the network to all mobile stations within the cell giving information on COMPACT neighbour cells. See table 9.37g/GSM 04.18. Special requirements for the transmission of this message apply, see GSM 05.02.

A mobile station that does not support COMPACT should ignore this message.

This message has a L2 pseudo length of 1.

Message type: SYSTEM INFORMATION TYPE 19

Significance: dual

Direction: network to mobile station

Table 9.37g/GSM 04.18: SYSTEM INFORMATION TYPE 19 message content

IEI	Information element	Type / Reference	Presence	Format	length
	L2 Pseudo Length	L2 Pseudo Length 10.5.2.19	M	V	1
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	System Information Type 19 Message Type	Message Type 10.4	M	V	1
	SI 19 Rest Octets	SI 19 Rest Octets 10.5.2.37g	M	V	20

9.1.43g System information type 18

This message is sent on the BCCH when the operator decides to transmit non-GSM broadcast information.

The L2 pseudo length of this message has the value 1.

Message type: SYSTEM INFORMATION TYPE 18

Significance: dual

Direction: network to mobile station

Table 9.43f/GSM 04.18: SYSTEM INFORMATION TYPE 18 message content

IEI	Information element	Type / Reference	Presence	Format	length
	L2 Pseudo Length	L2 Pseudo Length 10.5.2.19	M	V	1
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	System Information Type 18 Message Type	Message Type 10.4	M	V	1
	SI 18 Rest Octets	SI 18 Rest Octets 10.5.2.37h	M	V	20

9.1.43h System information type 20

This message is sent on the BCCH when the operator decides to transmit non-GSM broadcast information.

The L2 pseudo length of this message has the value 1.

Message type: SYSTEM INFORMATION TYPE 20

Significance: dual

Direction: network to mobile station

Table 9.43h/GSM 04.18: SYSTEM INFORMATION TYPE 20 message content

IEI	Information element	Type / Reference	Presence	Format	length
	L2 Pseudo Length	L2 Pseudo Length 10.5.2.19	M	V	1
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	System Information Type 20 Message Type	Message Type 10.4	M	V	1
	SI 20 Rest Octets	SI 18 Rest Octets 10.5.2.37i	M	V	20

9.1.44 Talker indication

This message is sent on the main DCCH by the mobile station to the network to give the talker information when a new layer 2 connection is established on a VGCS channel after an uplink access. See table 9.44/GSM 04.18.

Message type: TALKER INDICATION

Significance: dual

Direction: mobile station to network

Table 9.44/GSM 04.18: TALKER INDICATION message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Talker Indication Message Type	Message Type 10.4	M	V	1
	Mobile Station Classmark	Mobile Station Classmark 2 10.5.1.6	M	LV	4
	Mobile Identity	Mobile Identity 10.5.1.4	M	LV	2-9

9.1.45 Uplink access

This message is sent in random mode on the voice group call channel uplink. It does not follow the basic format. The possible formats are presented directly below, without reference to information fields. The order of bit transmission is defined in GSM 04.04.

The message is only one octet long, coded as shown in figure 9.4/GSM 04.18 and table 9.45/GSM 04.18.

8	7	6	5	4	3	2	1	
ESTABLISHMENT CAUSE			RANDOM REFERENCE					octet 1

Figure 9.4/GSM 04.18: UPLINK ACCESS message content

ESTABLISHMENT CAUSE (octet 1)

This information field indicates the reason for requesting the establishment of a connection. This field has a variable length (from 3 bits up to 8 bits).

RANDOM REFERENCE (octet 1)

This is an unformatted field with variable length (from 5 bits down to 0 bits).

The Uplink access message is coded as follows:

(Random Reference field is filled with "x").

Table 9.45/GSM 04.18: UPLINK ACCESS message content

Message 8 1	Meaning of Establishment Cause
110xxxxx	Subsequent talker uplink request
00100101	Reply on uplink access request
other values	reserved for future use

9.1.46 Uplink busy

The understanding of this message is only required for mobile stations supporting VGCS talking.

This message is broadcasted on the voice group call channel on the main DCCH, SAPI=0, by the network in unacknowledged mode to inform the mobile station of the uplink status of the voice group call channel. See table 9.46/GSM 04.18.

Message type: UPLINK BUSY

Significance: dual

Direction: network to mobile station

Table 9.46/GSM 04.18: UPLINK BUSY message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Uplink busy Message Type	Message Type 10.4	M	V	1

9.1.47 Uplink free

This message is sent on the main DCCH, in unacknowledged mode using the RR short protocol discriminator by the network to inform the mobile station of the uplink status of the voice group call channel. See table 9.47/GSM 04.18. The message indicates the uplink as free unless the Uplink Access Request field indicates the uplink as not free.

This message may also be used by the network to request the mobile station to perform an uplink reply procedure.

Message type: UPLINK FREE

Significance: dual

Direction: network to mobile station

Table 9.47/GSM 04.18: UPLINK FREE message content

<UPLINK FREE> ::=	<RR short PD : bit>	See TS 24.007
	<message type : bit(5)>	See 10.4
	<short layer 2 header : bit(2)	See GSM 04.06
	<Uplink Access Request bit>	
	{L|H <Uplink Identity Code bit(6)>}	
	<implicit spare> ;	

Uplink Access Request :

L Mobile station shall not perform the uplink reply procedure;

H Mobile station shall perform the uplink reply procedure.

When set to H, this element also indicates the uplink as not free for the uplink access procedure

Uplink Identity Code :

This field is coded as the binary representation of the UIC.

If provided by the network, the Uplink Identity Code shall be used by the mobile for the coding of the UPLINK ACCESS message

9.1.48 Uplink release

Only applicable for mobile stations supporting VGCS talking.

This message is sent on the uplink of the voice group call channel to initiate a deactivation of the group transmit mode and to set the uplink free or on the downlink of the voice group call channel in order to reject an uplink access which was already granted by the network. See table 9.48/GSM 04.18

Message type: UPLINK RELEASE

Significance: local

Direction: both

Table 9.48/GSM 04.18: UPLINK RELEASE message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Uplink Release Message Type	Message Type 10.4	M	V	1
	RR Cause	RR Cause 10.5.2.31	M	V	1

9.1.49 VGCS uplink grant

The understanding of this message is only required for mobile stations supporting VGCS talking.

This message is sent in unacknowledged mode on the main signalling channel by the network to the mobile station to stop the sending of access bursts from the mobile station and to change the channel configuration to a dedicated configuration. See table 9.49/GSM 04.18.

Message type: VGCS UPLINK GRANT

Significance: dual

Direction: network to mobile station

Table 9.49/GSM 04.18: VGCS UPLINK GRANT message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	VGCS Uplink Grant Message Type	Message Type 10.4	M	V	1
	Request Reference	Request Reference 10.5.2.30	M	V	3
	Timing Advance	Timing Advance 10.5.2.40	M	V	1

9.1.50 System information type 10 $(ASCI)$

The understanding of messages of this message type is only required for mobile stations supporting VGCS listening and VBS listening. A mobile station not understanding the message shall treat it as unknown message.

Messages of this message type are optionally sent by the network in unacknowledged mode on the SACCH. SYSTEM INFORMATION TYPE 10 messages contain information about neighbour cells. When sent on the SACCH of a VGCS or VBS downlink, SYSTEM INFORMATION TYPE 10 messages address all mobile stations receiving that downlink within the cell. There may be different SYSTEM INFORMATION TYPE 10 messages sent on the same SACCH.

They are not standard layer 3 messages. They shall be transferred using the short header format for SACCH messages sent in unacknowledged mode specified in TS 24.007.

Each SYSTEM INFORMATION TYPE 10 message defines a list of cells and may contain further information for cells of that list, a cell being identified by the pair of ARFCN and BSIC of the BCCH. Newer information about a cell received in SYSTEM INFORMATION TYPE 10 messages shall replace older information.

Message type: SYSTEM INFORMATION TYPE 10

Significance: dual

Direction: network to mobile station

```
<SYSTEM INFORMATION TYPE 10> ::=

                <RR short PD : bit>                 -- See 3G TS 24.007
                <message type : bit(5)>             -- See 10.4
                <short layer 2 header : bit(2)>     -- See GSM 04.06
                        <SI10 Rest Octets : bit(160)>;      -- See 10.5.2.44
```

9.1.51 EXTENDED MEASUREMENT ORDER

This message is sent on the SACCH by the network to the mobile station, to order the mobile station to send one extended measurement report. See table 9.1.51.1/GSM 04.18.

A mobile station which does not support Extended Measurements shall discard this message.

This message has a L2 Pseudo Length of 18.

Message type: EXTENDED MEASUREMENT ORDER

Significance: dual

Direction: network to mobile station

Table 9.1.51.1/GSM 04.18: EXTENDED MEASUREMENT ORDER message content

IEI	Information element	Type / Reference	Presence	Format	length
	L2 pseudo length	L2 pseudo length 10.5.2.19	M	V	1
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Extended Measurement Order	Message Type 10.4	M	V	1
	Extended Measurement Frequency List	Extended Measurement Frequency List 10.5.2.46	M	V	16

9.1.52 Extended measurement report

This message is sent on the SACCH by the mobile station to the network to report extended measurement results about the signal strength on specified carriers. See table 9.1.52.1/GSM 04.18.

Message type: EXTENDED MEASUREMENT REPORT

Significance: dual

Direction: mobile station to network

Table 9.1.52.1/GSM 04.18: EXTENDED MEASUREMENT REPORT message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Extended Measurement Report Message Type	Message Type 10.4	M	V	1
	Extended Measurement Results	Extended Measurement Results 10.5.2.45	M	V	16

9.1.53 Application Information

This message is sent on the main DCCH by the network or the mobile station to convey an embedded Application Protocol Data Unit (APDU) or APDU segment between the network and the mobile station. See table 9.1.53.1/GSM 04.18.

Message type: Application

Significance: global

Direction: both

Table 9.1.53.1/GSM 04.18: Application Information message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	RR management Protocol Discriminator	Protocol discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Application Information message type	Message type 10.4	M	V	1
	APDU ID	APDU ID `0.5.2.48	M	V	1/2
	APDU Flags	APDU Flags 10.5.2.49	M	V	1/2
	APDU Data	APDU Data 10.5.2.50	M	LV	2 to N

9.1.54 MEASUREMENT INFORMATION

This message is sent on the SACCH by the network to the mobile station.If not all information fits into one message, the remaining information will be sent in other instances of this message.

Message type: MEASUREMENT INFORMATION

Significance: dual

Direction: network to mobile station

This message can contain a combination of information for e.g. 3G Neighbour Cell Description, Real Time differences, BSICs, Measurement parameters or 3G Measurement parameters.

3G Neighbour Cell Description

One or more instances of the Measurement Information message may provide 3G Neighbour Cell Description information. This is used to build the 3G Neighbour Cell list. The maximum size of the 3G Neighbour Cell list is (0..126).

Building of the 3G Neighbour Cell list:

For each 3G Neighbour Cell Description received:

1. The order of indices is FDD Cell indices followed by the TDD Cell indices followed by CDMA 2000 Cell indices. The ordering of Cell indices within the same radio Access Technology shall be based on:

   1.a For UMTS FDD: FDD ARFCNs are included as received in the order of each 3G Neighbour Cell description. Then for each FDD ARFCN, the concatenated Scrambling codes / Time Diversity parameters are ordered by increasing numbers.

   1.b For UMTS TDD: TDD ARFCNs are included as received in the order of each 3G Neighbour Cell description. Then for each TDD ARFCN, the concatenated Cell Parameter / Sync Case / Time diversity parameters are ordered by increasing numbers.

   1.c For CDMA 2000: Parameters defining each cell are included as received in the order of each 3G Neighbour Cell description.

Any *3G Neighbour Cell Description* received is added to the Neighbour Cell list, starting with the index equal to the parameter Index_Start_3G. If this parameter is not present then the value 0 shall be used.

Any change/addition for each 3G Neighbour Cell shall overwrite any old data held by the mobile station for this 3G Neighbour Cell (this means that the value corresponding to 3G Neighbour Cell not included shall not be modified, with the exceptions described in 3.4.1.2).

If the MS receives some *3G Neighbour Cell Description* on some non-supported Radio Access Technologies, this shall not be considered as an error. However, indices in the 3G Neighbour Cell list are incremented.

BSIC Description:

One or more instances of the Measurement Information message may provide BSIC information and gap bit indicators. This is used to build the GSM Neighbour Cell list. The maximum number of indexes for the BSIC list is equal to 127.

Building of the GSM Neighbour Cell list:

The BSICs are associated to the frequencies in the BA (list). The BSICs may be received before the corresponding BA (list). The first BSIC in each instance applies to the frequency in the BA (list) referenced by the parameter Start_Index_BA. For each successive BSIC, there is a bit indicating if the BSIC applies to the same frequency as the previous BSIC or to the next frequency in the BA (list).

Any change/addition for each GSM Neighbour Cell shall overwrite any old data held by the mobile station for this GSM Neighbour Cell (this means that the values corresponding to a GSM Neighbour Cell not included shall not be modified, with the exceptions described in 3.4.1.2).

Real Time Difference Description:

One or more instances of the Measurement Information message may provide Real Time Difference information. This is used to build the Real Time Difference list. The maximum number of indexes for the Real Time Difference list is equal to 127.

Building of the Real Time Difference list:

Each frequency in the BA (list) can be associated to 0, 1 or more Real Time Difference parameters. The Real Time Difference parameters may be received before the corresponding BA (list). The first Real Time Difference parameter in each instance applies to the frequency in the BA (list) referenced by the parameter Start_Index_BA. In the recursive structure, a bit indicates (with 1 or 0) if the same or the subsequent BA (list) frequency is referenced. In the first case, a RTD parameter is included after this bit.

Any change/addition for each Real Time Difference shall overwrite any old data held by the mobile station for this Real Time Difference (this means that the values corresponding to Real Time Difference not included shall not be modified, with the exceptions described in 3.4.1.2).

Priority Description

Each Priority bit of this field relates to the index of the Neighbour Cells.

If the MS has no 3G Neighbour cell list:

Then this relates to the GSM Neighbour Cell list.

If the MS has a 3G Neighbour cell list:

Then this relates to the concatenated GSM Neighbour Cell list and 3G Neighbour cell list. For the concatenation the value of the parameter Absolute_Index_Start_EMR is added to the 3G Neighbour cell indexes. In this concatenation the indices exceeding the value 126 are ignored. If there are less indices than 126, the value 0 shall be assumed for the missing bits.

```
<Measurement information> ::=

< RR short PD : bit >              -- See GSM 04.07
< Message type : bit (5) >         -- See 10.4
< Short layer 2 header : bit (2) >   -- See GSM 04.06

< BA_IND : bit >
< 3G_BA_IND : bit >
< Report_Type : bit >
< REPORTING_RATE : bit >
< UNKNOWN_BSIC_REPORTING : bit >

{ L | H < 3G Neighbour Cells Description : 3G Neighbour Cells Description  > }

{ L | H < Real Time Difference Description : Real Time Difference Description > }    -- (GSM RAT)
{ L | H < BSIC Description : BSIC Description > }

{ L | H < PRIORITY Description : PRIORITY Description > }
{ L | H < MEASUREMENT Parameters Description : MEASUREMENT Parameters Description > }
{ L | H < 3G MEASUREMENT Parameters Description : 3G MEASUREMENT Parameters Description > }

< spare padding > ;



< 3G Neighbour Cells Description > : :=
{
{ 0 | 1 < Count : bit (3)> }
{ 0 | 1 < Index_Start_3G : bit (7)> }
{ 0 | 1 < Absolute_Index_Start_EMR : bit (7)> }
{ 0 | 1 < UMTS FDD Description : UMTS FDD Description > }
{ 0 | 1 < UMTS TDD Description : UMTS TDD Description > }
{ 0 | 1 < CDMA2000 Description : CDMA2000  Description > }
}


< UMTS FDD Description > : :=
{
{ 0 | 1 < Bandwidth_FDD : bit (3) > }
{ 1 { < Repeated UMTS FDD Neighbour Cells : Repeated UMTS FDD Neighbour Cells struct > } ** 0 }
}
< Repeated UMTS FDD Neighbour Cells struct > ::=
{ 0 < FDD-ARFCN : bit (14) > | 1 < FDD-ARFCN-INDEX : bit (3)  > }
< Number_of_Scrambling_Codes_and_Diversity : bit (5) >
< Range-1024-Format Scrambling Codes and Diversity Field :
bit(p(Number_of_Scrambling_Codes_and_Diversity)) > ; -- p(x) defined in table 9.1.53.a1/GSM 04.18

< UMTS TDD Description > : :=
{
{ 0 | 1 < Bandwidth_TDD : bit (3) > }
{ H < Repeated UMTS TDD Neighbour Cells : Repeated UMTS TDD Neighbour Cells struct > } ** L
}
< Repeated UMTS TDD Neighbour Cells struct > ::=
{ 0 < TDD-ARFCN : bit (14) > | 1 < TDD-ARFCN-INDEX : bit (3)  > }
< Number_of_Cell Parameters_and_sync cases_and_Diversity : bit (5) >
< Range-512-Format Cell Parameters and syncs cases and Diversity :
bit(q(Number_of_Scrambling_Codes_and_Diversity) > ; -- q(x) defined in table xxx/GSM04.18

< CDMA 2000 Description > ::=
{
     <cdma2000 frequency band : bit(5)>
     <cdma2000 frequency : bit(11)>
    < number_cdma2000_cells : bit (5) >

      {<Pilot PN offset : bit(9)>
          -- this information is enough for 1X Common Pilot
```

```
       {0|1{000{<TD_MODE : bit (2)> <TD_POWER_LEVEL : bit(3)>}
             -- additional information for 1X Common Pilot with Transmit Diversity

                |001{<QOF : bit(2)> <WALSH_LEN_A : bit(3)>
                        <AUX_PILOT_WALSH : bit(val(WALSH_LEN_A)+6)>}
             -- additional information for 1X Auxiliary Pilot

                |010{< QOF : bit(2)> <WALSH_LEN_B : bit(3)>
                       <AUX_TD_WALSH : bit(val(WALSH_LEN_B)+6)>
                       <AUX_TD_POWER_LEVEL : bit(2)> <TD_MODE : bit(2)>}
             -- additional information for 1X Auxiliary Pilot with Transmit Diversity

                |011{<SR3_PRIM_PILOT : bit(2)> <SR3_PILOT_POWER1 : bit(3)>
                       <SR3_PILOT_POWER2 : bit(3)>}
             -- additional information for 3X Common Pilot

                |110{<SR3_PRIM_PILOT : bit(2)> <SR3_PILOT_POWER1 : bit(3)>
                        <SR3_PILOT_POWER2 : bit(3)> <QOF : bit(2)>
                        <WALSH_LEN_C : bit(3)>
                        <AUX_WALSH_LEN : bit(val(WALSH_LEN_C)+6)>
                        {0|1< QOF1 : bit(2)> < WALSH_LENGTH1 : bit(3)>
                              < AUX_PILOT_WALSH1 : bit(val(WALSH_LENGTH1)+6)>}
                        {0|1< QOF2 : bit(2)> <WALSH_LENGTH2 : bit(3)>
                              <AUX_PILOT_WALSH2 : bit(val(WALSH_LENGTH2)+6)>}}
             -- additional information for 3X Auxiliary Pilot
                }
           }
          }  * val(number_cdma2000_cells)
 }

< Real Time Difference Description > : :=
{0 | 1 { 0 | 1 < START_INDEX_BA : bit (7) > } --default value=1
     < N1: bit(7)>
        < RTD : bit (6) >
        { 0 | 1 < RTD : bit(6) >} * (val(N1))          --  0 means same frequency
}

{0 | 1 { 0 | 1 < START_INDEX_BA : bit (7) > }  --default value=1
     < N2: bit(7)>
        < RTD : bit (12) >
        { 0 | 1 < RTD : bit(12) >} * (val(N2))        -- 0 means same frequency
} ;




< BSIC Description > ::=
     { 0 | 1 < Start_BSIC_Index : bit (7) > }
     < BSIC : bit (6) >
     < Number_Remaining_BSIC: bit (7) >
     {    < Frequency_Scrolling : bit >
          < BSIC : bit (6) > } * (val(Number_Remaining_BSIC)) ;



< PRIORITY Description > : :=
{
Number_Cells : bit(7) ;
{ PRIORITY: bit } * (val(Number_Cells)
}

< MEASUREMENT PARAMETERS Description > : :=
{
     { 0 | 1  < Multiband_Reporting : bit (2) > }
     { 0 | 1  < Serving_Band_Reporting : bit (2) > }
     { 0 | 1 < SCALE : bit(2) > }

     { 0 | 1  { 0 | 1  < 900_Offset : bit (3) > }
```

```
        { 0 | 1  < 900_Threshold_Reporting : bit (3) > } }

    { 0 | 1  { 0 | 1  < 1800_Offset : bit (3) > }
        { 0 | 1  < 1800_Threshold_Reporting : bit (3) > } }

    { 0 | 1  { 0 | 1  < 450_Offset : bit (3) > }
        { 0 | 1  < 450_Threshold_Reporting : bit (3) > } }

    { 0 | 1  { 0 | 1  < 1900_Offset : bit (3) > }
        { 0 | 1  < 1900_Threshold_Reporting : bit (3) > } }

    { 0 | 1  { 0 | 1  < 850_Offset : bit (3) > }
        { 0 | 1  < 850_Threshold_Reporting : bit (3) > } }
}

< 3G MEASUREMENT PARAMETERS Description > : :=
{
    { < Qsearch_D : bit (4) > }

    { 0 | 1  { 0 | 1  < FDD_MULTIMODE_REPORTING : bit (2) >  }                    --  FDD Parameters
        { 0 | 1  < FDD_Offset : bit (3) > }
        { 0 | 1  < FDD_Threshold_Reporting : bit (3) > } }

    { 0 | 1  { 0 | 1  < TDD_MULTIMODE_REPORTING : bit (2) >  }                    --  TDD Parameters
        { 0 | 1  < TDD_Offset : bit (3) > }
        { 0 | 1  < TDD_Threshold_Reporting : bit (3) > } }

    { 0 | 1  { 0 | 1  < CDMA2000_MULTIMODE_REPORTING : bit (2) >  }       --  CDMA2000 Parameters
        { 0 | 1  < CDMA2000_Offset : bit (3) > }
        { 0 | 1  < CDMA2000_Threshold_Reporting : bit (3) > } }
}
```

Figure 9.1.53.1/GSM 04.18: *Measurement Information* message content

Table 9.1.53.1/GSM 04.18: Measurement Information information element details

BA-IND (1 bit), BCCH allocation sequence number indication.
The BA-IND is needed to allow the network to discriminate measurements results related to different neighbour lists sent to the MS. The value of this parameter is reflected in the ENHANCED MEASUREMENT REPORT message and in the MEASUREMENT REPORT message.

Report_Type (1bit)
This parameter is used to indicate to the mobile to use the Enhanced Measurement report or Measurement report messages for reporting:
Bit
0 The MS shall use the Enhanced Measurement Report message for reporting if at least one BSIC is allocated to each BA (list) frequency.
1 The MS shall use the Measurement Report message for reporting.

REPORTING_RATE (1 bit)
This parameter is used for measurements, see GSM 05.08.
bit
0 SACCH rate reporting
1 Reduced reporting rate allowed

UNKNOWN_BSIC_REPORTING (1 bit)
This field specifies if cells with unknown BSIC and allowed NCC part of BSIC are allowed to be reported or not, see GSM 05.08.
bit
0 Report on cells with unknown BSIC and allowed NCC part of BSIC is not allowed.

1 Report on cells with unknown BSIC and allowed NCC part of BSIC is allowed.

3G Neighbour Cells Description:

Count (3 bits)
When 3G-BA-IND is received in a changed state, this parameter indicates the number of instances of 3G Neighbour Cells Description which shall be received before the MS reports on this new information. Two different instances of 3G Neighbour Cells description are two 3G Neighbour Cells Description with different Index_Start_3G.

3G-BA-IND (1 bit), 3G allocation sequence number indication.
The 3G-BA-IND is needed to allow the network to discriminate measurements results related to different 3G neighbour lists sent to the MS. The value of this parameter is reflected in the ENHANCED MEASUREMENT REPORT message and in the MEASUREMENT REPORT message.

Index_Start_3G (7 bit)
This optional information element indicates the binary value of the first index to use to build this instance of the 3G Neighbour Cell list. When missing, the value 0 is assumed.

Absolute_Index_Start_EMR (7 bit)
This parameter indicates in binary the value to be added to the indexes of the 3G Neighbour list for 3G enhanced measurement reporting. This parameter does not impact the 3G measurement reporting. If this parameter is absent, the same value than received in a previous instance (with the exceptions defined in 3.4.1.2) is assumed.

UMTS FDD Description:

Bandwidth_FDD (3bit field)
This optional information element is defined in 3G TS 25.331.

FDD_ARFCN (14 bit field)
Bits 1-9 of this optional information element are defined in GSM 05.05. Any parameter received with bits 10, 11, 12, 13 or 14 equal to 1 do not trigger measurements in this version of the protocol. However this leads to index increasing.

Number_of_Scrambling_Codes_and_Diversity (n) (5 bit field)
This optional field defines the decimal value of the number of Scrambling Codes/Diversity parameters (0–31).

Range-1024-Format Scrambling Codes and Diversity Field (p bit field)
This field allows to compute a set of 10-bit-long Scrambling Codes and Diversity Parameters, re-using the *Range 1024 format* compression algorithm, see Annex J: 'Algorithm to encode frequency list information'. The computation formulas for decoding are given in the 'Range 1024 format' sub-clause, 10.5.2.13.3. The consecutive parameters of this field are concatened, starting with the bit FDD_Indic0, and then w1, w2… Each parameter starts with the Most Significant Bit.

FDD_Indic0, information 0 indicator (1 bit):
0 information '0000000000' is not a member of the set
1 information '0000000000' is a member of the set
NOTE: This bit FDD_Indic0 is equivalent than the bit F0 bit in the frequency list information element.

For each (10-bit-long) decoded Parameter, bits 1-9 are the Scrambling Codes and bit 10 is the corresponding Diversity Parameter.

The total number of bits p of this field depends on the value of the parameter Number_of_Scrambling_Codes_and_Diversity = n, as follows (with p=0 if n=0):

n	**p**	**n**	**p**	**n**	**p**	**n**	**p**	**n**	**p**	**n**	**p**
1	11	6	53	11	89	16	123	21	153	26	183
2	20	7	61	12	96	17	129	22	159	27	189
3	29	8	68	13	103	18	135	23	165	28	195
4	37	9	75	14	110	19	141	24	171	29	201
5	45	10	82	15	117	20	147	25	177	30	207

Table 9.1.53.a1.

UMTS TDD Description:

Bandwidth_TDD (3bit field)
This optional information element is defined in 3G TS 25.331.

TDD_ARFCN (14 bit field)
Bits 1-10 of this optional information element are defined in GSM 05.05. Any parameter received with bits 11, 12, 13 or 14 equal to 1 do not trigger measurements in this version of the protocol. However this leads to index increasing.

Number_of_Cell Parameters_and_Sync Sases_and_Diversity (m) (5 bit field)
This optional field defines the decimal value of the number of Cell Parameters/Sync Case/Time Diversity parameters (0–31).

Range-512-Format Cell Parameters and syncs cases and Diversity (q bit field)
This field allows to compute a set of 9-bit-long Scrambling Codes and Diversity Parameters, re-using the *Range 512 format* compression algorithm, see Annex J: 'Algorithm to encode frequency list information'. The computation formulas for decoding are given in the 'Range 512 format' sub-clause, 10.5.2.13.4, with w0=0. The consecutive parameters of this field are concatened, starting with the bit TDD_Indic0, and then w1, w2… Each parameter starts with the Most Significant Bit.

TDD_Indic0, information 0 indicator (1 bit):
0 information '000000000' is not a member of the set
1 information '000000000' is a member of the set
NOTE: This bit TDD_Indic0 is equivalent than the bit F0 bit in the frequency list information element.

For each (9-bit-long) decoded Parameter, bits 1-7 are the Cell Parameters, bit 8 is the Sync Case and bit 9 is the Diversity bit..

The total number of bits q of this field depends on the value of the parameter **Number_of_Cell Parameters_and_Sync Cases_and_Diversity** = m, as follows (with q=0 if m=0):

m	**q**	**m**	**q**	**m**	**q**	**m**	**q**	**m**	**q**	**m**	**q**
1	10	6	47	11	78	16	106	21	132	26	157
2	18	7	54	12	84	17	112	22	137	27	161
3	26	8	60	13	90	18	117	23	142	28	166
4	33	9	66	14	96	19	122	24	147	29	171
5	40	10	72	15	102	20	127	25	152	30	176

Table 9.1.53.a2.

CDMA 2000 Description:

cdma2000 frequency band, a binary representation of cdma2000 BAND_CLASS, as defined in TIA/EIA-IS-2000-5-A. The mobile station shall ignore all the information relative to a cdma2000 frequency band that it can not support.

cdma2000 frequency, a binary representation of cdma2000 CDMA_FREQ, as defined in TIA/EIA-IS-2000-5-A. The mobile station shall ignore all the information relative to a cdma2000 frequency that it can not support.

number_cdma2000_cells (5 bit field)
This field indicates the number of CDMA 2000 neighbour cells.

cdma2000 **Pilot PN offset**, a binary representation of the PN offset of the Pilot PN sequence (in units of 64 cdma2000 1x-chips), PILOT_PN, as defined in TIA/EIA-IS-2000-5-A.

TD_MODE, an indication of transmit diversity mode is specified in TIA/EIA-IS-2000-5-A. The mobile station shall ignore TD_MODE if it does not support 1X Common Pilot with Transmit Diversity.

TD_POWER_LEVEL, power level of the Transmit Diversity Pilot relative to that of the Forward Pilot Channel as specified in TIA/EIA/IS-2000-5-A. The mobile station shall ignore TD_POWER_LEVEL if it does not support 1X Common Pilot with Transmit Diversity.

QOF, quasi-orthogonal function index is defined in TIA/EIA/IS-2000-5-A. The mobile station shall ignore QOF if it does not support the quasi-orthogonal function.

WALSH_LEN_A, WALSH_LEN_B and **WALSH_LEN_C**, a three bit field to indicate the length of the Walsh code for the pilot that is used in as the Auxiliary Pilot, and specified as WALSH_LEN in TIA/EIA/IS-2000-5-A. The mobile station shall ignore WALSH_LEN if it does not support 1X Auxiliary Pilot.

AUX_PILOT_WALSH indicates the walsh code corresponding to the Auxiliary Pilot, as specified in TIA/EIA/IS-2000-5-A. The mobile station shall ignore AUX_PILOT_WALSH if it does not support 1X Auxiliary Pilot.

AUX_TD_WALSH indicates the walsh code corresponding to the Auxiliary Transmit Diversity Pilot, as specified in TIA/EIA/IS-2000-5-A. The mobile station shall ignore AUX_TD_WALSH if it does not support 1X Auxiliary Pilot with Transmit Diversity.

AUX_TD_POWER_LEVEL, power level of the Auxiliary Transmit Diversity Pilot relative to that of the Forward Pilot Channel as specified in TIA/EIA/IS-2000-5-A. The mobile station shall ignore AUX_TD_POWER_LEVEL if it does not support 1X Auxiliry Pilot with Transmit Diversity.

SR3_PRIM_PILOT, position of the primary SR3 pilot as specified in TIA/EIA/IS-2000-5-A. The mobile station shall ignore SR3_PRIM_PILOT if it does not support 3X Common Pilot.

SR3_PILOT_POWER1, relative power level between the primary SR3 pilot and the pilot on the lower frequency of the two remaining SR3 frequencies, as specified in TIA/EIA/IS-2000-5-A. The mobile station shall ignore SR3_PILOT_POWER1 if it does not support 3X Common Pilot.

SR3_PILOT_POWER2, relative power level between the primary SR3 pilot and the pilot on the higher frequency of the two remaining SR3 frequencies, as specified in TIA/EIA/IS-2000-5-A. The mobile station shall ignore SR3_PILOT_POWER2 if it does not support 3X Common Pilot.

QOF1, WALSH_LEN1 and **AUX_PILOT_WALSH1** are the corresponding quantities for pilot on the lower frequency of the two remaining SR3 frequencies, as specified in TIA/EIA/IS-2000-5-A. The mobile station shall ignore QOF1, WALSH_LEN1 and AUX_PILOT_WALSH1 if it does not support 3X Auxiliary Pilot.

QOF2, **WALSH_LENGTH2** and **AUX_PILOT_WALSH2** are the corresponding quantities for pilot on the higher frequency of the two remaining SR3 frequencies, as specified in TIA/EIA/IS-2000-5-A. The mobile station shall ignore QOF2, WALSH_LEN2 and AUX_PILOT_WALSH2 if it does not support 3X Auxiliary Pilot.

PRIORITY Description

Priority bit:
0 Normal reporting priority
1 High reporting priority

Real Time Difference Description

START_INDEX_BA (7 bit field)
This field indicates the BA (list) index for the first RTD parameter.

RTD (6 or 12 bit field) are defined in GSM 05.08.

MEASUREMENT PARAMETERS Description
The fields of this Description are used for measurements, see GSM 05.08. They are defined in GSM 05.08.
Any parameter present overwrites any old data held by the mobile station for this parameter. This means that the value corresponding to a parameter not included is not modified, with the exception defined in 3.4.1.2. In this last case, default values are:
For the **SCALE** field: ‘00’ (normal range).

3G *MEASUREMENT PARAMETERS Description*
The fields of this Description are used for measurements, see GSM 05.08. They are defined in GSM 05.08.
Any parameter present overwrites any old data held by the mobile station for this parameter. This means that the value corresponding to a parameter not included is not modified, with the exception defined in 3.4.1.2.

9.1.55 ENHANCED MEASUREMENT REPORT

This message containing measurement results is sent on the SACCH by the mobile to the network. See figure 9.1.55.1/GSM 04.18.

This message may contain reports on GSM and/or 3G Radio Access Technologies. Measurements are defined in GSM 05.08.

Report on GSM Radio Access Technology:

The GSM Neighbour Cell list, defined in 9.1.53, shall be used.

Report on others Radio Access Technologies:

The 3G Neighbour Cell list, defined in 9.1.53, shall be used.

The 3G Neighbour cell list is concatenated to the GSM Neighbour Cell list. For the concatenation the value of the parameter Absolute_Index_Start_EMR is added to the 3G Neighbour cell indexes. In this concatenation the indices exceeding the value 126 are ignored. If this leads to GSM RAT and 3G overlapping indices, these overlapping indices shall be considered as GSM RAT indices.

Message type: ENHANCED MEASUREMENT REPORT

Significance: dual

Direction: mobile station to network

```
<Enhanced Measurement report> ::=

< RR short PD : bit >              -- See GSM 04.07
< Message type : bit (5) >         -- See 10.4
< Short layer 2 header : bit (2) >   -- See GSM 04.06

< BA_USED : bit  >
< 3G_BA_USED : bit >
< BSIC_Seen : bit >

{ 0 | 1 < SCALE : bit(2) > }

< Serving cell data : < Serving cell data struct >>

{ 1 < Repeated Unknown_BSIC_Information : Repeated Unknown_BSIC_Information struct > } ** 0


< NCELL_NUMBER : bit (7) >
{0 | 1 < REPORTING_QUANTITY : bit (6) > }* (val(NCELL_NUMBER)) - - bitmap type reporting


-- Only 3 more bits are available in this message
< spare padding > ;


< Serving cell data struct > ::=
< DTX_USED : bit >
< RXLEV_VAL : bit (6) >
< RX_QUAL_FULL : bit (3) >
< MEAN_BEP : bit (5) >
< CV_BEP : bit (3) >
< NBR_RCVD_BLOCKS : bit (5) > ;


< Repeated Unknown_BSIC_Information struct > ::=
< BCCH-FREQ-NCELL : bit (5) >
< BSIC : bit (6) >
< RXLEV-NCELL : bit (6) > ;
```

Figure 9.1.54.1/GSM 04.18: *Enhanced Measurement Report* message content

Table 9.1.54.1/GSM 04.18: Enhanced Measurement Report information element details

BA_USED (1 bit field),
The value of the BA-IND field of the neighbour cells description information element or elements defining the BCCH allocation used. Range 0 to 1.

3G_BA_USED (1 bit field)
The value of the 3G-BA-IND field of the neighbour cells description information element or elements defining the 3G allocation used. Range 0 to 1.

BSIC_Seen (1 bit field)
This parameters indicates if a GSM RAT cell with unknown BSIC and allowed NCC part BSIC is one of the six strongest, see GSM 05.08.
Bit
0 Unknown and allowed BSIC not seen
1 Unknown and allowed BSIC seen

SCALE (2 bit field)
The value of this optional field is defined in GSM 05.08.

Serving cell reporting

Parameters **RXLEV_VAL (6 bits), RX_QUAL_FULL (3 bits), MEAN_BEP (5 bits), CV_BEP (3 bits), NBR_RCVD_BLOCKS (5 bits)** are defined in GSM 05.08.

DTX_USED (1 bit field)
This bit indicates whether or not the mobile station used DTX during the previous measurement period.

0 DTX was not used
1 DTX was used.

Neighbour cell reporting

Repeated Unknown BSIC

BCCH-FREQ-NCELL (5 bits). This field represents the index of the BA (list), see 10.5.2.20.
BSIC (6 bits). Base station identity code of the corresponding index in the BA (list).
RXLEV (6 bits). GSM RAT reporting quantity, see GSM 05.08.

NCELL_NUMBER
This field indicates the number of Neighbour Cells.

Reporting_Quantity (6 bits):

Measurement quantities are defined in GSM 05.08.:

9.2 Messages for mobility management

See TS 24.008.

9.3 Messages for circuit-switched call control

See TS 24.008.

9.4 GPRS Mobility Management Messages

See TS 24.008.

9.5 GPRS Session Management Messages

See TS 24.008.

10 General message format and information elements coding

The figures and text in this section describe the Information Elements contents.

10.1 Overview

Within the RR protocols defined in GSM 04.18, every message with the exception of the messages sent on the BCCH, downlink CCCH, SCH, RACH, and the HANDOVER ACCESS message, is a standard L3 message as defined in TS 24.007 [20]. This means that the message consists of the following parts:

a) protocol discriminator;

b) transaction identifier;

c) message type;

d) other information elements, as required.

This organization is illustrated in the example shown in figure 10.1/GSM 04.18.

8	7	6	5	4	3	2	1	
Skip Indicator				Protocol discriminator				octet 1
Message type								octet 2
Other information elements as required								etc.

Figure 10.1/GSM 04.18: General message organization example

Unless specified otherwise in the message descriptions of section 9, a particular information element 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.

10.2 Protocol Discriminator

The Protocol Discriminator (PD) and its use are defined in TS 24.007 [20].

10.3 Skip indicator

10.3.1 Skip indicator

Bits 5 to 8 of the first octet of every Radio Resource management message contain the skip indicator. A message received with skip indicator different from 0000 shall be ignored. A message received with skip indicator encoded as 0000 shall not be ignored (unless it is ignored for other reasons). A protocol entity sending a Radio Resource management message shall encode the skip indicator as 0000.

10.4 Message Type

The message type IE and its use are defined in TS 24.007 [20]. Tables 10.1/GSM 04.18 and 10.1a/GSM 04.18 define the value part of the message type IE used in the Radio Resource management protocol.

Table 10.1/GSM 04.18 (page 1 of 2): Message types for Radio Resource management

```
8 7 6 5 4 3 2 1

0 0 1 1 1 - - -  Channel establishment messages:
          1 0 0  - RR INITIALISATION REQUEST
          0 1 1  - ADDITIONAL ASSIGNMENT
          1 1 1  - IMMEDIATE ASSIGNMENT
          0 0 1  - IMMEDIATE ASSIGNMENT EXTENDED
          0 1 0  - IMMEDIATE ASSIGNMENT REJECT
0 1 0 0 1 0 0 0  - DTM ASSIGNMENT FAILURE
0 1 0 0 1 0 0 1  - DTM REJECT
0 1 0 0 1 0 1 0  - DTM REQUEST
0 1 0 0 1 0 1 1  - MAIN DCCH ASSIGNMENT COMMAND
0 1 0 0 1 1 0 0  - PACKET ASSIGNMENT COMMAND

0 0 1 1 0 - - -  Ciphering messages:
          1 0 1  - CIPHERING MODE COMMAND
          0 1 0  - CIPHERING MODE COMPLETE

0 0 1 1 0 - - -  Configuration change messages:
          0 0 0  - CONFIGURATION CHANGE COMMAND
          0 0 1  - CONFIGURATION CHANGE ACK.
          0 1 1  - CONFIGURATION CHANGE REJECT

0 0 1 0 1 - - -  Handover messages:
          1 1 0  - ASSIGNMENT COMMAND
          0 0 1  - ASSIGNMENT COMPLETE
          1 1 1  - ASSIGNMENT FAILURE
          0 1 1  - HANDOVER COMMAND
          1 0 0  - HANDOVER COMPLETE
          0 0 0  - HANDOVER FAILURE
          1 0 1  - PHYSICAL INFORMATION
0 1 0 0 1 1 0 1  - DTM ASSIGNMENT COMMAND

0 0 0 0 1 0 0 0  - RR-CELL CHANGE ORDER
0 0 1 0 0 0 1 1  - PDCH ASSIGNMENT COMMAND

0 0 0 0 1 - - -  Channel release messages:
          1 0 1  - CHANNEL RELEASE
          0 1 0  - PARTIAL RELEASE
          1 1 1  - PARTIAL RELEASE COMPLETE

0 0 1 0 0 - - -  Paging and Notification 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  - NOTIFICATION/NCH
          1 0 1  - Reserved (see NOTE)
          1 1 0  - NOTIFICATION/RESPONSE
0 0 0 0 1 0 1 1  - Reserved (see NOTE)
1 1 0 0 0  - - -  UTRAN Specific messages
          0 0 0  - UTRAN Classmark Change
          0 0 1  - UE RAB Preconfiguration
          0 1 0  - cdma 2000 Classmark Change

0 0 0 1 1 - - -  System information messages:
          0 0 0  - SYSTEM INFORMATION TYPE 8
          0 0 1  - SYSTEM INFORMATION TYPE 1
          0 1 0  - SYSTEM INFORMATION TYPE 2
          0 1 1  - SYSTEM INFORMATION TYPE 3
          1 0 0  - SYSTEM INFORMATION TYPE 4
          1 0 1  - SYSTEM INFORMATION TYPE 5
          1 1 0  - SYSTEM INFORMATION TYPE 6
          1 1 1  - SYSTEM INFORMATION TYPE 7

0 0 0 0 0 - - -  System information messages:
          0 1 0  - SYSTEM INFORMATION TYPE 2bis
          0 1 1  - SYSTEM INFORMATION TYPE 2ter
          1 1 1  - SYSTEM INFORMATION TYPE 2quater
          1 0 1  - SYSTEM INFORMATION TYPE 5bis
          1 1 0  - SYSTEM INFORMATION TYPE 5ter
          1 0 0  - SYSTEM INFORMATION TYPE 9
          0 0 0  - SYSTEM INFORMATION TYPE 13

0 0 1 1 1 - - -  System information messages:
          1 0 1  - SYSTEM INFORMATION TYPE 16
```

```
          1 1 0  - SYSTEM INFORMATION TYPE 17

0 1 0 0 0 - - -  System information messages:
          0 0 0  - SYSTEM INFORMATION TYPE 18
          0 0 1  - SYSTEM INFORMATION TYPE 19
          0 1 0  - SYSTEM INFORMATION TYPE 20

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 0 0  - FREQUENCY REDEFINITION
          1 0 1  - MEASUREMENT REPORT
          1 1 0  - CLASSMARK CHANGE
          0 1 1  - CLASSMARK ENQUIRY
0 0 1 1 0 1 1 0  - EXTENDED MEASUREMENT REPORT
0 0 1 1 0 1 1 1  - EXTENDED MEASUREMENT ORDER
0 0 1 1 0 1 0 0  - GPRS SUSPENSION REQUEST

                 VGCS uplink control messages:

0 0 0 0 1 0 0 1  - VGCS UPLINK GRANT
0 0 0 0 1 1 1 0  - UPLINK RELEASE
0 0 0 0 1 1 0 0  - Reserved (see NOTE)
0 0 1 0 1 0 1 0  - UPLINK BUSY
0 0 0 1 0 0 0 1  - TALKER INDICATION

1 1 0 0 0 - - -  - Inter System Handover Command messages
          0 0 0  - Handover To UTRAN Command
          0 1 0  - cdma2000 Classmark Change

                 Application messages:

0 0 1 1 1 0 0 0  - Application Information
```

Bit 8 is reserved for possible future use as an extension bit, see TS 24.007.
NOTE: This value was allocated but never used in earlier phases of the protocol.

Table 10.1a/GSM 04.18: Message types for Radio Resource management messages using the RR short protocol discriminator

5	4	3	2	1	
0	0	0	0	0	System Information Type 10
0	0	0	0	1	Notification/FACCH
0	0	0	1	0	Uplink Free
0	0	1	0	0	Enhanced Measurement Report (uplink)
0	0	1	0	1	Measurement Information (downlink)

10.5 Other information elements

The different formats (V, LV, T, TV, TLV) and the four categories of information elements (type 1, 2, 3, and 4) are defined in TS 24.007.

The first octet of an information element in the non-imperative part contains the IEI of the information element. If this octet does not correspond to an IEI known in the message, the receiver shall determine whether this IE is of type 1 or 2 (i.e. it is an information element of one octet length) or an IE of type 4 (i.e. that the next octet is the length indicator indicating the length of the remaining of the information element) (see TS 24.007).

This allows the receiver to jump over unknown information elements and to analyse any following information elements.

The information elements which are common for at least two of the three protocols Radio Resources management, Mobility Management and Call Control, are listed in GSM 04.08, section 10.5.1.

The information elements for the protocols Radio Resources management are listed in section 10.5.2. Default information element identifiers are listed in annex K.

NOTE: Different information elements may have the same default information element identifier if they belong to different protocols.

The descriptions of the information element types in section 10.5.2 are organized in alphabetical order of the IE types. Each IE type is described in one subsection.

The subsection may have an introduction:

- possibly explaining the purpose of the IE;
- possibly describing whether the IE belongs to type 1, 2, 3, 4 or 5;
- possibly indicating the length that the information element has if it is either type 5 or if it is used in format TV (type 1 and 3) or TLV (type 4).

A figure of the subsection defines the structure of the IE indicating:

- possibly the position and length of the IEI. (However it depends on the message in which the IE occurs whether the IE contains an IEI.);
- the fields the IE value part is composed of;
- possibly the position and length of the length indicator. (However it depends on the IE type whether the IE contains a length indicator or not.);
- possibly octet numbers of the octets that compose the IE (see clause a) below).

Finally, the subsection contains tables defining the structure and value range of the fields that compose the IE value part. The order of appearance for information elements in a message is defined in section 9.

The order of the information elements within the imperative part of messages has been chosen so that information elements with 1/2 octet of content (type 1) go together in succession. The first type 1 information element 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. If the number of type 1 information elements is odd then bits 5 to 8 of the last octet occupied by these information elements contains a spare half octet IE in format V.

Where the description of information elements in this Technical Specification contains bits defined to be "spare bits", these bits shall set to the indicated value (0 or 1) by the sending side, and their value shall be ignored by the receiving side. With few exceptions, spare bits are indicated as being set to "0" in GSM 04.18.

The following rules apply for the coding of type 4 information elements:

a) The octet number of an octet (which is defined in the figure of a subsection) consists of a positive integer, possibly of an additional letter, and possibly of an additional asterisk, see clause f). The positive integer identifies one octet or a group of octets.

b) Each octet group is a self contained entity. The internal structure of an octet group may be defined in alternative ways.

c) An octet group is formed by using some extension mechanism. The preferred extension mechanism is to extend an octet (N) through the next octet(s) (Na, Nb, etc.) by using bit 8 in each octet as an extension bit.

   The bit value "0" indicates that the octet group continues through to the next octet. The bit value "1" indicates that this octet is the last octet of the group. If one octet (Nb) is present, the preceding octets (N and Na) shall also be present.

   In the format descriptions appearing in section 10.5.1 to 10.5.4, bit 8 is marked "0/1 ext" if another octet follows. Bit 8 is marked "1 ext" if this is the last octet in the extension domain.

   Additional octets may be defined in later versions of the protocols ("1 ext" changed to "0/1 ext") and equipments shall be prepared to receive such additional octets; the contents of these octets shall be ignored. However the length indicated in sections 9 and 10 only takes into account this version of the protocols.

d) In addition to the extension mechanism defined above, an octet (N) may be extended through the next octet(s) (N+1, N+2 etc.) by indications in bits 7-1 (of octet N).

e) The mechanisms in c) and d) may be combined.

f) Optional octets are marked with asterisks (*).

10.5.1 Common information elements.

See TS 24.008.

10.5.2 Radio Resource management information elements.

10.5.2.1a BA Range

The purpose of the BA Range information element is to provide the mobile station with ARFCN range information which can be used in the cell selection procedure.

The BA Range information element is coded as shown in figure 10.5.12/GSM 04.18 and table 10.5.12/GSM 04.18.

The BA Range is a type 4 information element with a minimum length of 6 octets. No upper length limit is specified except for that given by the maximum number of octets in a L3 message (see GSM 04.06).

8	7	6	5	4	3	2	1	
	BA RANGE IEI							octet 1
Length of BA Range contents								octet 2
Number of Ranges								octet 3
RANGE1_LOWER (high part)								octet 4
RANGE1_LOWER (low part)		RANGE1_HIGHER (high part)						octet 5
RANGE1_HIGHER (low part)				RANGE2_LOWER (high part)				octet 6
RANGE2_LOWER (low part)						RANGE2_HIGHER (high part)		octet 7
RANGE2_HIGHER (low part)								octet 8
RANGE3_LOWER (high part)								octet 9
RANGE3_LOWER (low part)		RANGE3_HIGHER (high part)						octet 10
RANGE3_HIGHER (low part)				RANGE4_LOWER (high part)				octet 11
RANGE4_LOWER (low part)						RANGE4_HIGHER (high part)		octet 12
RANGE4_HIGHER (low part)								octet 13
								octet n

Figure 10.5.12/GSM 04.18: *BA RANGE* information element

Table 10.5.12/GSM 04.18: *BA Range* information element

```
Number of Ranges parameter
The number of Ranges parameter indicates in binary
the number of ranges to be transmitted in the IE. It
shall have a minimum value of 1.

RANGEi_LOWER

If $(impr-BA-range-handling)$ is not supported:
$begin
The RANGEi_LOWER is coded as the binary representa-
 tion of the ARFCN used as the lower limit of a range
 of frequencies to be used by the mobile station in
 cell selection (see GSM 05.08 and 3G TS 23.022)
 $end

If $(impr-BA-range-handling)$ is supported:
$begin
The RANGEi_LOWER is coded as the binary representa-
tion of the ARFCN used as the lower limit of a range
of frequencies which could be used by the mobile
station in cell selection (see GSM 05.08 and
3G TS 23.022)
$end

RANGEi_HIGHER
If $(impr-BA-range-handling)$ is not supported:
$begin
The RANGEi_HIGHER is coded as the binary representa-
tion of the ARFCN used as the higher limit of a range
of frequencies to be used by the mobile station in
cell selection (see GSM 05.08 and 3G TS 23.022)
$end

If $(impr-BA-range-handling)$ is supported:
$begin
The RANGEi HIGHER is coded as the binary representa-
tion of the ARFCN used as the higher limit of a
range of frequencies which could be used by the
mobile station in cell selection (see GSM 05.08 and
3G TS 23.022)
$end

If the length of the BA range information element is
greater than the number of octets required to carry
the Number of Ranges given in octet 3, then any
unused octets or parts of octets at the end of the
IE shall be considered as spare.

If $(impr-BA-range-handling)$ is supported:

If a mobile station receives range information
which has ranges or part of the ranges which are not
supported by the mobile station, the mobile station
shall take into account those parts of the ranges
which it does support.
```

10.5.2.1b Cell Channel Description

The purpose of the *Cell Channel Description* information element is to provide the reference frequency list to be used to decode the mobile allocation information element.

The *Cell Channel Description* is a type 3 information element with 17 octets length.

There are several formats for the *Cell Channel Description* information element, distinguished by the "format indicator" subfield. Some formats are frequency bit maps, the others use a special encoding scheme.

NOTE: No more than 64 RF channels should be encoded in the Cell Allocation since this is the maximum number of RF channels which can be referenced in the Mobile Allocation IE.

10.5.2.1b.1 General description

Figure 10.5.13/04.18 shows only a special bit numbering. The different general format is described in table 10.5.13/04.18.

8	7	6	5	4	3	2	1	
Cell Channel Description IEI								octet 1
Bit 128	Bit 127	0 spare	0 spare	Bit 124	Bit 123	Bit 122	Bit 121	octet 2
Bit 120	Bit 119	Bit 118	Bit 117	Bit 116	Bit 115	Bit 114	Bit 113	octet 3
Bit 008	Bit 007	Bit 006	Bit 005	Bit 004	Bit 003	Bit 002	Bit 001	octet 17

Figure 10.5.13/GSM 04.18: *Cell Channel Description* information element (general format)

Table 10.5.13/GSM 04.18: *Cell Channel Description* information element, general format

```
FORMAT-ID, Format Identifier (Bit 128 and next)

The different formats are distinguished by the bits
of higher number. The possible values are the
following:

 Bit Bit Bit Bit Bit          format notation
 128 127 124 123 122

  0   0   X   X   X               bit map 0
  1   0   0   X   X               1024 range
  1   0   1   0   0               512 range
  1   0   1   0   1               256 range
  1   0   1   1   0               128 range
  1   0   1   1   1               variable bit map


All other combinations are reserved for future use.
A GSM 900 mobile station which only supports the
primary GSM band P-GSM 900 (cf. GSM 05.05)
may consider all values except the value for
bit map 0 as reserved.

The significance  of the remaining bits depends on
the FORMAT-ID. The different cases are specified in
the next sections.

Mobile stations shall treat all ARFCNs in the set
{0, 1, 2 ... 1023} as valid ARFCN values even if
the mobile station is unable to transmit or receive
on that ARFCN.
```

10.5.2.1b.2 Bit map 0 format

8	7	6	5	4	3	2	1	
	Cell Channel Description IEI							octet 1
0 FORMAT-ID	0	0 spare	0 spare	CA ARFCN 124	CA ARFCN 123	CA ARFCN 122	CA ARFCN 121	octet 2
CA ARFCN 120	CA ARFCN 119	CA ARFCN 118	CA ARFCN 117	CA ARFCN 116	CA ARFCN 115	CA ARFCN 114	CA ARFCN 113	octet 3
CA ARFCN 008	CA ARFCN 007	CA ARFCN 006	CA ARFCN 005	CA ARFCN 004	CA ARFCN 003	CA ARFCN 002	CA ARFCN 001	octet 17

Figure 10.5.14/GSM 04.18: *Cell Channel Description* information element, bit map 0 format

Table 10.5.14/GSM 04.18: *Cell channel Description* information element, bit map 0 format

CA ARFCN N, Cell Allocation Absolute RF Channel Number N (octet 2 etc.) For a RF channel with ARFCN = N belonging to the cell allocation the CA ARFCN N bit is coded with a "1"; N = 1, 2, .. , 124. For a RF channel with ARFCN = N not belonging to the cell allocation the CA ARFCN N bit is coded with a "0"; N = 1, 2 .. , 124.

10.5.2.1b.3 Range 1024 format

<table>
<tr><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td></td></tr>
<tr><td></td><td colspan="7">Cell Channel Description IEI</td><td>octet 1</td></tr>
<tr><td colspan="2">1 0
FORMAT-ID</td><td>0
spare</td><td>0
spare</td><td>0
FORMA
T-ID</td><td>F0</td><td colspan="2">W(1)
(high part)</td><td>octet 2</td></tr>
<tr><td colspan="8">W(1) (low part)</td><td>octet 3</td></tr>
<tr><td colspan="8">W(2) (high part)</td><td>octet 4</td></tr>
<tr><td>W(2)
(low)</td><td colspan="7">W(3)
(high part)</td><td>octet 5</td></tr>
<tr><td colspan="2">W(3)
(low part)</td><td colspan="6">W(4)
(high part)</td><td>octet 6</td></tr>
<tr><td colspan="2">W(4)
(low part)</td><td colspan="6">W(5)
(high part)</td><td>octet 7</td></tr>
<tr><td colspan="2">W(5)
(low part)</td><td colspan="6">W(6)
(high part)</td><td>octet 8</td></tr>
<tr><td colspan="2">W(6)
(low part)</td><td colspan="6">W(7)
(high part)</td><td>octet 9</td></tr>
<tr><td colspan="2">W(7)
(low part)</td><td colspan="6">W(8)
(high part)</td><td>octet 10</td></tr>
<tr><td>W(8)
(low)</td><td colspan="7">W(9)</td><td>octet 11</td></tr>
<tr><td colspan="7">W(10)</td><td>W(11)
high</td><td>octet 12</td></tr>
<tr><td colspan="6">W(11)
(low part)</td><td colspan="2">W(12)
(high part)</td><td>octet 13</td></tr>
<tr><td colspan="5">W(12) (low part)</td><td colspan="3">W(13) (high part)</td><td>octet 14</td></tr>
<tr><td colspan="4">W(13) (low part)</td><td colspan="4">W(14) (high part)</td><td>octet 15</td></tr>
<tr><td colspan="3">W(14) (low part)</td><td colspan="5">W(15) (high part)</td><td>octet 16</td></tr>
<tr><td colspan="2">W(15)
(low part)</td><td colspan="6">W(16)</td><td>octet 17</td></tr>
</table>

Figure 10.5.15/GSM 04.18: *Cell Channel Description* information element (1024 range format)

Table 10.5.15/GSM 04.18: *Cell Channel Description* information element, range 1024 format

F0, frequency 0 indicator (octet 2, bit 3):

0 ARFCN 0 is not a member of the set
1 ARFCN 0 is a member of the set

W(i), i from 1 to 16 (octet 2 to 17):

Each W(i) encodes a non negative integer in binary format.

If W(k) is null, W(k+1) to W(16) must be null also.

Each non null W(k) allows to compute, together with some previous W(i) the ARFCN F(k) of a frequency in the set. The computation formulas are given in section 10.5.2.13.3.

10.5.2.1b.4 Range 512 format

<table>
<tr><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td></td></tr>
<tr><td></td><td colspan="7">Cell Channel Description IEI</td><td>octet 1</td></tr>
<tr><td colspan="2">1 0
FORMAT-ID</td><td>0
spare</td><td>0
spare</td><td colspan="3">1 0 0
FORMAT-ID</td><td>ORIG-ARFCN high</td><td>octet 2</td></tr>
<tr><td colspan="8">ORIG-ARFCN (middle part)</td><td>octet 3</td></tr>
<tr><td>ORIG-ARFCN low</td><td colspan="7">W(1)
(high part)</td><td>octet 4</td></tr>
<tr><td colspan="2">W(1)
(low part)</td><td colspan="6">W(2)
(high part)</td><td>octet 5</td></tr>
<tr><td colspan="2">W(2)
(low part)</td><td colspan="6">W(3)
(high part)</td><td>octet 6</td></tr>
<tr><td colspan="2">W(3)
(low part)</td><td colspan="6">W(4)
(high part)</td><td>octet 7</td></tr>
<tr><td>W(4)
low</td><td colspan="7">W(5)</td><td>octet 8</td></tr>
<tr><td colspan="7">W(6)</td><td>W(7)
high</td><td>octet 9</td></tr>
<tr><td colspan="6">W(7)
(low part)</td><td colspan="2">W(8)
(high part)</td><td>octet 10</td></tr>
<tr><td colspan="4">W(8) (low part)</td><td colspan="4">W(9) (high part)</td><td>octet 11</td></tr>
<tr><td colspan="2">W(9)
(low part)</td><td colspan="6">W(10)</td><td>octet 12</td></tr>
<tr><td colspan="6">W(11)</td><td colspan="2">W(12)
(high part)</td><td>octet 13</td></tr>
<tr><td colspan="4">W(12) (low part)</td><td colspan="4">W(13) (high part)</td><td>octet 14</td></tr>
<tr><td colspan="2">W(13)
(low part)</td><td colspan="6">W(14)</td><td>octet 15</td></tr>
<tr><td colspan="6">W(15)</td><td colspan="2">W(16)
(high part)</td><td>octet 16</td></tr>
<tr><td colspan="3">W(16) (low part)</td><td colspan="5">W(17)</td><td>octet 17</td></tr>
</table>

Figure 10.5.16/GSM 04.18: *Cell Channel Description* information element (512 range format)

Table 10.5.16/GSM 04.18: *Cell Channel Description* information element, range 512 format

ORIG-ARFCN, origin ARFCN (octet 2, 3 and 4) This field encodes the ARFCN of one frequency belonging to the set. This value is also used to decode the rest of the element. W(i), i from 1 to 17 (octet 4 to 17): Each W(i) encodes a non negative integer in binary format. If W(k) is null, W(k+1) to W(17) must be null also. Each non null W(k) allows to compute, together with some previous W(i) the ARFCN F(k) of a frequency in the set. The computation formulas are given in section 10.5.2.13.4.

10.5.2.1b.5 Range 256 format

<table>
<tr><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td></td></tr>
<tr><td></td><td colspan="7">Cell Channel Description IEI</td><td>octet 1</td></tr>
<tr><td colspan="2">1 0
FORMAT-ID</td><td>0
spare</td><td>0
spare</td><td colspan="3">1 0 1
FORMAT-ID</td><td>ORIG-
ARFCN
high</td><td>octet 2</td></tr>
<tr><td colspan="8">ORIG-ARFCN (middle part)</td><td>octet 3</td></tr>
<tr><td>ORIG-
ARFCN
low</td><td colspan="7">W(1)
(high part)</td><td>octet 4</td></tr>
<tr><td>W(1)
(low)</td><td colspan="7">W(2)</td><td>octet 5</td></tr>
<tr><td colspan="7">W(3)</td><td>W(4)
high</td><td>octet 6</td></tr>
<tr><td colspan="5">W(4) (low part)</td><td colspan="3">W(5) (high part)</td><td>octet 7</td></tr>
<tr><td colspan="3">W(5) (low part)</td><td colspan="5">W(6) (high part)</td><td>octet 8</td></tr>
<tr><td>W(6)
low</td><td colspan="6">W(7)</td><td>W(8)
high</td><td>octet 9</td></tr>
<tr><td colspan="4">W(8) (low part)</td><td colspan="4">W(9) (high part)</td><td>octet 10</td></tr>
<tr><td>W(9)
low</td><td colspan="5">W(10)</td><td colspan="2">W(11)
(high part)</td><td>octet 11</td></tr>
<tr><td colspan="3">W(11) (low part)</td><td colspan="5">W(12)</td><td>octet 12</td></tr>
<tr><td colspan="5">W(13)</td><td colspan="3">W(14) (high part)</td><td>octet 13</td></tr>
<tr><td colspan="2">W(14)
low</td><td colspan="5">W(15)</td><td>W(16)
high</td><td>octet 14</td></tr>
<tr><td colspan="3">W(16)
(low part)</td><td colspan="4">W(17)</td><td>W(18)
high</td><td>octet 15</td></tr>
<tr><td colspan="3">W(18)
(low part)</td><td colspan="4">W(19)</td><td>W(20)
high</td><td>octet 16</td></tr>
<tr><td colspan="3">W(20)
(low part)</td><td colspan="4">W(21)</td><td>0
spare</td><td>octet 17</td></tr>
</table>

Figure 10.5.17/GSM 04.18: *Cell Channel Description* information element, range 256 format

Table 10.5.17/GSM 04.18: *Cell Channel Description* information element, range 256 format

ORIG-ARFCN, origin ARFCN (octet 2, 3 and 4) This field encodes the ARFCN of one frequency belonging to the set. This value is also used to decode the rest of the element. W(i), i from 1 to 21 (octet 4 to 17): Each W(i) encodes a non negative integer in binary format. If W(k) is null, W(k+1) to W(21) must be null also. Each non null W(k) allows to compute, together with some previous W(i) the ARFCN F(k) of a frequency in the set. The computation formulas are given in section 10.5.2.13.5.

10.5.2.1b.6 Range 128 format

<table>
<tr><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td></td></tr>
<tr><td></td><td colspan="7">Cell Channel Description IEI</td><td>octet 1</td></tr>
<tr><td colspan="2">1 0
FORMAT-ID</td><td>0
spare</td><td>0
spare</td><td colspan="3">1 1 0
FORMAT-ID</td><td>ORIG-
ARFCN
high</td><td>octet 2</td></tr>
<tr><td colspan="8">ORIG-ARFCN
(middle part)</td><td>octet 3</td></tr>
<tr><td>ORIG-
ARFCN
low</td><td colspan="7">W(1)</td><td>octet 4</td></tr>
<tr><td colspan="6">W(2)</td><td colspan="2">W(3)</td><td>octet 5</td></tr>
<tr><td colspan="4">W(3) (low part)</td><td colspan="4">W(4) (high part)</td><td>octet 6</td></tr>
<tr><td>W(4)
low</td><td colspan="5">W(5)</td><td colspan="2">W(6)
(high part)</td><td>octet 7</td></tr>
<tr><td colspan="3">W(6) (low part)</td><td colspan="5">W(7)</td><td>octet 8</td></tr>
<tr><td colspan="4">W(8)</td><td colspan="4">W(9)</td><td>octet 9</td></tr>
<tr><td colspan="4">W(10)</td><td colspan="4">W(11)</td><td>octet 10</td></tr>
<tr><td colspan="4">W(12)</td><td colspan="4">W(13)</td><td>octet 11</td></tr>
<tr><td colspan="4">W(14)</td><td colspan="4">W(15)</td><td>octet 12</td></tr>
<tr><td colspan="3">W(16)</td><td colspan="3">W(17)</td><td colspan="2">W(18)
(high part)</td><td>octet 13</td></tr>
<tr><td>W(18)
low</td><td colspan="3">W(19)</td><td colspan="3">W(20)</td><td>W(21)
high</td><td>octet 14</td></tr>
<tr><td colspan="2">W(21)
(low part)</td><td colspan="3">W(22)</td><td colspan="3">W(23)</td><td>octet 15</td></tr>
<tr><td colspan="3">W(24)</td><td colspan="3">W(25)</td><td colspan="2">W(26)
(high part)</td><td>octet 16</td></tr>
<tr><td>W(26)
low</td><td colspan="3">W(27)</td><td colspan="3">W(28)</td><td>0
spare</td><td>octet 17</td></tr>
</table>

Figure 10.5.18/GSM 04.18: *Cell Channel Description* information element, range 128 format

Table 10.5.18/GSM 04.18: *Cell Channel Description* information element, range 128 format

```
ORIG-ARFCN, origin ARFCN (octet 2, 3 and 4)

This field encodes the ARFCN of one frequency
belonging to the set. This value is also used to
decode the rest of the element.


W(i), i from 1 to 28 (octet 4 to 17):

Each W(i) encodes a non negative integer in binary
format.

If W(k) is null, W(k+1) to W(28) must be null also.

Each non null W(k) allows to compute, together with
some previous W(i) the ARFCN F(k) of a frequency in
the set. The computation formulas are given in
section 10.5.2.13.6.
```

10.5.2.1b.7 Variable bit map format

8	7	6	5	4	3	2	1	
	Cell Channel Description IEI							octet 1
0 FORMAT-ID	0	0 spare	0 spare	1 FORMAT-ID	1	1	CA ARFCN high	octet 2
ORIG-ARFCN (middle part)								octet 3
ORIG-ARFCN low	RRFCN 1	RRFCN 2	RRFCN 3	RRFCN 4	RRFCN 5	RRFCN 6	RRFCN 7	octet 4
RRFCN 104	RRFCN 105	RRFCN 106	RRFCN 107	RRFCN 108	RRFCN 109	RRFCN 110	CA ARFCN 111	octet 17

Figure 10.5.19/GSM 04.18: *Cell Channel Description* information element, variable bit map format

Table 10.5.19/GSM 04.18: *Cell Channel Description* information element, variable bit map format

```
ORIG-ARFCN, origin ARFCN (octet 2, 3 and 4)

This field encodes the ARFCN of one frequency
belonging to the set. This value is also used as
origin of the bit map to generate all other frequencies.

RRFCN N, relative radio frequency channel number N
(octet 4 etc.)

For a RF channel with ARFCN = (ORIG-ARFCN + N) mod 1024
belonging to the set, RRFCN N bit is coded with a
"1"; N = 1, 2, .. , 111

For a RF channel with ARFCN = (ORIG-ARFCN + N) mod 1024
not belonging to the set, RRFCN N bit is coded with a
"0"; N = 1, 2, .. , 111
```

10.5.2.1c BA List Pref

The purpose of the BA List Pref information element is to provide the mobile station with ARFCN information which can be used in the cell selection/reselection procedure.

The BA List Pref is a type 4 information element with a minimum length of 3 octets. No upper length limit is specified except for that given by the maximum number of octets in a L3 message (see GSM 04.06).

<BA List Pref>::=

<01110101>

<LENGTH OF BA LIST PREF : bit (8)>

{1 <RANGE LIMITS >}**0

{1 <BA FREQ: bit (10)>}**0

<spare padding>;

<RANGE LIMITS>::=

<RANGE LOWER : bit (10)>

<RANGE UPPER : bit (10)>;

The RANGE LOWER is coded as the binary representation of the ARFCN used as the lower limit of a range of frequencies to be used by the mobile station in cell selection and reselection (see GSM 05.08 and TS 23.022).

The RANGE HIGHER is coded as the binary representation of the ARFCN used as the higher limit of a range of frequencies to be used by the mobile station in cell selection and reselection (see GSM 05.08 and TS 23.022).

BA FREQ is coded as the binary representation of the ARFCN indicating a single frequency to be used by the mobile station in cell selection and reselection (see GSM 05.08 and TS 23.022).

10.5.2.1d UMTS Frequency List

The purpose of the UMTS Frequency List information element is to provide the mobile station with UMTS neighbour cell information which can be used in the cell selection/reselection procedure.

The UMTS Frequncy List is a type 4 information element with a minimum length of 3 octets. No upper length limit is specified except for that given by the maximum number of octets in a L3 message (see GSM 04.06).

The first FDD frequency will be assigned index 0 and the last TDD frequency the highest index. In subsequent transactions with the mobile station the network may use this index to specify fequencies.

< UMTS Freq List >::=

< 0 1 0 0 1 1 0 0 > --type

< LENGTH OF UMTS FREQ LIST : bit (8) > -- length following in octets

{ 1 < UMTS_ABS_RF_CHAN > : bit (9) } ** 0 - - FDD frequencies

{ 1 < UMTS_ABS_RF_CHAN > : bit (10) } ** 0 - - TDD frequencies

spare bits;

UMTS_ABS_RF_CHAN is coded as the binary representation of the ARFCN indicating a single frequency to be used by the mobile station in cell selection and reselection (see GSM 05.08 and TS 23.022).

Spare bits in the end of the field are used to fill the last octet.

10.5.2.2 Cell Description

The purpose of the *Cell Description* information element is to provide a minimum description of a cell, e.g. to allow the mobile station to use its pre-knowledge about synchronization.

The *Cell Description* information element is coded as shown in figure 10.5.20/GSM 04.18 and table 10.5.20/GSM 04.18.

The *Cell Description* is a type 3 information element with 3 octets length.

8	7	6	5	4	3	2	1	
	Cell Channel Description IEI							octet 1
BCCH ARFCN (high part)		NCC			BCC			octet 2
BCCH ARFCN (low part)								octet 3

Figure 10.5.20/GSM 04.18: *Cell Description* information element

Table 10.5.20/GSM 04.18: *Cell Description* information element

NCC, PLMN colour code (octet 2) The NCC field is coded as the binary representation of the PLMN colour code (see 3G TS 23.003). BCC, BS colour code (octet 2) The BCC field is coded as the binary representation of the BS colour code (see 3G TS 23.003). BCCH ARFCN (octet 2, bits 7 and 8, and octet 3) The BCCH ARFCN number field is coded as the binary representation of the BCCH carriers absolute RF channel number. Range: 0 to 1023

10.5.2.3 Cell Options (BCCH)

The purpose of the *Cell Options* (BCCH) information element is to provide a variety of information about a cell.

The *Cell Options* (BCCH) information element is coded as shown in figure 10.5.21/GSM 04.18 and table 10.5.21/GSM 04.18.

The *Cell Options* (BCCH) is a type 3 information element with 2 octets length.

8	7	6	5	4	3	2	1	
	Cell Channel Description IEI							octet 1
0 spare	PWRC	DTX		RADIO-LINK-TIMEOUT				octet 2

Figure 10.5.21/GSM 04.18: *Cell Options* (BCCH) information element

10.5.2.3a Cell Options (SACCH)

The purpose of the *Cell Options* (SACCH) information element is to provide a variety of information about a cell.

The *Cell Options* (SACCH) information element is coded as shown in figure 10.5.22 /GSM 04.18 and table 10.5.22/GSM 04.18.

The *Cell Options* (SACCH) is a type 3 information element with 2 octets length.

8	7	6	5	4	3	2	1	
	Cell Channel Description IEI							octet 1
DTX	PWRC	DTX		RADIO-LINK-TIMEOUT				octet 2

Figure 10.5.22/GSM 04.18: *Cell Options* (SACCH) information element

Table 10.5.21/GSM 04.18: *Cell Options* (BCCH) information element

```
PWRC Power control indicator (octet 2) Note 1
bit 7
0  PWRC is not set
1  PWRC is set

DTX, DTX indicator (octet 2) Note 3
Bit
 6 5
 0 0  The MSs may use uplink discontinuous
      transmission
 0 1  The MSs shall use uplink discontinuous
      transmission
 1 0  The MS shall not use uplink discontinuous
      transmission

RADIO-LINK_TIMEOUT  (octet 2)  Note 2
  Bits
 4 3 2 1
 0 0 0 0     4
 0 0 0 1     8
 0 0 1 0    12
    .
    .
    .
 1 1 1 0    60
 1 1 1 1    64
```

NOTE 1: The precise meaning of the PWRC parameter can be found in GSM 05.08.

NOTE 2: The precise meaning of RADIO-LINK-TIMEOUT parameter can be found in GSM 05.08.

NOTE 3: The DTX indicator field is not related to the use of downlink discontinuous transmission.

Table 10.5.22/GSM 04.18: *Cell Options* (SACCH) information element

```
PWRC Power control indicator (octet 2) Note 1
bit 7
0  PWRC is not set
1  PWRC is set

DTX, DTX indicator (octet 2) Note 3
Bit
8 6 5
0 0 0  The MS may use uplink discontinuous
       transmission on a TCH-F. The MS shall not use
       uplink discontinuous transmission on TCH-H.

0 0 1  The MS shall use uplink discontinuous
       transmission on a TCH-F. The MS shall not use
       uplink discontinuous transmission on TCH-H.

0 1 0  The MS shall not use uplink discontinuous
       transmission on a TCH-F. The MS shall not use
       uplink discontinuous transmission on TCH-H.

0 1 1  Note 4: The MS shall use uplink discontinuous
       transmission on a TCH-F. The MS may use
       uplink discontinuous transmission on TCH-H.

1 0 0  The MS may use uplink discontinuous
       transmission on a TCH-F. The MS may use
       uplink discontinuous transmission on TCH-H.

1 0 1  The MS shall use uplink discontinuous
       transmission on a TCH-F. The MS shall use
       uplink discontinuous transmission on TCH-H.

1 1 0  The MS shall not use uplink discontinuous
       transmission on a TCH-F. The MS shall use
       uplink discontinuous transmission on TCH-H.

1 1 1  Note 4: The MS may use uplink discontinuous
       transmission on a TCH-F. The MS shall use
       uplink discontinuous transmission on TCH-H.
RADIO-LINK_TIMEOUT  (octet 2)  Note 2
  Bits
 4 3 2 1
 0 0 0 0     4
 0 0 0 1     8
 0 0 1 0    12
    .
    .
    .
 1 1 1 0    60
 1 1 1 1    64
```

NOTE 1: The precise meaning of the PWRC parameter can be found in GSM 05.08.

NOTE 2: The precise meaning of RADIO-LINK-TIMEOUT parameter can be found in GSM 05.08.

NOTE 3: The DTX indicator field is not related to the use of downlink discontinuous transmission.

NOTE 4: These codes shall not be sent to mobile stations that implement an earlier version of this protocol in which these codes were not defined.

10.5.2.4 Cell Selection Parameters

The purpose of the *Cell Selection Parameters* information element is to provide a variety of information about a cell.

The *Cell Selection Parameters* information element is coded as shown in figure 10.5.23/GSM 04.18 and table 10.5.23/GSM 04.18.

The *Cell Selection Parameters* information element is a type 3 information element with 3 octets length.

8	7	6	5	4	3	2	1	
	Cell Selection Parameters IEI							octet 1
CELL-RESELECT HYSTERESIS			MS-TXPWR-MAX-CCH					octet 2
ACS	NECI	RXLEV-ACCESS-MIN						octet 3

Figure 10.5.23/GSM 04.18: *Cell Selection Parameters* information element

Table 10.5.23/GSM 04.18: *Cell Selection Parameters* information element

```
CELL-RESELECT-HYSTERESIS (octet 2)
The usage of this information is defined in GSM
05.08
Bits
8 7 6
0 0 0    0 dB RXLEV hysteresis for LA re-selection
0 0 1    2 dB RXLEV hysteresis for LA re-selection
0 1 0    4 dB RXLEV hysteresis for LA re-selection
0 1 1    6 dB RXLEV hysteresis for LA re-selection
1 0 0    8 dB RXLEV hysteresis for LA re-selection
1 0 1   10 dB RXLEV hysteresis for LA re-selection
1 1 0   12 dB RXLEV hysteresis for LA re-selection
1 1 1   14 dB RXLEV hysteresis for LA re-selection


MS-TXPWR-MAX-CCH (octet 2)
The  MS-TXPWR-MAX-CCH  field  is coded as the binary
representation of the "power control level" in TS
GSM 05.05 corresponding to the maximum TX power
level an MS may use when accessing on a Control
Channel CCH. This value shall be used by the Mobile
Station according to GSM 05.08.

Range: 0 to 31.


RXLEV-ACCESS-MIN (octet 3)
The  RXLEV-ACCESS-MIN  field  is coded as the binary
representation  of the minimum received signal level
at  the  MS  for which it is permitted to access the
system.

Range: 0 to 63.            (See TS  GSM 05.08).

ACS, ADDITIONAL RESELECT PARAM IND (octet 3)
Bit 8:
  In System Information type 3 message:
    0    System information type 16 and 17 are not
         broadcast on the BCCH.
    1    System information type 16 and 17 are
         broadcast on the BCCH.
    A mobile station which does not support System
    information type 16 and 17 may consider this bit
    as ”0”.

  In System Information type 4 message:
    0   The SI 4 rest octets, if present, and SI 7
        and SI 8 rest octets, if so indicated in the
        SI 4 rest octets shall be used to derive the
        value of PI and possibly
        C2 parameters and/or other parameters
    1   The value of PI and possibly C2 parameters
        and/or other parameters in a System
        information type 7 or type 8 message shall
        be used


NECI: HALF RATE SUPPORT (octet 3)
Bit 7:
    0   New establishment causes are not supported
    1   New establishment causes are supported
```

10.5.2.4a MAC Mode and Channel Coding Requested

The purpose of the *MAC Mode and Channel Coding Requested* information element is for the mobile station to indicate to the network which channel coding rate the mobile station desires the network to use on the downlink.

The *MAC Mode and Channel Coding Requested* information element is coded as shown in figure 10.5.24/GSM 04.18 and table 10.5.24/GSM 04.18.

The *MAC Mode and Channel Coding Requested* is a type 1 information element.

<table>
<tr><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td></td></tr>
<tr><td></td><td colspan="3">MAC Mode and
Chan Cod Req IEI</td><td colspan="2">MAC 0
mode</td><td colspan="2">CS</td><td>octet 1</td></tr>
</table>

Figure 10.5.24/GSM 04.18: *MAC Mode and Channel Coding Requested* information element

Table 10.5.24/GSM 04.18: *MAC Mode and Channel Coding Requested* information element

```
CS : Coding Scheme
This field indicates to network the channel coding
scheme (see GSM 05.03) that the network should use
on the downlink. The field is encoded according to
the following table:
bits
2 1
0 0  CS 1
0 1  CS 2
1 0  CS 3
1 1  CS 4

MAC Mode (bits 3-4, octet 1)
This field is encoded the same as the MAC_MODE field
in the PACKET RESOURCE REQUEST message described in
GSM 04.60.
```

10.5.2.5 Channel Description

The purpose of the *Channel Description* information element is to provide a description of an allocable channel together with its SACCH.

The *Channel Description* information element is coded as shown in figure 10.5.25/GSM 04.18 and table 10.5.25/GSM 04.18.

The *Channel Description* is a type 3 information element with 4 octets length.

<table>
<tr><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td></td></tr>
<tr><td></td><td colspan="7">Channel Description IEI</td><td>octet 1</td></tr>
<tr><td colspan="5">Channel type
and TDMA offset</td><td colspan="3">TN</td><td>octet 2</td></tr>
<tr><td colspan="3" rowspan="2">TSC</td><td>H=1-></td><td colspan="4">MAIO (high part)</td><td rowspan="3">octet 3</td></tr>
<tr><td>--- H ---</td><td colspan="4">---</td></tr>
<tr><td colspan="3"></td><td>H=0-></td><td colspan="2">0
spare</td><td colspan="2">ARFCN
(high part)</td></tr>
<tr><td colspan="2">MAIO
(low part)</td><td colspan="6">HSN</td><td rowspan="2">octet 4</td></tr>
<tr><td colspan="8">ARFCN (low part)</td></tr>
</table>

Figure 10.5.25/GSM 04.18: *Channel Description* information element

Table 10.5.25/GSM 04.18: *Channel Description* information element

```
 Channel type and TDMA offset (octet 2)
   Bits
 8 7 6 5 4
 0 0 0 0 1  TCH/F + ACCHs
 0 0 0 1 T  TCH/H + ACCHs
 0 0 1 T T  SDCCH/4 + SACCH/C4 or CBCH (SDCCH/4)
 0 1 T T T  SDCCH/8 + SACCH/C8 or CBCH (SDCCH/8)

 The  T bits indicate the subchannel number coded in
 binary.

 All other values are reserved.

 The Channel Type and TDMA offset field shall be
 ignored and all bits treated as spare when received
 in a PDCH ASSIGNMENT COMMAND message. The sender
 set the spare bits to the coding for TCH/F+ACCHs

 TN, Timeslot number (octet 2)
 The  TN field is coded as the binary representation
 of the timeslot number as defined in GSM 05.10.

 Range: 0 to 7.

 The Timeslot number field shall be ignored and all
 bits treated as spare when received in a PDCH
 ASSIGNMENT COMMAND message. The sender sets the spare
 bits as '000'

 TSC, Training Sequence Code (octet 3)
 The TSC field is coded as the binary representation
 of the Training Sequence code as defined in GSM
 05.03
 Range: 0 to 7.

 H, Hopping channel (octet 3)
 Bit
 5
 0        Single RF channel
 1        RF hopping channel

 Note: The  value  of H affects the semantics of the
       channel  selector  field

 Channel selector (octet 3 and 4)
 H = "0": The channel selector field
        consists of the absolute RF channel number

       Octet 3
        Bits
        4 3
        0 0     Spare

ARFCN, (octet 3, bits 2 and 1, and
               octet 4, bits 8 to 1)
         The ARFCN is coded as the binary representa-
         tion of the absolute RF channel number

          Range: 0 to 1023

 H = "1": The channel selector field consists of the
          mobile allocation index offset, MAIO, and
          the hopping sequence number, HSN.

           MAIO, (octet 3 bit 4 to 1 high part and
                  octet 4 bit 8 to 7 low part)
           The MAIO field is coded as the binary rep-
           resentation of the mobile allocation index
           offset as defined in GSM 05.02.

          Range: 0 to 63.

          HSN, (octet 4 bit 6 to 1)
          The HSN field is coded as the binary repres-
          entation of the hopping sequence number
           as defined in GSM 05.02
```

```
Range 0 to 63.
```

10.5.2.5a Channel Description 2

The purpose of the *Channel Description* 2 information element is to provide a description of an allocable channel configuration together with its SACCH.

The *Channel Description* 2 information element is coded as shown in figure 10.5.26 /GSM 04.18 and table 10.5.26/GSM 04.18.

The *Channel Description* 2 is a type 3 information element with 4 octets length.

<table>
<tr><th>8</th><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th></th></tr>
<tr><td></td><td colspan="7">Channel Description IEI</td><td>octet 1</td></tr>
<tr><td colspan="5">Channel type
and TDMA offset</td><td colspan="3">TN</td><td>octet 2</td></tr>
<tr><td colspan="3" rowspan="2">TSC</td><td>H=1-></td><td colspan="4">MAIO (high part)</td><td rowspan="2">octet 3</td></tr>
<tr><td>--- H ---
H=0-></td><td colspan="2">0
spare</td><td colspan="2">ARFCN
(high part)</td></tr>
<tr><td colspan="2">MAIO
(low part)</td><td colspan="6">HSN</td><td rowspan="2">octet 4</td></tr>
<tr><td colspan="8">ARFCN (low part)</td></tr>
</table>

Figure 10.5.26/GSM 04.18: *Channel Description* 2 information element

Table 10.5.26/GSM 04.18: *Channel Description 2* information element

```
 Channel type and TDMA offset (octet 2)
   Bits
 8 7 6 5 4
 0 0 0 0 0  TCH/F + FACCH/F and SACCH/M at the
            timeslot indicated by TN, and
            additional bidirectional or
            undirectional TCH/Fs and SACCH/Ms
            according to the multislot allocation
            information element

 0 0 0 0 1  TCH/F + FACCH/F and SACCH/F
 0 0 0 1 T  TCH/H + ACCHs
 0 0 1 T T  SDCCH/4 + SACCH/C4 or CBCH (SDCCH/4)
 0 1 T T T  SDCCH/8 + SACCH/C8 or CBCH (SDCCH/8)

 The  T bits indicate the subchannel number coded in
 binary.

 In the description below "n" is the timeslot number
 indicated by TN. The description is valid only if
 all the indicated timeslot numbers are in the range
 0 to 7.


 1 0 X X X  TCH/F + FACCH/F and SACCH/M at the
            time slot indicated by TN, and additional
            bidirectional TCH/Fs and SACCH/Ms at other
            timeslots according to the following:

     X X X:
     0 0 0  no additional timeslots
     0 0 1  at timeslot n-1
     0 1 0  at timeslot n+1, n-1
     0 1 1  at timeslot n+1, n-1 and n-2
     1 0 0  at timeslot n+1, n-1, n-2, and n-3
     1 0 1  at timeslot n+1, n-1, n-2, n-3 and n-4
     1 1 0  at timeslot n+1, n-1, n-2, n-3, n-4
            and n-5
     1 1 1  at timeslot n+1, n-1, n-2, n-3, n-4, n-5
            and n-6

 1 1 0 0 1
     to
 1 1 0 1 1  TCH/F + FACCH/F and SACCH/M at the time
            slot indicated by TN and additional
            unidirectional TCH/FDs and SACCH/MDs at
            other timeslots according to the
            following:
 1 1 0 0 1  at timeslot n-1
 1 1 0 1 0  at timeslot n+1, n-1
 1 1 0 1 1  at timeslot n+1, n-1 and n-2

 1 1 1 1 0  TCH/F + FACCH/F and SACCH/M at the time
            slot indicated by TN and additional
            bidirectional TCH/F and SACCH/M at
            timeslot n+1 and unidirectional TCH/FD
            and  SACCH/MD at timeslot n-1

 All other values are reserved.

TN, Timeslot number (octet 2)
 The  TN field is coded as the binary representation
 of the timeslot number as defined in TS GSM 05.10.

 Range: 0 to 7.

 TSC, Training Sequence Code (octet 3)
 The TSC field is coded as the binary representation
 of the Training Sequence code as defined in TS GSM
 05.03
 Range: 0 to 7.

 H, Hopping channel (octet 3)
 Bit
 5
 0        Single RF channel
```

```
1        RF hopping channel

Note: The  value  of H affects the semantics of the
      channel  selector  field

Channel selector (octet 3 and 4)
H = "0": The channel selector field
       consists of the absolute RF channel number

      Octet 3
       Bits
       4 3
       0 0     Spare

      ARFCN, (octet 3, bits 2 and 1, and
              octet 4, bits 8 to 1)
        The ARFCN is coded as the binary representa-
        tion of the absolute RF channel number

         Range: 0 to 1023

H = "1": The channel selector field consists of the
         mobile allocation index offset, MAIO, and
         the hopping sequence number, HSN.

          MAIO, (octet 3 bit 4 to 1 high part and
                 octet 4 bit 8 to 7 low part)
          The MAIO field is coded as the binary rep-
          resentation of the mobile allocation index
          offset as defined in TS GSM 05.02.

         Range: 0 to 63.

         HSN, (octet 4 bit 6 to 1)
         The HSN field is coded as the binary repres-
         entation of the hopping sequence number
          as defined in TS GSM 05.02
         Range 0 to 63.
```

10.5.2.6 Channel Mode

The *Channel Mode* information element gives information of the mode on coding/decoding and transcoding. The exact mode is determined by the contents of this IE and the channel type.

The *Channel Mode* information element is coded as shown in figure 10.5.27/GSM 04.18 and table 10.5.27/GSM 04.18.

The C*hannel Mode* is a type 3 information element with 2 octets length.

8	7	6	5	4	3	2	1	
	Channel Mode IEI							octet 1
Mode								octet 2

Figure 10.5.27/GSM 04.18: *Channel Mode* information element

Table 10.5.27/GSM 04.18: *Channel Mode* information element

```
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 full rate or half rate version 1
0 0 1 0 0 0 0 1   speech full rate or half rate version 2
0 1 0 0 0 0 0 1   speech full rate or half rate version 3
0 1 1 0 0 0 0 1   data, 43.5 kbit/s (downlink)+14.5 kbps (uplink)
0 1 1 0 0 0 1 0   data, 29.0 kbit/s (downlink)+14.5 kbps (uplink)
0 1 1 0 0 1 0 0   data, 43.5 kbit/s (downlink)+29.0 kbps (uplink)
0 1 1 0 0 1 1 1   data, 14.5 kbit/s (downlink)+43.5 kbps (uplink)
0 1 1 0 0 1 0 1   data, 14.5 kbit/s (downlink)+29.0 kbps (uplink)
0 1 1 0 0 1 1 0   data, 29.0 kbit/s (downlink)+43.5 kbps (uplink)
```

```
0 0 1 0 0 1 1 1   data, 43.5 kbit/s radio interface rate
0 1 1 0 0 0 1 1   data, 32.0 kbit/s radio interface rate
0 1 0 0 0 0 1 1   data, 29.0 kbit/s radio interface rate
0 0 0 0 1 1 1 1   data, 14.5 kbit/s radio interface rate
0 0 0 0 0 0 1 1   data, 12.0 kbit/s radio interface rate
0 0 0 0 1 0 1 1   data, 6.0 kbit/s radio interface rate
0 0 0 1 0 0 1 1   data, 3.6 kbit/s radio interface rate

Other values are reserved for future use.

Note 1: The speech full rate or half rate version 3 is
       also referred as the adaptive multi-rate full rate
       or half rate speech version 1
```

10.5.2.7 Channel Mode 2

The *Channel Mode 2* information element gives information of the mode of coding/decoding and transcoding.

The *Channel Mode 2* information element is coded as shown in figure 10.5.28/GSM 04.18 and table 10.5.28/GSM 04.18.

The *Channel Mode 2* is a type 3 information element with 2 octets length.

8	7	6	5	4	3	2	1	
	Channel Mode IEI							octet 1
Mode								octet 2

Figure 10.5.28/GSM 04.18: *Channel Mode 2* information element

Table 10.5.28/GSM 04.18: *Channel Mode 2* information element

```
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 1 0 1    speech half rate version 1
0 0 1 0 0 1 0 1    speech half rate version 2
0 1 0 0 0 1 0 1    speech half rate version 3
0 0 0 0 1 1 1 1    data, 6.0 kbit/s radio interface rate
0 0 0 1 0 1 1 1    data, 3.6 kbit/s radio interface rate

Other values are reserved for future use.


Note 1: The speech half rate version 3 is
        also referred as the adaptive multi-rate
        half rate speech version 1
```

10.5.2.7a UTRAN pre-configuration indication set

The UTRAN pre-configuration set indication gives information to the network on the-configuration set stored in the MS.The pre-configuration indication set is a type 3 information element with 2 octets length.

8	7	6	5	4	3	2	1	
	UTRAN pre-configuration indication set IEI							octet 1
UTRAN pre-configuration set value part								octet 2

Figure 10.5.27/GSM 04.18: UTRAN pre-configuration set information element

Table 10.5.27/GSM 04.18: UTRAN pre-configuration set value part

8	7	6	5	4	3	2	1	
Spare								octet 1

```
 The UTRAN pre-configuration set value part is encoded as follows:
 (octet 2)
 Bits
4 3 2 1
0 0 0 0  Configuration 1
0 0 0 1  Configuration 2
- - - -
1 1 1 1  Configuration 16
```

10.5.2.7b UTRAN pre-configuration set

The UTRAN pre-configuration set information element defines one or more sets of radio access bearer configuration to the mobile station to be used in UTRAN.At Inter System handover to UTRAN the mobile is configured to one of the pre-defined sets by the target system in the handover signalling.

Contents is defined in TS 25.331.

The pre-configuration indication set is a type 3 information element with 1 and 19 octets

10.5.2.7c Channel Needed

The purpose of the *Channel Needed* information element is to indicate to up to two mobile stations which type of channel is needed (for each mobile station) for the transaction linked to the paging procedure.

The *Channel Needed* information element is coded as shown in figure 10.5.29/GSM 04.18 and table 10.5.29/GSM 04.18.

The *Channel Needed* is a type 1 information element.

8	7	6	5	4	3	2	1	
Channel Needed IEI				CHANNEL (second)		CHANNEL (first)		octet 1

Figure 10.5.29/GSM 04.18: *Channel Needed* information element

Table 10.5.29/GSM 04.18: *Channel Needed* information element

```
CHANNEL (octet 1)
Bits
2/4  1/3
 0    0    Any channel.
 0    1    SDCCH.
 1    0    TCH/F  (Full rate).
 1    1    TCH/H or TCH/F  (Dual rate).

If this information element is used for only one
mobile station, then the first CHANNEL field is
used and the second CHANNEL field is spare.
```

10.5.2.8 Classmark Enquiry Mask

The UE Classmark Request mask defines the capabilities to be returned to network. The bit mask defines the specific information to be returned, such as UE capability and/or information about RAB pre-configuration and/or defines Classmark Change procedure invocation.The classmark change procedure is described in chapter 3.4.10.

The Classmark Enquiry Mask is a type 4 information element with 3 octets.

8	7	6	5	4	3	2	1	
	Classmark Enquiry Mask IEI							octet 1
Length of Classmark Enquiry Mask contents								octet 2
Classmark Enquiry Mask value part								octet 3

Figure 10.5.2.7c1/GSM 04.18: Classmark Enquiry Mask information element

Table 10.5.2.7.c2/GSM 04.18: Classmark Enquiry Mask value part

Bits 8-3: spare. Bits 2 1 0 0 Classmark Change Procedure invocation 0 1 UE capability requested 1 0 RAB pre-configuration requested 1 1 UE capability and RAB pre-configuration requested

10.5.2.8a Channel Request Description

The purpose of the *Channel Request Description* information element is to indicate to the network the type of requested uplink resources or to indicate the type of paging that is being responded to.

The *Channel Request Description* information element is coded as shown in figure 10.5.30/GSM 04.18 and table 10.5.30/GSM 04.18.

The *Channel Request Description* is a type 3 information element with a length of 6 octets.

8	7	6	5	4	3	2	1	
	Channel Request Description IEI							octet 1
=0-> MT/MO =1->	0	0	0	0	0	0	0	octet 2
	spare							
	spare			priority		RLC mode	LLC frame type	
0	0	0	0	0	0	0	0	
spare								
Requested bandwidth (MSB-Value field)								octet 3
0	0	0	0	0	0	0	0	
spare								octet 4
Requested bandwidth (LSB-Value field)								
0	0	0	0	0	0	0	0	
Spare								
RLC Octet Count (MSB-Value field)								octet 5
0	0	0	0	0	0	0	0	
Spare								octet 6
RLC Octet Count (LSB-Value field)								

Figure 10.5.30/GSM 04.18: *Channel Request Description* information element

Table 10.5.30/GSM 04.18: Channel Request Description information element details

MT/MO (bit 8, octet 2)

1 Mobile originated (MO)
0 Mobile terminated (MT)

PRIORITY (bits 3-4, octet 2)
When MT/MO indicates MO, this field indicates the priority of the requested TBF

bit
4 3
0 0 Priority Level 1 (Highest priority)
0 1 Priority Level 2
1 0 Priority Level 3
1 1 Priority Level 4 (Lower priority)

RLC_MODE (bit 2, octet 2)
When MT/MO indic

ates MO, this field indicates the RLC mode of the requested TBF.

0 RLC acknowledged mode
1 RLC unacknowledged mode

LLC_FRAME_TYPE (bit 1, octet 2)
When MT/MO indicates MO, this field indicates the type of the first LLC frame to be transmitted over the requested uplink TBF.

0 LLC frame is SACK or NACK
1 LLC frame is not SACK or NACK

REQUESTED_BANDWIDTH (16 bits field, octets 3 and 4)

When MT/MO indicates MO, this field indicates the useful uplink bandwidth requested in bit rate.

The bit rate field is the binary encoding of the rate information expressed in 100 bits/s, starting from 0 x 100 bits/s until 65535 x 100 bits/s.

The throughput granted by BSS may be higher to cope with protocol overhead and retransmissions.

RLC_OCTET_COUNT (16 bits field, octets 5 and 6)
When MT/MO indicates MO, this field indicates the number of octets of RLC data the mobile station wishes to transfer: see GSM 04.60.

10.5.2.8b Channel Request Description 2

The purpose of the *Channel Request Description 2* information element is to indicate to the network the reason of the request to enter dual transfer mode.

The *Channel Request Description 2* information element is coded as shown in figure 10.5.30a/GSM 04.18 and table 10.5.30a/GSM 04.18.

The *Channel Request Description 2* information element is a type 4 information element.

Table 10.5.30a/GSM 04.18: *Channel Request Description 2* information element

< Channel Request Description 2 IE > ::=
< **LENGTH_IN_OCTETS** : bit(8) >
< **Packet establishment cause** : bit(3) >
< **Priority** : bit(2) >
< **RLC Mode** : bit >
< **LLC Type** : bit >
< **QoS Parameters** >
< **RLC Octet Count** : bit(16) >
<spare padding>;

Table 10.5.30b/GSM 04.18: Channel Request Description 2 information element details

PACKET ESTABLISHMENT CAUSE (3 bit field)
This field provides information about the reason to request packet resources.

It is coded as follows:
Bit 3 2 1
0 0 0 Notification response
0 0 1 Cell Update
0 1 0 GMM procedure
0 1 1 Other GPRS signalling, including SMS
1 0 0 LLC data other than signalling or SMS
Other values are intended for further use and shall not be sent. If received they shall be treated as '100'.

PRIORITY (2 bit field)
This field indicates the priority of the requested packet resources.
Bit 2 1
0 0 Priority Level 1 (Highest priority)
0 1 Priority Level 2
1 0 Priority Level 3
1 1 Priority Level 4 (Lower priority)

RLC MODE (1 bit field)
This field indicates the RLC mode of the requested resources.
Bit 1
0 RLC acknowledged mode
1 RLC unacknowledged mode

LLC TYPE (bit 1, octet 2)
This field indicates the type of the first LLC frame to be transmitted over the requested uplink packet resources.
Bit 1
0 LLC frame is SACK or NACK
1 LLC frame is not SACK or NACK

QoS PARAMETERS
This field encodes the information regarding the QoS of the request packet session.
Its coding is FFS.

LLC_OCTET_COUNT (16 bit field)
The use of this field is left FFS.

10.5.2.9 Cipher Mode Setting

The purpose of the *Cipher Mode Setting* information element is to indicate whether stream ciphering shall be started or not and if it is to be started, which algorithm to use.

The *Cipher Mode Setting* information element is coded as shown in figure 10.5.31/GSM 04.18 and table 10.5.31/GSM 04.18.

The *Cipher Mode Setting* is a type 1 information element.

8	7	6	5	4	3	2	1	
	Ciph Mod Set IEI			algorithm identifier			SC	octet 1

Figure 10.5.31/GSM 04.18: *Cipher Mode Setting* information element

Table 10.5.31/GSM 04.18: *Cipher Mode Setting* information element

```
algorithm identifier
If SC=1 then:
bits
4 3 2
0 0 0  cipher with algorithm A5/1
0 0 1  cipher with algorithm A5/2
0 1 0  cipher with algorithm A5/3
0 1 1  cipher with algorithm A5/4
1 0 0  cipher with algorithm A5/5
1 0 1  cipher with algorithm A5/6
1 1 0  cipher with algorithm A5/7
1 1 1  reserved

If SC=0 then bits 4, 3 and 2 are spare and set to "0"

SC (octet 1)
Bit
1
0        No ciphering
1        Start ciphering
```

10.5.2.10 Cipher Response

The *Cipher Response* information element is used by the network to indicate to the mobile station which information the mobile station has to include in the CIPHERING MODE COMPLETE message.

The *Cipher Response* information element is coded as shown in figure 10.5.32/GSM 04.18 and table 10.5.32/GSM 04.18.

The *Cipher Response* is a type 1 information element.

8	7	6	5	4	3	2	1	
	Cipher Resp. IEI			0 Spare	0	0	CR	octet 1

Figure 10.5.32/GSM 04.18: *Cipher Response* information element

Table 10.5.32/GSM 04.18: *Cipher Response* information element

```
CR Cipher Response (octet 1)
Bit
1
0        IMEISV shall not be included
1        IMEISV shall be included
```

10.5.2.11 Control Channel Description

The purpose of the *Control Channel Description* information element is to provide a variety of information about a cell.

The *Control Channel Description* information element is coded as shown in figure 10.5.33/GSM 04.18 and table 10.5.33/GSM 04.18.

The *Control Channel Description* is a type 3 information element with 4 octets length.

8	7	6	5	4	3	2	1	
	Control Channel Description IEI							octet 1
MSCR	ATT	BS-AG-BLKS-RES			CCCH-CONF			octet 2
0 spare	0 spare	0 spare	CBQ2					octet 3
T 3212 time-out value								octet 4

Figure 10.5.33/GSM 04.18: *Control Channel Description* information element

Table 10.5.33/GSM 04.18: *Control Channel Description* information element

```
MSCR, MSC Release (octet 2)
Bit
8
0           MSC is Release '98 or older
1           MSC is Release '99 onwards

ATT, Attach-detach allowed (octet 2)
 Bit
 7
 0          MSs in the cell are not allowed to apply
            IMSI  attach  and  detach procedure.
 1          MSs in the cell shall apply IMSI attach
            and detach procedure.


 BS-AG-BLKS-RES (octet 2)
 The  BS-AG-BLKS-RES  field  is  coded as the binary
 representation of the number of blocks reserved for
 access grant.

 Range 0 to 2 if CCCH-CONF = "001"
       0 to 7 for other values of CCCH-CONF

 All other values are reserved in the first case

CBQ2, Cell Bar Qualify 2 (octet 3)
 Bits
 5 4
 0 0        Cell Bar Qualify 2 inactive
 0 1        Reserved
 1 0        Cell not barred, norm. cell selection priority
 1 1        Cell not barred, low cell selection priority

Note: See GSM 05.08 for information on Cell Bar Qualify 2

 CCCH-CONF (octet 2)
 bits
 3 2 1
 0 0 0      1 basic physical channel used for CCCH,
            not combined with SDCCHs
 0 0 1      1 basic physical channel used for CCCH,
            combined with SDCCHs
 0 1 0      2 basic physical channel used for CCCH,
            not combined with SDCCHs
 1 0 0      3 basic physical channel used for CCCH,
            not combined with SDCCHs
 1 1 0      4 basic physical channels used for CCCH,
            not combined with SDCCHs
  all other values are reserved

BS-PA-MFRMS (octet 3)
  Bits
 3 2 1
 0 0 0      2 multiframes period for transmission of
              PAGING  REQUEST  messages  to the same
              paging subgroup
 0 0 1      3 multiframes period for transmission of
              PAGING  REQUEST  messages  to the same
              paging subgroup
 0 1 0      4 multiframes period for transmission of
              PAGING  REQUEST  messages  to the same
   .          paging   subgroup
   .
   .
 1 1 1      9 multiframes period for transmission of
              PAGING  REQUEST  messages  to the same
              paging subgroup

 Note: The number of different paging subchannels on
       the CCCH is:

       MAX(1,(3 - BS-AG-BLKS-RES)) * BS-PA-MFRMS
               if CCCH-CONF = "001"
       (9 - BS-AG-BLKS-RES) * BS-PA-MFRMS
               for other values of CCCH-CONF
```

T3212 timeout value (octet 4) The T3212 timeout value field is coded as the binary representation of the timeout value for periodic updating in decihours. Range: 1 to 255 The value 0 is used for infinite timeout value i.e. periodic updating shall not be used within the cell.

10.5.2.11a DTM Reject Information

The purpose of the *DTM Reject Information* IE is to provide extra information about the reason for rejection of a packet request attempt in dedicated mode and command further actions.

The *DTM Reject Options* information element is coded as shown in figure 10.5.33a/GSM 04.18 and table 10.5.33a/GSM 04.18.

The *DTM Reject Options* is a type 3 information element with 2 octets length.

8	7	6	5	4	3	2	1	
	DTM Reject Options IEI							octet 1
Reset at handover	Spare							octet 2

Figure 10.5.33a/GSM 04.18: *DTM Reject Options* information element

Table 10.5.33a/GSM 04.18: *DTM Reject Options* information element

RESET_AT_HANDOVER_INDICATION (bit 8, octet 2) This bit indicates the validity of the waiting time after a successful handover. Bit 8 0 Waiting time valid in this cell only 1 Waiting time valid also after successful handover NOTE: the waiting time shall always be reset when the mobile station enters idle mode

10.5.2.12 Frequency Channel Sequence

The purpose of the *Frequency Channel Sequence* information element is to provide the absolute radio frequency channel numbers used in the mobile hopping sequence. This information element shall only be used for radio frequency channels in the primary GSM band (see GSM 05.05).

The *Frequency Channel Sequence* information element is coded as shown in figure 10.5.34/GSM 04.18 and table 10.5.34/GSM 04.18.

The *Frequency Channel Sequence* is a type 3 information element with 10 octets length.

8	7	6	5	4	3	2	1	
	Frequency Channel Sequence IEI							octet 1
0 spare	Lowest ARFCN							octet 2
inc skip of ARFCN 01				inc skip of ARFCN 02				octet 3
⋮								
inc skip of ARFCN 15				inc skip of ARFCN 16				octet 10

Figure 10.5.34/GSM 04.18: *Frequency Channel Sequence* information element

Table 10.5.34/GSM 04.18: *Frequency Channel Sequence* information element

Lowest ARFCN (octet 2) The lowest ARFCN field is coded as the binary representation of the lowest absolute RF channel number appearing in the sequence of channels used in the frequency hopping. Range: 1 to 124 All other values are reserved.   Increment skip ARFCN n (octet 3 to 10) The increment skip ARFCN n is coded as the binary representation of the increment of the preceding absolute RF channel number appearing in the sequence of channels used in the frequency hopping: n = 1,...,16. Range: 0 to 15 The value 0 indicates that the increment value is 15 but the concerned channel is not used and the next field, i.e. Increment skip ARFCN n+1 (if present) must be added to the increment to determine the next absolute RF channel number in the sequence of channels used in the frequency hopping.

10.5.2.13 Frequency List

The purpose of the *Frequency List* information element is to provide the list of the absolute radio frequency channel numbers used in a frequency hopping sequence.

The *Frequency List* information element is a type 4 information element.

There are several formats for the *Frequency List* information element, distinguished by the "format indicator" subfield. Some formats are frequency bit maps, the others use a special encoding scheme.

10.5.2.13.1 General description

Table 10.5.35/GSM 04.18: *Frequency List* information element, general format

FORMAT-ID, Format Identifier (part of octet 3)

The different formats are distinguished by the FORMAT-ID field. The possible values are the following:

Bit 8	Bit 7	Bit 4	Bit 3	Bit 2	format notation
0	0	X	X	X	bit map 0
1	0	0	X	X	1024 range
1	0	1	0	0	512 range
1	0	1	0	1	256 range
1	0	1	1	0	128 range
1	0	1	1	1	variable bit map

All other combinations are reserved for future use.
A GSM 900 mobile station which only supports the primary GSM band P-GSM 900 (cf. GSM 05.05) may consider all values except the value for bit map 0 as reserved.

The significance of the remaining bits depends on the FORMAT-ID. The different cases are specified in the next sections.

10.5.2.13.2 Bit map 0 format

8	7	6	5	4	3	2	1	
	Frequency List IEI							octet 1
0	0	0	1	0	0	0	0	
Length of frequency list contents								octet 2
0	0	0	0					
FORMAT-ID		spare		ARFCN 124	ARFCN 123	ARFCN 122	ARFCN 121	octet 3
ARFCN 120	ARFCN 119	ARFCN 118	ARFCN 117	ARFCN 116	ARFCN 115	ARFCN 114	ARFCN 113	octet 4
...								
ARFCN 008	ARFCN 007	ARFCN 006	ARFCN 005	ARFCN 004	ARFCN 003	ARFCN 002	ARFCN 001	octet 18

Figure 10.5.35/GSM 04.18: *Frequency List* information element, bit map 0 format

Table 10.5.36/GSM 04.18: *Frequency List* information element, bit map 0 format

ARFCN N, Absolute RF Channel Number N (octet 3 etc.) For a RF channel with ARFCN = N belonging to the frequency list the ARFCN N bit is coded with a "1"; N = 1, 2, .. , 124. For a RF channel with ARFCN = N not belonging to the frequency list the ARFCN N bit is coded with a "0"; N = 1, 2 .. , 124.

10.5.2.13.3 Range 1024 format

The information element contains a header, and W(1) to W(M) for some M. If, due to octet boundaries, some bits are not used at the end of the last octet, these bits must be set to 0.

<table>
<tr><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td></td></tr>
<tr><td></td><td colspan="7">Frequency List IEI</td><td>octet 1</td></tr>
<tr><td colspan="8">Length of frequency list contents</td><td>octet 2</td></tr>
<tr><td colspan="2">1 0
FORMAT-ID</td><td colspan="2">0 0
spare</td><td>0
FORMAT-ID</td><td>F0</td><td colspan="2">W(1)
(high part)</td><td>octet 3</td></tr>
<tr><td colspan="8">W(1) (low part)</td><td>octet 4</td></tr>
<tr><td colspan="8">W(2) to W(3) are on 9 bits, when present
W(4) to W(7) are on 8 bits, when present
W(8) to W(15) are on 7 bits, when present
W(16) to W(31) are on 6 bits, when present
W(2k) to W(2k+1-1) are on 10-k bits when present
and so on</td><td></td></tr>
</table>

Figure 10.5.36/GSM 04.18: *Frequency List* information element (Range 1024 format)

Table 10.5.37/GSM 04.18: *Frequency List* information element, range 1024 format

```
 F0, frequency 0 indicator (octet 3, bit 3):

 0     ARFCN 0 is not a member of the set
 1     ARFCN 0 is a member of the set

 W(i), i from 1 to M (octet 3 and next):

 Each W(i) encodes a non negative integer in binary
 format.

 If W(k) is null, W(i) for i>k must be null also.

 Each non null W(k) allows to compute, together with
 some previous W(i) the ARFCN F(k) of a frequency in
 the set. The first computation formulas are given
 hereafter, with the following conventions:

   Wi denotes W(i);
   Fi denotes F(i);
   +  indicates the natural integer addition;
   *  indicates the natural integer multiplication;
   n mod m  indicates the remainder of the euclidian
     division of n by m, ie 0 = (n mod m) = m-1 and
     there exists k such that  n = (k*m) + (n mod m);

   n smod m  indicates the offset remainder of the
     euclidian division of n by m, ie
     1 = (n smod m) = m and there exists k such that
     n = (k*m) + (n smod m);

    F1 =  W1
    F2 = (W1 - 512 + W2) smod 1023
    F3 = (W1       + W3) smod 1023
    F4 = (W1 - 512 + (W2 - 256 + W4) smod 511) smod 1023
    F5 = (W1       + (W3 - 256 + W5) smod 511) smod 1023
    F6 = (W1 - 512 + (W2       + W6) smod 511) smod 1023
    F7 = (W1       + (W3       + W7) smod 511) smod 1023
    F8  = (W1 - 512 + (W2 - 256 + (W4 - 128 + W8 )
          smod 255) smod 511) smod 1023

F9  = (W1       + (W3 - 256 + (W5 - 128 + W9 )
          smod 255) smod 511) smod 1023
   F10 = (W1 - 512 + (W2       + (W6 - 128 + W10)
          smod 255) smod 511) smod 1023
   F11 = (W1       + (W3       + (W7 - 128 + W11)
          smod 255) smod 511) smod 1023
   F12 = (W1 - 512 + (W2 - 256 + (W4       + W12)
          smod 255) smod 511) smod 1023
   F13 = (W1       + (W3 - 256 + (W5       + W13)
          smod 255) smod 511) smod 1023
   F14 = (W1 - 512 + (W2       + (W6       + W14)
          smod 255) smod 511) smod 1023
   F15 = (W1       + (W3       + (W7       + W15)
          smod 255) smod 511) smod 1023
   F16  = (W1 - 512 + (W2 - 256 + (W4 - 128 +
              (W8 - 64 + W16) smod 127)
          smod 255) smod 511) smod 1023

More generally, the computation of F(K) can be done
 with the following program, using ADA language
 (declarative parts are skipped and should be obvious):


 INDEX := K;
 J := GREATEST_POWER_OF_2_LESSER_OR_EQUAL_TO(INDEX);
 N := W(INDEX);
 while INDEX>1 loop
   if 2*INDEX < 3*J then
     INDEX := INDEX – J/2;              -- left child
     N := (N + W(PARENT) - 1024/J - 1) mod
           (2048/J - 1) + 1;
   else                                -- right child
     INDEX := INDEX - J;
     N := (N + W(PARENT) - 1) mod (2048/J - 1) + 1;
   end if;
```

```
  J := J/2;
end loop;
F(K) := N;
```

10.5.2.13.4 Range 512 format

The information element contains a header, and W(1) to W(M) for some M. If, due to octet boundaries, some bits are not used at the end of the last octet, these bits must be set to 0.

8	7	6	5	4	3	2	1	
	Frequency List IEI							octet 1
Length of frequency list contents								octet 2
1 FORMAT-ID	0	0 spare	0 spare	1 FORMAT-ID	0	0	ORIG-ARFCN high	octet 3
ORIG-ARFCN (middle part)								octet 4
ORIG-ARFCN low	W(1) (high part)							octet 5
W(1) (low part)		W(2) (high part)						octet 6
W(2) to W(3) are on 8 bits, when present W(4) to W(7) are on 7 bits, when present W(8) to W(15) are on 6 bits, when present W(16) to W(31) are on 5 bits, when present W(2k) to W(2k+1-1) are on 9-k bits when present and so on								

Figure 10.5.37/GSM 04.18: *Frequency List* information element (Range 512 format)

Table 10.5.38/GSM 04.18: *Frequency List* information element, range 512 format

```
   ORIG-ARFCN, origin ARFCN (octet 3, 4 and 5)

   This field encodes the ARFCN of one frequency
   belonging to the set. This value is also used to
   decode the rest of the element.


 W(i), i from 1 to M (octet 5 and next):

 Each W(i) encodes a non negative integer in binary
 format.

 If W(k) is null, W(i) for i>k must be null also.

 Each non null W(k) allows to compute, together with
 some previous W(i) the ARFCN F(k) of a frequency in
 the set. The first computation formulas are given
 hereafter, with the following conventions:

   Wi denotes W(i); W0 denotes the value of ORIG-ARFCN
   Fi denotes F(i);
   +  indicates the natural integer addition;
   *  indicates the natural integer multiplication;
   n mod m  indicates the remainder of the euclidian
     division of n by m, ie 0 = (n mod m) = m-1 and
     there exists k such that  n = (k*m) + (n mod m);

   n smod m  indicates the offset remainder of the
     euclidian division of n by m, ie
     1 = (n smod m) = m and there exists k such that
     n = (k*m) + (n smod m);

 F1  = (W0 + W1) mod 1024
 F2  = (W0 + (W1 - 256 + W2) smod 511) mod 1024
 F3  = (W0 + (W1       + W3) smod 511) mod 1024
 F4  = (W0 + (W1 - 256 + (W2 - 128 + W4) smod 255)
        smod 511) mod 1024
 F5  = (W0 + (W1       + (W3 - 128 + W5) smod 255)
        smod 511) mod 1024
 F6  = (W0 + (W1 - 256 + (W2       + W6) smod 255)
        smod 511) mod 1024
 F7  = (W0 + (W1       + (W3       + W7) smod 255)
        smod 511) mod 1024
 F8  = (W0 + (W1 - 256 + (W2 - 128 + (W4 - 64 + W8 )
        smod 127) smod 255) smod 511) mod 1024
 F9  = (W0 + (W1       + (W3 - 128 + (W5 - 64 + W9 )
        smod 127) smod 255) smod 511) mod 1024

F10 = (W0 + (W1 - 256 + (W2       + (W6 - 64 + W10)
        smod 127) smod 255) smod 511) mod 1024
 F11 = (W0 + (W1       + (W3       + (W7 - 64 + W11)
        smod 127) smod 255) smod 511) mod 1024
 F12 = (W0 + (W1 - 256 + (W2 - 128 + (W4      + W12)
        smod 127) smod 255) smod 511) mod 1024

 F13 = (W0 + (W1       + (W3 - 128 + (W5      + W13)
        smod 127) smod 255) smod 511) mod 1024
 F14 = (W0 + (W1 - 256 + (W2       + (W6      + W14)
        smod 127) smod 255) smod 511) mod 1024
 F15 = (W0 + (W1       + (W3       + (W7      + W15)
        smod 127) smod 255) smod 511) mod 1024
 F16 = (W0 + (W1 - 256 + (W2 - 128 + (W4 - 64 +
       (W8 - 32 + W16)
      smod 63) smod 127) smod 255) smod 511) mod 1024
 F17 = (W0 + (W1       + (W3 - 128 + (W5 - 64 +
       (W9 - 32 + W17)
      smod 63) smod 127) smod 255) smod 511) mod 1024

More generally, the computation of F(K) can be done
 with the following program, using ADA language
 (declarative parts are skipped and should be obvious):


 INDEX := K;
 J := GREATEST_POWER_OF_2_LESSER_OR_EQUAL_TO(INDEX);
 N := W(INDEX);
```

```
while INDEX>1 loop
  if 2*INDEX < 3*J then               -- left child
    INDEX := INDEX - J/2;
    N := (N + W(PARENT) - 512/J - 1) mod
          (1024/J - 1) + 1;
  else                                -- right child
    INDEX := INDEX - J;
    N := (N + W(_INDEX) - 1) mod (1024/J - 1) + 1;
  end if;
  J := J/2;
end loop;
F(K) := (W(0) + N) mod 1024;
```

10.5.2.13.5 Range 256 format

The information element contains a header, and W(1) to W(M) for some M. If, due to octet boundaries, some bits are not used at the end of the last octet, these bits must be set to 0.

<table>
<tr><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td></td></tr>
<tr><td></td><td colspan="7">Frequency List IEI</td><td>octet 1</td></tr>
<tr><td colspan="8">Length of frequency list contents</td><td>octet 2</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td><td rowspan="2">ORIG-ARFCN high</td><td rowspan="2">octet 3</td></tr>
<tr><td colspan="2">FORMAT-ID</td><td>spare</td><td>spare</td><td colspan="3">FORMAT-ID</td></tr>
<tr><td colspan="8">ORIG-ARFCN (middle part)</td><td>octet 4</td></tr>
<tr><td>ORIG-ARFCN low</td><td colspan="7">W(1)
(high part)</td><td>octet 5</td></tr>
<tr><td>W(1) low</td><td colspan="7">W(2)</td><td>octet 6</td></tr>
<tr><td colspan="8">W(2) to W(3) are on 7 bits, when present
W(4) to W(7) are on 6 bits, when present
W(8) to W(15) are on 5 bits, when present
W(16) to W(31) are on 4 bits, when present
W(2k) to W(2k+1-1) are on 8-k bits when present
and so on</td><td></td></tr>
</table>

Figure 10.5.38/GSM 04.18: *Frequency List* information element (Range 256 format)

Table 10.5.39/GSM 04.18: *Frequency List* information element, range 256 format

```
ORIG-ARFCN, origin ARFCN (octet 3, 4 and 5)

This field encodes the ARFCN of one frequency belonging to
the set. This value is also used to decode the rest of the
element.

W(i), i from 1 to M (octet 5 and next):

Each W(i) encodes a non negative integer in binary format.

If W(k) is null, W(i) for i>k must be null also.

Each non null W(k) allows to compute, together with
some previous W(i) the ARFCN F(k) of a frequency in
the set. The first computation formulas are given
hereafter, with the following conventions:

  Wi denotes W(i);  W0 denotes the value of ORIG-ARFCN
  Fi denotes F(i);
  +  indicates the natural integer addition;
  *  indicates the natural integer multiplication;
  n mod m  indicates the remainder of the euclidian
    division of n by m, ie 0 = (n mod m) = m-1 and
    there exists k such that  n = (k*m) + (n mod m);

  n smod m  indicates the offset remainder of the
    euclidian division of n by m, ie
    1 = (n smod m) = m and there exists k such that
    n = (k*m) + (n smod m);


F1  = (W0 + W1) mod 1024
F2  = (W0 + (W1 - 128 + W2) smod 255) mod 1024
F3  = (W0 + (W1       + W3) smod 255) mod 1024
F4  = (W0 + (W1 - 128 + (W2 - 64 + W4) smod 127) smod 255)
     mod 1024
F5  = (W0 + (W1       + (W3 - 64 + W5) smod 127) smod 255)
     mod 1024
F6  = (W0 + (W1 - 128 + (W2      + W6) smod 127) smod 255)
     mod 1024
F7  = (W0 + (W1       + (W3      + W7) smod 127) smod 255)
     mod 1024
F8  = (W0 + (W1 - 128 + (W2 - 64 + (W4 - 32 + W8 ) smod 63)
     smod 127) smod 255) mod 1024
F9  = (W0 + (W1       + (W3 - 64 + (W5 - 32 + W9 ) smod 63)
     smod 127) smod 255) mod 1024
F10 = (W0 + (W1 - 128 + (W2      + (W6 - 32 + W10) smod 63)
     smod 127) smod 255) mod 1024
F11 = (W0 + (W1       + (W3      + (W7 - 32 + W11) smod 63)
     smod 127) smod 255) mod 1024
F12 = (W0 + (W1 - 128 + (W2 - 64 + (W4      + W12) smod 63)
     smod 127) smod 255) mod 1024
F13 = (W0 + (W1       + (W3 - 64 + (W5      + W13) smod 63)
     smod 127) smod 255) mod 1024
F14 = (W0 + (W1 - 128 + (W2      + (W6      + W14) smod 63)
     smod 127) smod 255) mod 1024
F15 = (W0 + (W1       + (W3      + (W7      + W15) smod 63)
     smod 127) smod 255) mod 1024
F16 =(W0 + (W1 - 128 + (W2 - 64 + (W4 - 32 + (W8  - 16 + W16)
      smod 31) smod 63) smod 127) smod 255) mod 1024
F17 =(W0 + (W1       + (W3 - 64 + (W5 - 32 + (W9  - 16 + W17)
     smod 31) smod 63) smod 127) smod 255) mod 1024
F18 =(W0 + (W1 - 128 + (W2      + (W6 - 32 + (W10 - 16 + W18)
     smod 31) smod 63) smod 127) smod 255) mod 1024
F19 =(W0 + (W1       + (W3      + (W7 - 32 + (W11 - 16 + W19)
     smod 31) smod 63) smod 127) smod 255) mod 1024
F20 =(W0 + (W1 - 128 + (W2 - 64 + (W4      + (W12 - 16 + W20)
     smod 31) smod 63) smod 127) smod 255) mod 1024
F21 =(W0 + (W1       + (W3 - 64 + (W5      + (W13 - 16 + W21)
     smod 31) smod 63) smod 127) smod 255) mod 1024

More generally, the computation of F(K) can be done
with the following program, using ADA language
(declarative parts are skipped and should be obvious):
```

```
INDEX := K;
J := GREATEST_POWER_OF_2_LESSER_OR_EQUAL_TO(INDEX);
N := W(INDEX);
while INDEX>1 loop
  if 2*INDEX < 3*J then                -- left child
    INDEX := INDEX - J/2;
    N := (N + W(INDEX) - 256/J - 1) mod
          (512/J - 1) + 1;
  else                                 -- right child
    INDEX := INDEX - J;
    N := (N + W(INDEX) - 1) mod (512/J - 1) + 1;
  end if;
  J := J/2;
end loop;
F(K) := (W(0) + N) mod 1024;
```

10.5.2.13.6 Range 128 format

The information element contains a header, and W(1) to W(M) for some M. If, due to octet boundaries, some bits are not used at the end of the last octet, these bits must be set to 0.

<table>
<tr><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td></td></tr>
<tr><td></td><td colspan="7">Frequency List IEI</td><td>octet 1</td></tr>
<tr><td colspan="8">Length of frequency list contents</td><td>octet 2</td></tr>
<tr><td colspan="2">1 0
FORMAT-ID</td><td>0
spare</td><td>0
spare</td><td colspan="3">1 1 0
FORMAT-ID</td><td>ORIG-ARFCN high</td><td>octet 3</td></tr>
<tr><td colspan="8">ORIG-ARFCN (middle part)</td><td>octet 4</td></tr>
<tr><td>ORIG-ARFCN low</td><td colspan="7">W(1)
(high part)</td><td>octet 5</td></tr>
<tr><td colspan="8">W(2) to W(3) are on 6 bits, when present
W(4) to W(7) are on 5 bits, when present
W(8) to W(15) are on 4 bits, when present
W(16) to W(31) are on 3 bits, when present
W(2k) to W(2k+1-1) are on 7-k bits when present
and so on</td><td></td></tr>
</table>

Figure 10.5.39/GSM 04.18: *Frequency List* information element (Range 128 format)

Table 10.5.40/GSM 04.18: *Frequency List* information element, range 128 format

```
ORIG-ARFCN, origin ARFCN (octet 3, 4 and 5)

This field encodes the ARFCN of one frequency belonging to
the set. This value is also used to decode the rest of the
element.

W(i), i from 1 to M (octet 5 and next):

Each W(i) encodes a non negative integer in binary format.

If W(k) is null, W(i) for i>k must be null also.

Each non null W(k) allows to compute, together with
some previous W(i) the ARFCN F(k) of a frequency in
the set. The first computation formulas are given
hereafter, with the following conventions:

  Wi denotes W(i); W0 denotes the value of ORIG-ARFCN
  Fi denotes F(i);
  +  indicates the natural integer addition;
  *  indicates the natural integer multiplication;
  n mod m  indicates the remainder of the euclidian
    division of n by m, ie 0 = (n mod m) = m-1 and
    there exists k such that  n = (k*m) + (n mod m);

  n smod m  indicates the offset remainder of the
    euclidian division of n by m, ie
    1 = (n smod m) = m and there exists k such that
    n = (k*m) + (n smod m);


F1 = (W0 + W1) mod 1024
F2 = (W0 + (W1 - 64 + W2) smod 127) mod 1024
F3 = (W0 + (W1       + W3) smod 127) mod 1024
F4 = (W0 + (W1 - 64 + (W2 - 32 + W4) smod 63) smod 127)
     mod 1024
F5 = (W0 + (W1       + (W3 - 32 + W5) smod 63) smod 127)
     mod 1024
F6 = (W0 + (W1 - 64 + (W2      + W6) smod 63) smod 127)
     mod 1024
F7 = (W0 + (W1       + (W3      + W7) smod 63) smod 127)
     mod 1024
F8  = (W0 + (W1 - 64 + (W2 - 32 + (W4 - 16 + W8 ) smod 31)
     smod 63) smod 127) mod 1024
F9  = (W0 + (W1       + (W3 - 32 + (W5 - 16 + W9 ) smod 31)
     smod 63) smod 127) mod 1024
F10 = (W0 + (W1 - 64 + (W2      + (W6 - 16 + W10) smod 31)
     smod 63) smod 127) mod 1024
F11 = (W0 + (W1       + (W3      + (W7 - 16 + W11) smod 31)
     smod 63) smod 127) mod 1024
F12 = (W0 + (W1 - 64 + (W2 - 32 + (W4      + W12) smod 31)
     smod 63) smod 127) mod 1024
F13 = (W0 + (W1       + (W3 - 32 + (W5      + W13) smod 31)
     smod 63) smod 127) mod 1024
F14 = (W0 + (W1 - 64 + (W2      + (W6      + W14) smod 31)
     smod 63) smod 127) mod 1024
F15 = (W0 + (W1       + (W3      + (W7      + W15) smod 31)
     smod 63) smod 127) mod 1024
F16 = (W0 + (W1 - 64 + (W2 - 32 + (W4 - 16 + (W8  - 8 + W16)
     smod 15) smod 31) smod 63) smod 127) mod 1024
F17 = (W0 + (W1       + (W3 - 32 + (W5 - 16 + (W9  - 8 + W17)
     smod 15) smod 31) smod 63) smod 127) mod 1024
F18 = (W0 + (W1 - 64 + (W2      + (W6 - 16 + (W10 - 8 + W18)
     smod 15) smod 31) smod 63) smod 127) mod 1024
F19 = (W0 + (W1       + (W3      + (W7 - 16 + (W11 - 8 + W19)
     smod 15) smod 31) smod 63) smod 127) mod 1024
F20 = (W0 + (W1 - 64 + (W2 - 32 + (W4      + (W12 - 8 + W20)
     smod 15) smod 31) smod 63) smod 127) mod 1024
F21 = (W0 + (W1       + (W3 - 32 + (W5      + (W13 - 8 + W21)
     smod 15) smod 31) smod 63) smod 127) mod 1024
F22 = (W0 + (W1 - 64 + (W2      + (W6      + W(14 - 8 + W22)
     smod 15) smod 31) smod 63) smod 127) mod 1024
F23 = (W0 + (W1       + (W3      + (W7      + (W15 - 8 + W23)
     smod 15) smod 31) smod 63) smod 127) mod 1024
F24 = (W0 + (W1 - 64 + (W2 - 32 + (W4 - 16 + (W8       + W24)
```

```
     smod 15) smod 31) smod 63) smod 127) mod 1024
F25 = (W0 + (W1      + (W3 - 32 + (W5 - 16 + (W9       + W25)
     smod 15) smod 31) smod 63) smod 127) mod 1024
F26 = (W0 + (W1 - 64 + (W2      + (W6 - 16 + (W10      + W26)
     smod 15) smod 31) smod 63) smod 127) mod 1024
F27 = (W0 + (W1      + (W3      + (W7 - 16 + (W11      + W27)
     smod 15) smod 31) smod 63) smod 127) mod 1024
F28 = (W0 + (W1 - 64 + (W2 - 32 + (W4      + (W12      + W28
     smod 15) smod 31) smod 63) smod 127) mod 1024
F29 = (W0 + (W1      + (W3 - 32 + (W5      + (W13      + W29
     smod 15) smod 31) smod 63) smod 127) mod 1024

More generally, the computation of F(K) can be done
with the following program, using ADA language
(declarative parts are skipped and should be obvious):


INDEX := K;
J := GREATEST_POWER_OF_2_LESSER_OR_EQUAL_TO(INDEX);
N := W(INDEX);
while INDEX>1 loop
  if 2*INDEX < 3*J then                -- left child
    INDEX := INDEX - J/2;
    N := (N + W(INDEX) - 128/J - 1) mod
          (256/J - 1) + 1;
  else                                 -- right child
    INDEX := INDEX - J;
    N := (N + W(INDEX) - 1) mod (256/J - 1) + 1;
  end if;
  J := J/2;
end loop;
F(K) := (W(0) + N) mod 1024;
```

10.5.2.13.7 Variable bit map format

8	7	6	5	4	3	2	1	
	Frequency List IEI							octet 1
Length of frequency list contents								octet 2
1 FORMAT-ID	0	0 spare	0 spare	1 FORMAT-ID (continued)	1	1	ORIG-ARFCN high	octet 3
ORIG-ARFCN (middle part)								octet 4
ORIG-ARFCN low	RRFCN 1	RRFCN 2	RRFCN 3	RRFCN 4	RRFCN 5	RRFCN 6	RRFCN 7	octet 5
RRFCN 8k-40	RRFCN 8k-39	RRFCN 8k-38	RRFCN 8k-37	RRFCN 8k-36	RRFCN 8k-35	RRFCN 8k-34	RRFCN 8k-33	octet k

Figure 10.5.40/GSM 04.18: *Frequency List* information element, variable bit map format

Table 10.5.41/GSM 04.18: *Frequency List* information element, variable bit map format

```
ORIG-ARFCN, origin ARFCN (octet 3, 4 and 5)

This field encodes the ARFCN of one frequency belonging
to the set. This value is also used as origin of the
bit map to generate all the other frequencies.

RRFCN N, relative radio frequency channel number N
(octet 5 etc.)

For a RF channel with ARFCN = (ORIG-ARFCN + N) mod 1024
belonging to the set, RRFCN N bit is coded with a
"1"; N = 1, 2, .. ,  8M+7  with 1 = M = 127

For a RF channel with ARFCN = (ORIG-ARFCN + N) mod 1024
not belonging to the set, RRFCN N bit is coded with a
"0"; N = 1, 2, .. ,  8M+7  with 1 = M = 127
```

10.5.2.14 Frequency Short List

The purpose of the *Frequency Short List* information element is to provide the list of the absolute radio frequency channel numbers used in a frequency hopping sequence, in a small fixed length information element to obtain when possible the HANDOVER COMMAND message in a single block.

The *Frequency Short List* information element is a type 3 information element of 10 octet length.

This element is encoded exactly as the *Frequency List* information element, except that it has a fixed length instead of a variable length and does not contain a length indicator and that it shall not be encoded in bitmap 0 format.

10.5.2.14a Frequency Short List 2

The purpose of the *Frequency Short List 2* information element is to provide the list of the absolute radio frequency channel numbers used in a frequency hopping sequence, in a small fixed length information element to obtain the SYSTEM INFORMATION TYPE 11 and NOTIFICATION FACCH messages in a single block.

The *Frequency Short List* information element is a type 3 information element of 8 octet length.

This element is encoded exactly as the *Frequency List* information element, except that it has a fixed length instead of a variable length and does not contain a length indicator and that it shall not be encoded in bitmap 0 format.

10.5.2.14b Group Channel Description

The purpose of the *Group Channel Description* information element is to provide a description of an allocable voice group call or voice broadcast call channel together with its SACCH and that part of the RF channels belonging to the cell allocation which is used in the mobile hopping sequence if applicable.

The *Group Channel Description* information element is coded as shown in figure 10.5.41/GSM 04.18 and table 10.5.42/GSM 04.18.

The *Group Channel Description* is a type 4 information element with 4 to 13 octets length.

<table>
<tr><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td></td></tr>
<tr><td></td><td colspan="7">Group Channel Description IEI</td><td>octet 1</td></tr>
<tr><td colspan="8">Length of mobile allocation contents</td><td>octet 2</td></tr>
<tr><td colspan="5">Channel type
and TDMA offset</td><td colspan="3">TN</td><td>octet 3</td></tr>
<tr><td colspan="3">TSC</td><td>H=1->
--- H ---
H=0-></td><td colspan="4">MAIO (high part)
----
0 spare | ARFCN (high part)</td><td>octet 4</td></tr>
<tr><td colspan="2">MAIO
(low part)</td><td colspan="6">HSN

ARFCN (low part)</td><td>octet 5</td></tr>
<tr><td>MA
C
8n</td><td>MA
C
8n-1</td><td>MA
C
8n-2</td><td>MA
C
8n-3</td><td>MA
C
8n-4</td><td>MA
C
8n-5</td><td>MA
C
8n-6</td><td>MA
C
8n-7</td><td>octet 6</td></tr>
<tr><td colspan="8"></td><td></td></tr>
<tr><td>MA
C
008</td><td>MA
C
007</td><td>MA
C
006</td><td>MA
C
005</td><td>MA
C
004</td><td>MA
C
003</td><td>MA
C
002</td><td>MA
C
001</td><td>octet n+5</td></tr>
</table>

Figure 10.5.41/GSM 04.18: *Group Channel Description* information element

Table 10.5.42/GSM 04.18: *Group Channel Description* information element

```
Channel type and TDMA offset (octet 3)
  Bits
8 7 6 5 4
0 0 0 0 1  TCH/FS + ACCHs (speech codec version 1)
0 0 0 1 T  TCH/HS + ACCHs (speech codec version 1)
0 0 1 T T  SDCCH/4 + SACCH/C4
0 1 T T T  SDCCH/8 + SACCH/C8

The  T bits indicate the subchannel number coded in
binary.

All other values are reserved for future use.

TN, Timeslot number (octet 3)
The  TN field is coded as the binary representation
of the timeslot number as defined in GSM 05.10.

Range: 0 to 7.

TSC, Training Sequence Code (octet 4)
The TSC field is coded as the binary representation
of the Training Sequence code as defined in GSM
05.03
Range: 0 to 7.

H, Hopping channel (octet 4)
Bit
5
0        Single RF channel
1        RF hopping channel

Note 1: The  value  of H affects the semantics of the
      channel  selector  field

Note 2: If H=0, the information element terminates
      with octet 5

Channel selector (octet 4 and 5)
H = "0": The channel selector field
       consists of the absolute RF channel number

      Octet 4
       Bits
       4 3
       0 0     Spare
      ARFCN, (octet 4, bits 2 and 1, and
              octet 5, bits 8 to 1)
        The ARFCN is coded as the binary representa-
        tion of the absolute RF channel number

         Range: 0 to 1023

H = "1": The channel selector field consists of the
         mobile allocation index offset, MAIO, and
         the hopping sequence number, HSN.

          MAIO, (octet 4 bit 4 to 1 high part and
                 octet 5 bit 8 to 7 low part)
          The MAIO field is coded as the binary rep-
          resentation of the mobile allocation index
          offset as defined in GSM 05.02.

         Range: 0 to 63.

         HSN, (octet 5 bit 6 to 1)
         The HSN field is coded as the binary repres-
         entation of the hopping sequence number
          as defined in GSM 05.02
         Range 0 to 63.

MA  C  i,  Mobile  allocation RF channel i (octet 4
etc.), i = 1, 2,..., NF
The MA C i bit indicates whether or not the Mobile
allocation frequency list includes the  i'th
frequency in the cell allocation frequency list.
In the cell allocation frequency list the absolute
```

RF channel numbers are placed in increasing order of ARFCN, except that ARFCN 0, if included in the set, is put in the last position in the list, For a RF channel belonging to the mobile allocation the MA C i bit is coded with a "1"; i = 1, 2,..., NF. For a RF channel not belonging to the mobile allocation the MA C i bit is coded with a "0"; i = 1, 2,..., NF. If NF mod 8 <> 0 then bits NF to 8n in octet 4 must be coded with a "0" in each.

10.5.2.14c GPRS Resumption

The purpose of the *GPRS Resumption* information element is to indicate whether the network has successfully resumed GPRS services or not.

The *GPRS Resumption* information element is coded as shown in figure 10.5.42/GSM 04.18 and table 10.5.43/GSM 04.18.

The *GPRS Resumption* is a type 1 information element.

8	7	6	5	4	3	2	1	
	GPRS resumption IEI			spare 0	0	0	ACK	octet 1

Figure 10.5.42/GSM 04.18: *GPRS Resumption* information element

Table 10.5.43/GSM 04.18: *GPRS Resumption* information element

The ACK field (1 bit) is the binary acknowledge of a successful resumption of GPRS services:

0 resumption of GPRS services not successfully acknowledged;

1 resumption of GPRS services successfully acknowledged.

10.5.2.15 Handover Reference

The purpose of the *Handover Reference* information element is to provide a handover reference value used for access identification.

The *Handover Reference* information element is coded as shown in figure 10.5.43/GSM 04.18 and table 10.5.44/GSM 04.18.

The *Handover Reference* is a type 3 information element with 2 octets length.

8	7	6	5	4	3	2	1	
	Handover Reference IEI							octet 1
Handover reference value								octet 2

Figure 10.5.43/GSM 04.18: *Handover Reference* information element

Table 10.5.44/GSM 04.18: *Handover Reference* information element

Handover reference value (octet 2) The handover reference value field is coded using binary representation. Range: 0 to 255.

10.5.2.16 IA Rest Octets

The *IA Rest Octet*s information element contains spare bits and possibly either a *packet uplink assignment* construction, a *packet downlink assignment* construction, a *second part packet assignment* construction or a *frequency parameters, before time* construction.

The *frequency parameters, before time* construction combines a mobile allocation (see 10.5.2.21) and a MAIO (see the *channel description* information element).

The *IA Rest Octet*s information element is coded according to the syntax specified below and described in table 10.5.45/GSM 04.18.

The *IA Rest Octet*s information element is a type 5 information element with 0-11 octets length.

```
<IA Rest Octets> ::=
    { LL
     | LH
        { 00    < EGPRS Packet Uplink Assignment >
         | 01   < Second Part Packet Assignment : null >
         | 1          -- reserved for future use (however the value 7C for the first octet shall not be used)
        }
     | HL
        < Length of frequency parameters : bit string (6) >
        < Frequency Parameters, before time >
     | HH
        { 00    < Packet Uplink Assignment >
         | 01   < Packet Downlink Assignment >
         | 1    < Second Part Packet Assignment : null > }
}
    <spare padding>;

< EGPRS Packet Uplink Assignment > : :=
{ 0 | 1 < Access Technologies Request : Access Technologies Request struct > }
{ 1
    < TFI_ASSIGNMENT : bit (5) >
    < POLLING : bit >
    { 0                -- Dynamic Allocation
        < USF: bit (3) >
        < USF_GRANULARITY : bit >
        { 0 | 1 < P0 : bit (4) >
        < PR_MODE : bit (1) >}
    | 1                    -- Fixed Allocation
        < ALLOCATION_BITMAP_LENGTH : bit (5) >
        < ALLOCATION_BITMAP : bit (val(ALLOCATION_BITMAP_LENGTH)) >
        { 0 | 1 < P0 : bit (4) >
            < BTS_PWR_CTRL_MODE : bit (1) >
            < PR_MODE : bit (1) >}
    }
    < EGPRS CHANNEL_CODING_COMMAND : < EGPRS Modulation and Coding IE>>
    < TLLI_BLOCK_CHANNEL_CODING : bit (1) >
    { 0 | 1 < BEP_PERIOD2 : bit (4) >}
    < Resegment : < Resegment IE>>
    < EGPRS Window Size : < EGPRS Window Size IE>>
    { 0 | 1 < ALPHA : bit (4) >}
    < GAMMA : bit (5) >
    { 0 | 1 < TIMING_ADVANCE_INDEX : bit (4) > }
    { 0 | 1 < TBF_STARTING_TIME : bit (16) > }
| 0          -- Multi Block Allocation
    { 0 | 1 < ALPHA : bit (4) >}
    < GAMMA : bit (5) >
    < TBF_STARTING_TIME : bit (16) >
    < NUMBER OF RADIO BLOCKS ALLOCATED : bit (2) >
    { 0 | 1 < P0 : bit (4) >
            < BTS_PWR_CTRL_MODE : bit (1) >
            < PR_MODE : bit (1) >}
} ;

<Access Technologies Request struct> ::= -- recursive structure allows any combination of Access technologies
    <Access Technology Type : bit (4)>
    { 0 | 1 <Access Technologies Request struct> };

< Packet Uplink Assignment > ::=

  {  1
    < TFI_ASSIGNMENT : bit (5) >
    < POLLING : bit >
    { 0                -- Dynamic Allocation
        < USF: bit (3) >
        < USF_GRANULARITY : bit >
        { 0 | 1 < P0 : bit (4) >
        < PR_MODE : bit (1) >}
    | 1                    -- Fixed Allocation
```

```
        < ALLOCATION_BITMAP_LENGTH : bit (5) >
        < ALLOCATION_BITMAP : bit (val(ALLOCATION_BITMAP_LENGTH)) >
        { 0 | 1 < P0 : bit (4) >
            < BTS_PWR_CTRL_MODE : bit (1) >
            < PR_MODE : bit (1) >}
    }
        < CHANNEL_CODING_COMMAND : bit (2) >
        < TLLI_BLOCK_CHANNEL_CODING : bit >
    { 0 | 1 < ALPHA : bit (4) >}
    < GAMMA : bit (5) >
    { 0 | 1 < TIMING_ADVANCE_INDEX : bit (4) > }
    { 0 | 1 < TBF_STARTING_TIME : bit (16) > }
| 0         -- Single Block Allocation
    { 0 | 1 < ALPHA : bit (4) >}
    < GAMMA : bit (5) >
    0 1         -- See Note 1
    < TBF_STARTING_TIME : bit (16) >
    { L | H < P0 : bit (4) >
            < BTS_PWR_CTRL_MODE : bit (1) >
            < PR_MODE : bit (1) >}
} ;


< Packet Downlink Assignment > ::=
    < TLLI : bit (32) >
    { 0 | 1
        < TFI_ASSIGNMENT : bit (5) >
        < RLC_MODE : bit >
        {0 | 1 < ALPHA : bit (4) >}
        < GAMMA : bit (5) >
        < POLLING : bit >
        < TA_VALID : bit (1) >}
        { 0 | 1 < TIMING_ADVANCE_INDEX : bit (4) > }
        { 0 | 1 < TBF_STARTING_TIME : bit (16) > }
        { 0 | 1 < P0 : bit (4) >
            < BTS_PWR_CRTL_MODE : bit (1) >
            < PR_MODE : bit (1) >}
{ L | H -- indicates EGPRS TBF mode, see 04.60
       <EGPRS_ WINDOW_SIZE : bit(5) >
       < LINK_QUALITY_MEASUREMENT_MODE : bit (2)>  ;
       { 0 | 1 < BEP_PERIOD2 : bit (4) > } };
< Frequency Parameters, before time > ::=
    { null                      -- Length of frequency parameters = 0
    |   0 0
        < MAIO : bit (6) >
        < Mobile Allocation : octet (val (Length of frequency parameters) – 1)
    };
```

NOTE 1: A ‘Timing Advance index’ shall not be allocated at a Single Block allocation. A ‘TBF Starting Time’ shall be allocated at a Single Block allocation. The control bits set to fixed values to specify these requirements in a way compatible with early GPRS mobile stations in release 97.

Table 10.5.45/GSM 04.18: *IA Rest Octet* information element

Packet Uplink Assignment

The POLLING field (1 bit) indicates if the MS is being polled for a PACKET CONTROL ACKNOWLEDGEMENT.

0 ; no action is required from MS.
1 : MS shall send a PACKET CONTROL ACKNOWLEDGEMENT message in the uplink block specified by TBF Starting Time, on the assigned PDCH.

The **TFI_ASSIGNMENT** field (5 bit) is the binary representation of the Temporary Flow Identity, see GSM 04.60. Range: 0 to 31.

The **USF** field (3 bit) is the binary representation of the uplink state flag, see GSM 04.60. Range: 0 to 7.

The **USF_GRANULARITY** field (1 bit) indicates the USF granularity to be applied by the mobile station when it is assigned a TBF using Dynamic Allocation, see GSM 04.60:

0 the mobile station shall transmit one RLC/MAC block;
1 the mobile station shall transmit four consecutive RLC/MAC blocks.

The **ALLOCATION_BITMAP_LENGTH** field (5 bit) specifies the number of bits in the ALLOCATION_BITMAP. Range 0 to 31.

The **ALLOCATION_BITMAP** field (variable length field) represents uplink radio blocks, each bit representing one radio block. Each bit indicates whether the mobile station is permitted to transmit during the corresponding uplink radio block. The bitmap describes a one dimensional array of block periods, indexed as follows:

block period[z]
z = n for n = 0 to L,

where:
L = number of bits in the ALLOCATION_BITMAP - 1;
z = block period relative to TBF_STARTING_TIME;
n = bit number index into the ALLOCATION_BITMAP, range 0 to L;
TBF_STARTING_TIME indicates the first block period of the assigned allocation

The value of each bit is encoded as:

0 block period[n] is not part of the assigned allocation
1 block period[n] is part of the assigned allocation

The **CHANNEL_CODING_COMMAND** field (2 bit) indicates the coding scheme to be used for transmission, see GSM 05.03:

0 0 coding scheme 1, CS-1;
0 1 coding scheme 2, CS-2;
1 0 coding scheme 3, CS-3;
1 1 coding scheme 4, CS-4.

The **TLLI_BLOCK_CHANNEL_CODING** field (1 bit) indicates the channel coding to be used for RLC data block comprising TLLI for contention resolution:

0 mobile station shall use CS-1 in GPRS TBF mode or MCS-1 in EGPRS TBF mode;
1 mobile station shall use coding scheme as specified by the corresponding CHANNEL CODING COMMAND or EGPRS CHANNEL CODING COMMAND field.

The **ALPHA** field (4 bit) is the binary representation of the parameter α for MS output power control, see GSM 05.08:

0 0 0 0 $\alpha = 0.0$
0 0 0 1 $\alpha = 0.1$
: :
1 0 1 0 $\alpha = 1.0$
All other values are reserved.

The **GAMMA** field (5 bit) is the binary representation of the parameter Γ_{CH} for MS output power control in units of 2 dB, see GSM 05.08.

The **TA_INDEX** field (4 bit) is the binary representation of the timing advance index (TAI), see GSM 05.10 and GSM 04.04. Range: 0 to 15.

The **TBF_STARTING_TIME** field (16 bit) defines a starting time for the packet uplink assignment. The TBF starting time is coded using the same coding as the V format of the type 3 information element *Starting Time* (10.5.2.38).

P0 **(4 bit field)**
For description and encoding, see the Packet Uplink Assignment message in GSM 04.60.

BTS_PWR_CTRL_MODE (1 bit field)
For description and encoding, see the Packet Uplink Assignment message in GSM 04.60.

PR_MODE (1 bit field)
For description and encoding, see the Packet Uplink Assignment message in GSM 04.60.

Packet Downlink Assignment

The **TLLI** field (32 bit) is the binary representation of a TLLI. The coding of TLLI is left open for each administration using the structure specified in TS 23.003.

The **TFI_ASSIGNMENT** field (5 bit) is the binary representation of the Temporary Flow Identity, see GSM 04.60. Range: 0 to 31.

The **RLC_MODE** field (1 bit) indicates the RLC mode, see GSM 04.60:

0 RLC acknowledged mode;
1 RLC unacknowledged mode.

The **ALPHA** field (4 bit) and the **GAMMA** field (5 bit) are the binary representations of the respective parameters α and Γ_{CH} for MS output power control, see *Packet Uplink Assignment* construction.

The POLLING field (1 bit) indicates if the MS is being polled for a PACKET CONTROL ACKNOWLEDGEMENT.

0 ; no action is required from MS.
1 : MS shall send a PACKET CONTROL ACKNOWLEDGEMENT message in the uplink block specified by TBF Starting Time, on the assigned PDCH.

The TA_VALID field (1 bit) indicates the validity of the timing advance value given in the *Timing Advance* IE.

0 the timing advance value is not valid ;
1 the timing advance value is valid.

The **TIMING_ADVANCE_INDEX** field (4 bit) is the binary representation of the timing advance index (TAI), see GSM 05.10 and GSM 04.04. Range: 0 to 15.

The **TBF_STARTING_TIME** field (16 bit) defines a starting time for the packet downlink assignment. The TBF starting time is coded using the same coding as the V format of the type 3 information element *Starting Time* (10.5.2.38).

P0 **(4 bit field)**
For description and encoding, see the Packet Uplink Assignment message in GSM 04.60.

BTS_PWR_CTRL_MODE (1 bit field)
For description and encoding, see the Packet Uplink Assignment message in GSM 04.60.

PR_MODE (1 bit field)
For description and encoding, see the Packet Uplink Assignment message in GSM 04.60.

Second Part Packet Assignment

The presence of the Second Part Packet Assignment is the indication that this message is the second message of two IMMEDIATE ASSIGNMENT messages in an assignment of an uplink or downlink Temporary Block Flow (TBF).

Frequency parameters, before time

Length of frequency parameters (6 bit field)
This field is coded as the binary representation of the number of octets occupied by the frequency parameters, before time field. If this length is 0, the frequency parameters, before time is not present.

The **MAIO** field (6 bit field) is coded as the binary representation of the mobile allocation index offset. Range: 0 to 63.

The **Mobile Allocation** field (k octet field (k = Length of frequency parameters –1) contains a bitmap referring to the *Cell Channel Description* IE in SI 1 message. The length of the bitmap is 8k, where k = ((NF-1) div 8 + 1) and where NF denotes the number of ARFCNs contained in the cell channel description. The different bit positions in the mobile allocation bitmap are assigned indices i = 1 to 8k, starting with i = 8k in the most significant bit position and ending with i = 1 in the least significant bit position. The bit position with index i corresponds to the i'th frequency in the cell channel description arranged in ascending order of ARFCN (except that ARFCN = 0, if included, is put last) and numbered from 1 to NF. Each bit position in the mobile allocation bitmap is coded:

0 RF channel not belonging to mobile allocation;
1 RF channel belonging to mobile allocation.

If NF mod 8 <> 0, then bit positions i = NF+1 to 8k shall each be coded with a "0".

EGPRS Window Size IE
This field is encoded as the EGPRS window size IE in the PACKET DOWNLINK ASSIGNMENT message in GSM 04.60.

LINK_QUALITY_MEASUREMENT_MODE (2 bit field)
This field is encoded as the LINK_QUALITY_MEASUREMENT_MODE **in the PACKET DOWNLINNK ASSIGNMENT message in GSM 04.60.**

ACCESS TECHNOLOGY TYPE

This field indicates the access technology that is requested from the mobile station. The field is coded according to the definition in GSM 24.008. The access technology types requested from the MS in the Access Technologies Request structure shall be classified by priority, the most important first. The MS shall reply using the same order.

NUMBER OF RADIO BLOCKS ALLOCATED (2 bit field)

Bits

1 0

0 0 1 radio block reserved for uplink transmission

0 1 2 radio blocks reserved for uplink transmission

1 0 reserved for future use

1 1 reserved for future use

EGPRS Modulation and Coding Scheme

The EGPRS Modulation and Coding Scheme information element is defined in GSM 04.60.

BEP_PERIOD2 (4 bit field)

This field contains a constant which is used for filtering channel quality measurements in EGPRS. BEP_PERIOD2 when present shall be used instead of BEP_PERIOD. For details see GSM 05.08.

Range: 0 to 15

Resegment

The Resegment information element is defined in GSM 04.60.

BEP_PERIOD2 (4 bit field)

This field is encoded as the BEP_PERIOD2 in the PACKET DOWNLINK/UPLINK ASSIGNMENT messages in GSM 04.60

10.5.2.17 IAR Rest Octets

The *IAR Rest Octets* information element contains only spare bits. Its purpose is to allow the upward compatible introduction of new information on the AGCH in later phases.

The *IAR Rest Octets* information element is a type 5 information element with 3 octets length.

```
<IAR Rest Octets> ::=
        <spare padding> ;
```

Figure 10.5.44/GSM 04.18: *IAR Rest Octets* information element

10.5.2.18 IAX Rest Octets

The *IAX Rest Octets* information element contains only spare bits only. Its purpose is to allow the upward compatible introduction of new information on the AGCH in later phases.

The *IAX Rest Octets* information element is a type 5 information element with 0-4 octets length.

```
<IAX Rest Octets> ::=
        <spare padding> ;
```

Figure 10.5.45/GSM 04.18: *IAX Rest Octets* information element

10.5.2.19 L2 Pseudo Length

The *L2 Pseudo Length* information element indicates the number of octets following it in the message which are to be interpreted in the scope of the phase 1 protocol, i.e. the total number of octets (excluding the Rest Octets) for which T, V, TV, LV, or TLV formatting is used (reference Table 11.1/TS 24.007).

The *L2 Pseudo Length* information element is the first part of e.g. SYSTEM INFORMATION messages which are mentioned as exceptions in section 10.1. It occupies the first octet of such messages.

For any of the SYSTEM INFORMATION messages sent on the BCCH, a mobile station should ignore the contents of the L2 Pseudo Length value contained in the *L2 Pseudo Length* information element. For some specific messages, further requirements are specified in section 9.

The *L2 Pseudo Length* Information element is an element with 2 octets length:

8	7	6	5	4	3	2	1	
	L2 Pseudo Length IEI							octet 1
L2 Pseudo Length value						0	1	octet 2

Figure 10.5.46/GSM 04.18: *L2 Pseudo Length* information element

Table 10.5.46/GSM 04.18: *L2 Pseudo Length* information element

L2 pseudo length value (octet 2) 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 information element occurs.

NOTE: Bits 1 and 2 are not spare.

10.5.2.19a Main DCCH Assignment Information

The *Main DCCH Assignment Information* information element is sent by the network to the mobile station to describe the main DCCH as the packet resources to be used.

The *Main DCCH Assignment Information* information element is coded as shown in tables 10.5.79a/GSM 04.18 and 10.5.79b/GSM 04.18.

The *Main DCCH Assignment Information* is a type 4 information element.

Table 10.5.79a: MAIN DCCH ASSIGNMENT INFORMATION information element

<Main DCCH Assignment Information IE > ::= < **LENGTH_IN_OCTETS** : bit(8) > < **Maximum Length** : bit(8) > < **Direction** : bit(2) > <spare padding>;

Table 10.5.79b: MAIN DCCH ASSIGNMENT INFORMATION information element details

LENGTH_IN_OCTETS (8 bit field) This field encodes the number that is equal to one eighth of the number of bits (rounded up to the next integer) in the *Main DCCH Assignment Information* IE that follows the end of this field. **MAXIMUM LENGTH** (8 bit field) This field encodes the maximum number of octets of LLC data that the mobile station has in the transmission buffer in order to be able to use the main DCCH without a request. **DIRECTION** (2 bit field) This field encodes direction on which the main DCCH is allocated as a packet resource. It is coded as follows: Bit 2 1 0 0 Reserved 0 1 Uplink only 1 0 Downlink only 1 1 Uplink and downlink

10.5.2.20 Measurement Results

The purpose of the *Measurement Results* information element is to provide the results of the measurements made by the mobile station on the serving cell and the neighbour cells.

The *Measurement Results* information element is coded as shown in figure 10.5.47/GSM 04.18 and table 10.5.47/GSM 04.18.

The *Measurement Results* is a type 3 information element with 17 octets length.

<table>
<tr><th>8</th><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th></th></tr>
<tr><td></td><td colspan="7">Measurement Results IEI</td><td>octet 1</td></tr>
<tr><td>BA-USED</td><td>DTX USED</td><td colspan="6">RXLEV-FULL-SERVING-CELL</td><td>octet 2</td></tr>
<tr><td>3G-BA-USED</td><td>MEAS-VALID</td><td colspan="6">RXLEV-SUB-SERVING-CELL</td><td>octet 3</td></tr>
<tr><td>0
spare</td><td colspan="3">RXQUAL-FULL SERVING-CELL</td><td colspan="3">RXQUAL-SUB SERVING-CELL</td><td>NO-NCELL M (high part)</td><td>octet 4</td></tr>
<tr><td colspan="2">NO-NCELL-M
(low part)</td><td colspan="6">RXLEV-NCELL 1</td><td>octet 5</td></tr>
<tr><td colspan="5">BCCH-FREQ-NCELL 1</td><td colspan="3">BSIC-NCELL 1
(high part)</td><td>octet 6</td></tr>
<tr><td colspan="3">BSIC-NCELL 1
(low part)</td><td colspan="5">RXLEV-NCELL 2
(high part)</td><td>octet 7</td></tr>
<tr><td>RXLEV NCELL 2 (low part)</td><td colspan="5">BCCH-FREQ-NCELL 2</td><td colspan="2">BSIC-NCELL 2
(high part)</td><td>octet 8</td></tr>
<tr><td colspan="4">BSIC-NCELL 2
(low part)</td><td colspan="4">RXLEV-NCELL 3
(high part)</td><td>octet 9</td></tr>
<tr><td colspan="2">RXLEV-NCELL 3
(low part)</td><td colspan="5">BCCH-FREQ-NCELL 3</td><td>BSIC-NCELL 3 (high part)</td><td>octet 10</td></tr>
<tr><td colspan="5">BSIC-NCELL 3
(low part)</td><td colspan="3">RXLEV-NCELL 4
(high part)</td><td>octet 11</td></tr>
</table>

<table>
<tr><td colspan="3">RXLEV-NCELL 4
(low part)</td><td colspan="5">BCCH-FREQ-NCELL 4</td><td>octet 12</td></tr>
<tr><td colspan="6">BSIC-NCELL 4</td><td colspan="2">RXLEV-NCELL 5
(high part)</td><td>octet 13</td></tr>
<tr><td colspan="4">RXLEV-NCELL 5
(low part)</td><td colspan="4">BCCH-FREQ-NCELL 5
(high part)</td><td>octet 14</td></tr>
<tr><td>BCCH-FREQ-NCELL 5 (low part)</td><td colspan="6">BSIC-NCELL 5</td><td>RXLEV NCELL 6 (high part)</td><td>octet 15</td></tr>
<tr><td colspan="5">RXLEV-NCELL 6
(low part)</td><td colspan="3">BCCH-FREQ-NCELL 6
(high part)</td><td>octet 16</td></tr>
<tr><td colspan="2">BCCH-FREQ-NCELL 6
(low part)</td><td colspan="6">BSIC-NCELL 6</td><td>octet 17</td></tr>
</table>

Figure 10.5.47/GSM 04.18: *Measurement Results* information element (continued)

Table 10.5.47/GSM 04.18: *Measurement Results* information element

BA-USED (octet 2), the value of the BA-IND field of the neighbour cells description information element or elements defining the BCCH allocation used for the coding of BCCH-FREQ-NCELL fields. Range 0 to 1.

DTX-USED (octet 2) This bit indicates whether or not the mobile station used DTX during the previous measurement period.

Bit 7
0 DTX was not used
1 DTX was used

RXLEV-FULL-SERVING-CELL and RXLEV-SUB-SERVING-CELL, (octets 2 and 3) Received signal strength on serving cell, measured respectively on all slots and on a subset of slots (see GSM 05.08)

The RXLEV-FULL-SERVING-CELL and RXLEV-SUB-SERVING-CELL fields are coded as the binary representation of a value N. N corresponds according to the mapping defined in GSM 05.08 to the received signal strength on the serving cell.

Range: 0 to 63

MEAS-VALID (octet 3)
This bit indicates if the measurement results for the dedicated channel are valid or not

Bit 7
0 The measurement results are valid
1 the measurement results are not valid

3G-BA-USED (octet 3)
The value of the 3G-BA-IND field of the neighbour cells description information element or elements defining the BCCH allocation used for the coding of 3G BCCH-FREQ-NCELL fields. Range 0 to 1.

RXQUAL-FULL-SERVING-CELL and RXQUAL-SUB-SERVING-CELL (octet 4)
Received signal quality on serving cell, measured respectively on all slots and on a subset of the slots (see TS. GSM 05.08)

CELL fields are coded as the binary representation of the received signal quality on the serving cell.

Range: 0 to 7 (See GSM 05.08)

NO-NCELL-M, Number of neighbouring cell measurements (octets 4 and 5)

Bits

1 8 7

0 0 0 No neighbour cell measurement result

0 0 1 1 " " " "

0 1 0 2 " " " "

0 1 1 3 " " " "

1 0 0 4 " " " "

1 0 1 5 " " " "

1 1 0 6 " " " "

1 1 1 Neighbour cell information not available for serving cell

RXLEV-NCELL i, Result of measurement on the i'th neighbouring cell (octet 5, 7, 8, 9, 10, 11, 12, 13, 14, 15 and 16)

If the i'th neighbouring cell is a GSM RAT cell, the RXLEV-NCELL field is coded as the binary representation of a value N. N corresponds according to the mapping defined in TS. GSM 05.08 to the received signal strength on the i'th neighbouring cell. See note 1 & 2.

10.5.2.20a GPRS Measurement Results

The purpose of the *GPRS Measurement Results* information element is to provide the results of the GPRS measurements made by the GPRS mobile station on the serving cell.

The *GPRS Measurement Results* information element is coded as shown in figure 10.5.48/GSM 04.18 and table 10.5.48/GSM 04.18.

The *GPRS Measurement Results* is a type 3 information element with 3 octets length.

8	7	6	5	4	3	2	1	
	GPRS Measurement Results IEI							octet 1
C_VALUE						RXQUAL (high part)		octet 2
RXQ-L (low)	0 spare	SIGN_VAR						octet 3

Figure 10.5.48/GSM 04.18: *GPRS Measurement Results* information element

Table 10.5.48/GSM 04.18: *GPRS Measurement Results* information element

C_VALUE (octet 1), the value of the C parameter calculated by the GPRS mobile station (see GSM 05.08). This field is encoded as the binary representation of the C parameter value defined in GSM 05.08. Range 0 to 63.
RXQUAL (octets 1 and 2), contains the RXQUAL parameter field calculated by the GPRS mobile station (see GSM 05.08). This field is encoded as defined in GSM 05.08. Range 0 to 7.
SIGN_VAR (octet 3), contains the signal variance parameter SIGN_VAR calculated by the mobile station (see GSM 05.08). This field is encoded as defined in GSM 04.60.

10.5.2.21 Mobile Allocation

The purpose of the *Mobile Allocation* information element is to provide that part of the RF channels belonging to the cell allocation (coded with a "1" in the cell channel description information element) which is used in the mobile hopping sequence.

The *Mobile Allocation* information element is coded as shown in figure 10.5.49/GSM 04.18 and table 10.5.49/GSM 04.18.

The *Mobile Allocation* is a type 4 information element with 3 to 10 octets length except for the cases specified in section 9.1.18.1 and 9.1.19.2.

8	7	6	5	4	3	2	1	
	Mobile Allocation IEI							octet 1
Length of mobile allocation contents								octet 2
MA C 8n	MA C 8n-1	MA C 8n-2	MA C 8n-3	MA C 8n-4	MA C 8n-5	MA C 8n-6	MA C 8n-7	octet 3
MA C 008	MA C 007	MA C 006	MA C 005	MA C 004	MA C 003	MA C 002	MA C 001	octet n+2

Figure 10.5.49/GSM 04.18: *Mobile Allocation* information element

Table 10.5.49/GSM 04.18: *Mobile Allocation* information element

```
MA  C  i,  Mobile  allocation RF channel i (octet 3
etc.), i = 1, 2,..., NF
The MA C i bit indicates whether or not the Mobile
allocation frequency list includes the  i'th
frequency in the cell allocation frequency list.
The cell allocation frequency list is derived from
the set of frequencies defined by the reference cell
channel description information element. NF denotes
the number of frequencies in the cell allocation
frequency list.
In the cell allocation frequency list the absolute
RF channel numbers are placed in increasing order of
ARFCN, except that ARFCN 0, if included in the set,
is put in the last position in the list,

For  a RF channel belonging to the mobile allocation
the  MA  C  i bit is coded with a "1"; i = 1, 2,...,
NF.

For  a  RF  channel  not  belonging  to  the  mobile
allocation  the  MA C i bit is coded with a "0"; i =
1, 2,..., NF.

If  NF mod 8 <> 0 then bits NF to 8n in octet 3 must
be coded with a "0" in each.
```

10.5.2.21a Mobile Time Difference

A *Mobile Time Difference* information element encodes a time related to the synchronization difference between the time bases of two base stations. This type of information is used in conjunction with the HANDOVER COMPLETE message.

The *Mobile Time Difference* information element is coded as shown in figure 10.5.50/GSM 04.18 and table 10.5.50/GSM 04.18.

The *Mobile Time Difference* information element is a type 4 information element with 5 octets length.

8	7	6	5	4	3	2	1	
	Mobile Time Difference IEI							Octet 1
Length of Mobile Time difference contents								Octet 2
Mobile Time Difference value (high)								Octet 3
Mobile Time Difference value (contd)								Octet 4
Mobile Time Difference value (low)					0 spare	0 spare	0 spare	Octet 5

Figure 10.5.50/GSM 04.18: *Mobile Time Difference* information element

Table 10.5.50/GSM 04.18: *Mobile Time Difference* information element

Mobile Time Difference value (octet 3, 4 and 5) The coding of the Mobile Time Difference value field is the binary representation of the time difference in half bit periods and modulo 2^{21} half bit periods; 1/2 bit period = 24/13 µs.

10.5.2.21aa MultiRate configuration

The *MultiRate configuration* information element gives all parameters related to a multi-rate speechcodec.

The *MultiRate configuration* information element is coded as shown in figure 10.5.2.47/GSM 04.18 and table 10.5.2.47/GSM 04.18.

The MultiRate *configuration* is a type 4 information element with a minimum length of 4 octets and a maximum length of 8 octets.

8	7	6	5	4	3	2	1	
Multirate speech configuration IEI								octet 1
Length								octet 2
MR version			spare	ICMI	spare	Start mode		octet 3
Parameters for multirate speech								octet 4 . . octet n

Figure 10.5.2.47/GSM 04.18: MultiRate *configuration* information element

8	7	6	5	4	3	2	1	
Set of AMR codec modes								octet 4

Figure 10.5.2.47a/GSM 04.18: Parameters for multirate speech field for the MR version 1 when a set with one codec mode is chosen

8	7	6	5	4	3	2	1	
Set of AMR codec modes								octet 4
Spare 0	0	Threshold 1						octet 5
Hysteresis 1				Spare 0	0	0	0	octet 6

Figure 10.5.2.47b/GSM 04: Parameters for multirate speech field for the MR version 1 when a set with two codec modes is chosen

8	7	6	5	4	3	2	1	
Set of AMR codec modes								octet 4
Spare 0	0	Threshold 1						octet 5
Hysteresis 1				Threshold 2				octet 6
Threshold 2 (cont.)		Hysteresis 2				Spare 0	0	octet 7

Figure 10.5.2.47c/GSM 04.18: Parameters for multirate speech field for the MR version 1 when a set of three codec modes is chosen

8	7	6	5	4	3	2	1	
Set of AMR codec modes								octet 4
Spare 0	0	Threshold 1						octet 5
Hysteresis 1				Threshold 2				octet 6
Threshold 2 (cont.)		Hysteresis 2				Threshold 3		octet 7
Threshold (3)				Hysteresis 3				octet 8

Figure 10.5.2.47d/GSM 04.18: Parameters for multirate speech field for the MR version 1 when a set of four modes is chosen

Table 10.5.2.47/GSM 04.18: *MultiRate configuration* information element

Octet 3 Bits **8 7 6**	**Multirate speech version**
0 0 1	Adaptive Multirate speech version 1
Other values reserved	
Bit 5 0	Spare
Bit 4	Initial Codec Mode Indicator
0	The initial codec mode is defined by the implicit rule provided in GSM 05.09
1	The initial codec mode is defined by the Start Mode field
Bit **3**	
0	Spare
Bits 2 1	Start Mode,
	The initial codec mode is coded as in GSM 05.09 section 3.4.1
When Multirate speech version field indicates Adaptive Multirate speech version 1 then the remaining fields are coded as follows: THRj (6 bits), is coded as the binary representation of a value N. N corresponds to the threshold of C/I in dB, as defined in GSM 05.09; HYSTj (4 bits) is coded as the binary representation of the hysteresis value associated to THRj, as defined in GSM 05.09. j = 1 corresponds to the lowest value of threshold in dB, j = 2 to the second lowest, j = 3 to the highest value.	

Set of adaptive multirate codec modes field (octet 4) Bit **8** 0 12,2 kbit/s codec rate is not part of the subset; 1 12,2 kbit/s codec rate is part of the subset; Bit **7** 0 10,2 kbit/s codec rate is not part of the subset; 1 10,2 kbit/s codec rate is part of the subset; Bit **6** 0 7,95 kbit/s codec rate is not part of the subset; 1 7,95 kbit/s codec rate is part of the subset; Bit **5** 0 7,40 kbit/s codec rate is not part of the subset; 1 7,40 kbit/s codec rate is part of the subset; Bit **4** 0 6,70 kbit/s codec rate is not part of the subset; 1 6,70 kbit/s codec rate is part of the subset; Bit **3** 0 5,90 kbit/s codec rate is not part of the subset; 1 5,90 kbit/s codec rate is part of the subset; Bit **2** 0 5,15 kbit/s codec rate is not part of the subset; 1 5,15 kbit/s codec rate is part of the subset; Bit **1** 0 4,75 kbit/s codec rate is not part of the subset; 1 4,75 kbit/s codec rate is part of the subset;

10.5.2.21b Multislot Allocation

The purpose of the *Multislot Allocation* information element is to provide a description of which channels are used in downlink and uplink respectively, in a multislot configuration. It also groups the channels into channel sets, the channel mode for each channel set can be defined by a separate information element.

The *Multislot Allocation* information element is coded as shown in figure 10.5.51/GSM 04.18 and table 10.5.51/GSM 04.18.

The multislot allocation information element is a type 4 information element with a minimum length of 3 octets and a maximum length of 12 octets.

8	7	6	5	4	3	2	1	
	Multislot alloction IEI							octet 1
Length of the multislot allocation contents								octet 2
0/1 ext	DA 7	DA 6	DA 5	DA 4	DA 3	DA 2	DA 1	octet 3
1 ext	UA 7	UA 6	UA 5	UA 4	UA 3	UA 2	UA 1	octet 3a
Channel set 1								octet 4*
Channel set 2								octet 5*
. . .								
Channel set 8								octet 11*

Figure 10.5.51/GSM 04.18: *Multislot Allocation* information element

Table 10.5.51/GSM 04.18: *Multislot allocation* information element

```
DA 1-7, Downlink assignment (octet 3)

Indicates additional downlink channel allocation.
If bit DA n is set to "1" this indicates that
timeslot TN = (n + TNm)mod8 is assigned. If bit DA n
is set to "0" the corresponding timeslot is not
assigned. TNm is the timeslot number of the main
link.

UA 1-7, Uplink assignment (octet 3a)

Indicates additional uplink channel allocation.
If bit UA n is set to "1" this indicates that
timeslot TN = (n + TNm)mod8 is assigned. If bit UA n
is set to "0" the corresponding timeslot is not
assigned. TNm is the timeslot number of the main
link.

If octet 3a is not included the timeslots indicated
by octet 3 are allocated in both downlink and uplink
direction.

Note1: Allocation of timeslots only in uplink is FFS.
Note2: In combination with the channel description
       IE, all types of channels can be indicated.
       The channel carrying the main signalling link
       (indicated by the channel description IE is of
       type 1 (see below)), all other channels
       allocated both in downlink and uplink are of
       type 2 and channels with allocation in only
       one direction are of type 3.

   Type 1:  TCH/F + FACCH/F + SACCH/M  bidirectional
   Type 2:  TCH/F + SACCH/M            bidirectional
   Type 3:  TCH/F + SACCH/M           unidirectional


Channel set n (octet 4 to 11 (if included))
If octets 4-11 are omitted, all channels belong
to channel set 1.

If bit m of Channel set n is set to "1" then timeslot
m-1 is included in channel set n.
If bit m of Channel set n is set to "0" then timeslot
m-1 is not included in channel set n.

Each allocated timeslot, including the timeslot
carrying the main signalling link, shall be included
in one (and only one) channel set.
```

10.5.2.21c NC mode

The purpose of the *NC mode* information element is for the network to inform the mobile station of the NC mode to be implemented on the target cell.

The *NC mode* information element is coded as shown in figure 10.5.52/GSM 04.18 and table 10.5.52/GSM 04.18.

The *NC mode* is a type 1 information element.

8	7	6	5	4	3	2	1	
	NC mode IEI			0 spare	0	NC mode		octet 1

Figure 10.5.52 /GSM 04.18: *NC mode* information element

Table 10.5.52/GSM 04.18: *NC Mode* information element

```
NC mode
This field indicates to the mobile the NC mode for
the target cell (see GSM 04.60). The field is encoded
according to the following table:
bits
2 1
0 0  NC 0
0 1  NC 1
1 0  NC 2
1 1  information on NC mode to be gathered from the
      target cell
```

10.5.2.22 Neighbour Cells Description

The purpose of the *Neighbour Cells Description* information element is to provide the absolute radio frequency channel numbers of the BCCH carriers to be monitored by the mobile stations in the cell.

The *Neighbour Cells Description* information element is coded as the *Cell Channel Description* information element, as specified in section 10.5.2.1b, with the exception of bits 5 and 6 of octet 2. figure 10.5.53/GSM 04.18 and table 10.5.53/GSM 04.18 contains the difference of specifications.

The *Neighbour Cells Description* information element is a type 3 information element with 17 octets length.

8	7	6	5	4	3	2	1	
	Neighbour Cells Description IEI							octet 1
Bit 128	Bit 127	EXT-IND	BA-IND	Bit 124	Bit 123	Bit 122	Bit 121	octet 2
Bit 120	Bit 119	Bit 118	Bit 117	Bit 116	Bit 115	Bit 114	Bit 113	octet 3
Bit 008	Bit 007	Bit 006	Bit 005	Bit 004	Bit 003	Bit 002	Bit 001	octet 17

Figure 10.5.53/GSM 04.18: *Neighbour Cells Description* information element

Table 10.5.53/GSM 04.18: *Neighbour Cells Description* information element

EXT-IND, Extension indication (octet 2, bit 6) If received in System Information 2, 2bis, 5 or 5bis this bit indicates whether the information element carries the complete information of a BCCH channel sub list or whether a complementary information element is sent in another message. A GSM 900 mobile station which only supports the primary GSM band P-GSM 900 (cf. GSM 05.05) may consider this bit as a spare bit and assume that the information element carries the complete BA, see section 3.2.2.1. NOTE: This indicator is set to 1 in the neighbour cells description information elements in System Information 2 and 2bis and 5 and 5bis respectively when more than one is needed to describe a BCCH channel sub list. Bit 6 0 The information element carries the complete BA 1 The information element carries only a part of the BA BA-IND, BCCH allocation sequence number indication (octet 2). Range 0 to 1 The BA-IND is needed to allow the network to discriminate measurements results related to different BAs (e.g. BA(BCCH) and BA(SACCH)) sent to the MS.

10.5.2.22a Neighbour Cells Description 2

The purpose of the *Neighbour Cells Description 2* information element is to provide the absolute radio frequency channel numbers of the BCCH carriers to be monitored by the mobile stations in the cell.

The *Neighbour Cells Description 2* information element is coded as the *Cell Channel Description* information element, as specified in section 10.5.2.1b, with the exception of bits 5 to 7 of octet 2. figure 10.5.54/GSM 04.18 and table 10.5.54/GSM 04.18 contains the difference of specifications.

The *Neighbour Cells Description 2* information element is a type 3 information element with 17 octets length.

8	7	6	5	4	3	2	1	
	Neighbour Cells Description IEI							octet 1
Bit 128	Multiband reporting		BA-IND	Bit 124	Bit 123	Bit 122	Bit 121	octet 2
Bit 120	Bit 119	Bit 118	Bit 117	Bit 116	Bit 115	Bit 114	Bit 113	octet 3
Bit 008	Bit 007	Bit 006	Bit 005	Bit 004	Bit 003	Bit 002	Bit 001	octet 17

Figure 10.5.54/GSM 04.18: *Neighbour Cells Description* 2 information element

Table 10.5.54/GSM 04.18: *Neighbour Cells Description 2* information element

Octet 2 bit 8, 4, 3 and 2 FORMAT-ID, Format Identifier (Bit 128 and next) The different formats are distinguished by the bits of higher number. As an exception to the general format for the neighbour cell description the format ID is coded as follows : Bit Bit Bit Bit format notation **128 124 123 122** 0 X X X bit map 0 1 0 X X 1024 range 1 1 0 0 512 range 1 1 0 1 256 range 1 1 1 0 128 range 1 1 1 1 variable bit map Bits 6 and 7 of Octet 2 Multiband reporting Binary encoding of multiband reporting parameter as specified in GSM 05.08. Range: 0 to 3 Bit 5 of octet 2 BA-IND, BCCH allocation sequence number indication. The BA-IND is needed to allow the network to discriminate measurements results related to different BAs (e.g. BA(BCCH) and BA(SACCH)) sent to the MS. Range 0 to 1.

10.5.2.22b Spare

10.5.2.22c NT/N Rest Octets

The *NT/N Rest Octets* information element is a type 5 information element with 20 octets length.

NT/N Rest Octets ::= {0 I 1<NLN(PCH) : bit (2)>} <list of Group Call NCH information> <Spare padding>; <List of Group Call NCH information> ::= 0 | 1 <Group Call information> <List of Group Call NCH information> ; NLN(PCH) This field gives the NLN value to be used as specified in 3.3.3 <Group Call information> See clause 9.1.21a

10.5.2.23 P1 Rest Octets

The *P1 Rest Octets* information element contains information about the status of information on an existing NCH, priority levels and packet page indications applied for mobile station identities and spare bits.

The *P1 Rest Octets* information element is a type 5 information element with 0-17 octets length.

```
{   <P1 Rest Octets> ::=
    {L I H <NLN(PCH) : bit (2)> <NLN status : bit>}
    {L I H <Priority1 ::= Priority>}
    {L I H <Priority2 ::= Priority>}
    {L | H <Group Call information>}
    < Packet Page Indication 1 : {L | H} >
    < Packet Page Indication 2 : {L | H} >
    <spare padding>;
}   -- truncation allowed, bits 'L' assumed

<Priority> ::= <bit (3)>;

<Group Call information>
See clause 9.1.21a
```

NOTE 1: The value 17h shall not be used as a value of the first octet when this information element is used in the PAGING REQUEST TYPE 1 message. This will prevent mobile stations misinterpreting this information as the Mobile Identity IEI.

Table 10.5.55/GSM 04.18: *P1 Rest Octets* information element

NLN(PCH) Notification List Number The presence of the *NLN(PCH)* field indicates that if an NCH is present, reduced NCH monitoring can be used, and gives the NLN(PCH) value, to be used as specified in 3.3.3. **Priority**: **Priority i** relates to *Mobile Station Identity i* (i = 1, 2) 0 0 0 no priority applied 0 0 1 call priority level 4 0 1 0 call priority level 3 0 1 1 call priority level 2 1 0 0 call priority level 1 1 0 1 call priority level 0 1 1 0 call priority level B 1 1 1 call priority level A The **Packet Page Indication i** field relates to *Mobile Station Identity i* (i = 1, 2) and indicates the kind of paging procedure associated with the mobile station identity. If the identity is not IMSI the Packet Page Indication has no meaning and is ignored. L paging procedure for RR connection establishment; H packet paging procedure.

10.5.2.24 P2 Rest Octets

The *P2 Rest Octets* information element contains information on the channel needed by the network and information about the status of information on an existing NCH, priority levels and packet page indications applied for mobile station identities and spare bits.

The *P2 Rest Octets* information element is a type 5 information element with 1-11 octets length.

```
{   <P2 Rest Octets> ::=
    {L I H <CN3: bit (2)>}
    {L I H <NLN : bit (2)> <NLN status : bit>}
    {L I H <Priority1 ::= Priority>}
    {L I H <Priority2 ::= Priority>}
    {L I H <Priority3 ::= Priority>}
    < Packet Page Indication 3 : {L | H} >
    <spare padding>;
}   -- truncation allowed, bits 'L' assumed

<Priority> ::= <bit(3)>;
```

NOTE 1: The value 17h shall not be used as a value of the first octet when this information element is used in the PAGING REQUEST TYPE 2 message. This will prevent mobile stations misinterpreting this information as the Mobile Identity IEI.

Table 10.5.56/GSM 04.18: *P2 Rest Octets* information element

CN3 Channel Needed for Mobile Identity 3
The values and semantics used in the *CN3* field are those of the CHANNEL field of *Channel Needed* IE (see 10.5.2.8). The *CN3* field is associated with the Mobile Identity 3 IE of the PAGING REQUEST TYPE 2 message.

If the *CN3* field is not present, the default value is 00 (any channel).

NLN Notification List Number
See P1 Rest Octets.

Priority: **Priority i** relates to *Mobile Station Identity i* (i = 1, 2, 3)

0 0 0	no priority applied
0 0 1	call priority level 4
0 1 0	call priority level 3
0 1 1	call priority level 2
1 0 0	call priority level 1
1 0 1	call priority level 0
1 1 0	call priority level B
1 1 1	call priority level A

The **Packet Page Indication 3** field relates to *Mobile Station Identity 3* and indicates the kind of paging procedure associated with the mobile station identity. If the identity is not IMSI the Packet Page Indication has no meaning and is ignored.

L	paging procedure for RR connection establishment;
H	packet paging procedure.

10.5.2.25 P3 Rest Octets

The *P3 Rest Octets* information element contains information on the channel needed by the network and information about the status of information on an existing NCH, priority levels applied for mobile station identities and spare bits. The purpose of the spare bits is to allow the upward compatible introduction of new information on the PCH in later phases.

The *P3 Rest Octets* information element is a type 5 information element with 3 octets length.

```
<P3 Rest Octets> ::=
    {L | H <CN3 : bit (2)> <CN4 : bit (2)>}
    {L | H <NLN : bit (2)> <NLN status : bit>}
    {L | H <Priority1 ::= Priority>}
    {L | H <Priority2 ::= Priority>}
    {L | H <Priority3 ::= Priority>}
    {L | H <Priority4 ::= Priority>}
    <spare padding>;

<Priority> ::= <bit(3)>;
```

Table 10.5.57/GSM 04.18: *P3 Rest Octets* information element

```
CN3  Channel Needed for Mobile Identity 3
The values and semantics used in the CN3 field are those
of the CHANNEL field of Channel Needed IE (see 10.5.2.8).
The CN3 field is associated with the Mobile Identity 3
IE of the PAGING REQUEST TYPE 3 message.

If the CN3 field is not present, the default value is
00 (any channel)

CN4  Channel Needed for Mobile Identity 4
The values and semantics used in the CN43 field are those
of the CHANNEL field of Channel Needed IE (see 10.5.2.8).
The CN4 field is associated with the Mobile Identity 4
IE of the PAGING REQUEST TYPE 3 message.

If the CN4 field is not present, the default value is
00 (any channel)


NLN   Notification List Number
See P1 Rest Octets

Priority: Priority i relates to Mobile Station Identity i
          i (i = 1,2,3,4)

0 0 0    no priority applied
0 0 1    call priority level 4
0 1 0    call priority level 3
0 1 1    call priority level 2
1 0 0    call priority level 1
1 0 1    call priority level 0
1 1 0    call priority level B
1 1 1    call priority level A
```

10.5.2.25a Packet Channel Description

The purpose of the *Packet Channel Description* information element is to provide a description of a packet data physical channel (PDCH).

The *Packet Channel Description* information element is coded according to the syntax specified below and described in table 10.58/GSM 04.18.

The *Packet Channel Description* is a type 3 information element with 4 octets length.

```
< Packet Channel Description > ::=
    < Channel type : bit (5) >
    < TN : bit (3) >
    < TSC : bit (3) >
    { 0
        { 0 < spare bit >
            < ARFCN : bit (10) >                    -- non-hopping RF channel configuraion
         | 1 < spare bit >
            < MAIO : bit (6) >                      -- indirect encoding of hopping RF channel configuration
            < MA_NUMBER_IND : bit >
            { 0  < spare bits : bit (2) >
            | 1  < CHANGE_MARK_1 : bit (2) >
            }
        }
    | 1
        < MAIO : bit (6) >                          -- direct encoding of hopping RF channel configuration
        < HSN : bit (6) >
    };
```

Table 10.5.58/GSM 04.18: *Packet Channel Description* information element

The **Channel type** field (5 bit) shall be ignored by the receiver and all bits treated as spare. For backward compatibility reasons, the sender shall set the spare bits to binary ‘00001’.

The **TN** field (3 bit) is the binary representation of the timeslot number as defined in GSM 05.10. Range: 0 to 7

The **TSC** field (3 bit) is the binary representation of the training sequence code as defined in GSM 05.02.
Range: 0 to 7.

Non-hopping RF channel configuration
The **ARFCN** field (10 bit) is the binary representation of the absolute RF channel number, see GSM 05.05.
Range: 0 to 1023.

Indirect encoding of hopping RF channel configuration
The **MAIO** field (6 bit) is the binary representation of the mobile allocation index offset, see GSM 05.02.
Range: 0 to 63.

The **MA_NUMBER_IND** field (1 bit) is the binary representation of the MA_NUMBER to use as reference to a GPRS mobile allocation:

0	MA_NUMBER = 14
1	MA_NUMBER = 15

The **CHANGE_MARK_1** field (2 bit) is the binary representation of the allowed value of the SI *change mark* associated with the GPRS mobile allocation to which the MA_NUMBER refers. Range: 0 to 3.

If the *indirect encoding* is used, this information element may contain the CHANGE_MARK_1 field. If that is present, the mobile station being assigned the TBF shall verify the validity of the SI *change mark* associated with the GPRS mobile allocation to which this information element refers, see GSM 04.60. The CHANGE_MARK_1 field shall not be included in this information element if MA_NUMBER = 15 is used.

Direct encoding of hopping RF channel configuration
The **MAIO** field (6 bit) is the binary representation of the mobile allocation index offset, see GSM 05.02.
Range: 0 to 63.

The **HSN** field (6 bit) is the binary representation of the hopping sequence number, see GSM 05.02. Range: 0 to 63.

10.5.2.25b Dedicated mode or TBF

The *Dedicated mode or TBF* information element is used by the network to indicate to the mobile station whether the rest of the message shall be decoded as an IMMEDIATE ASSIGNMENT message allocating a channel in dedicated mode or whether the rest of the message shall be decoded as the allocation of a Temporary Block Flow.

This IE also indicates:

- whether the IMMEDIATE ASSIGNMENT message relates to a downlink TBF for a mobile station in packet idle mode; and
- whether the IMMEDIATE ASSIGNMENT message is the first message of two IMMEDIATE ASSIGNMENT messages in a two-message assignment of an uplink or downlink TBF.

The *Dedicated mode or TBF* information element is coded as shown in figure 10.5.55/GSM 04.18 and table 10.5.59/GSM 04.18.

The *Dedicated mode or TBF* is a type 1 information element.

8	7	6	5	4	3	2	1	
	Dedicated mode or TBF IEI			spare 0	TMA	down-link	T/D	octet 1

Figure 10.5.55/GSM 04.18: *Dedicated mode or TBF* information element

Table 10.5.59/GSM 04.18: *Dedicated mode or TBF* information element

T/D : TBF or dedicated mode (octet 1) Bit 1 0 this message assigns a dedicated mode resource 1 this message assigns a Temporary Block Flow (TBF). Downlink : Downlink assignment to mobile in packet idle mode Bit 2 0 No meaning 1 this message assigns a resource to the mobile station identified in the IA rest octets. The type of resource (either dedicated mode or TBF) is indicated by bit 1. TMA : Two-message assignment Bit 3 0 No meaning 1 This message is the first message of two in a two-message assignment of an uplink or downlink TBF.

10.5.2.25c RR Packet Uplink Assignment

The *RR Packet Uplink Assignment* information element is sent by the network to the mobile station to indicate the assigned uplink resources.

The *RR Packet Uplink Assignment* information element is coded as shown in tables 10.5.60/GSM 04.18 and 10.5.61/GSM 04.18.

The *RR Packet Uplink Assignment* is a type 4 information element.

Table 10.5.60: RR PACKET UPLINK ASSIGNMENT information element

```
< RR Packet Uplink Assignment IE > ::=
   < LENGTH_IN_OCTETS : bit (8) >
   < CHANNEL_CODING_COMMAND : bit (2) >
   < TLLI_BLOCK_CHANNEL_CODING : bit (1) >
   < Packet Timing Advance : Packet Timing Advance IE >
   {01 <Dynamic Allocation : Dynamic Allocation struct>
   | 10 <Single Block Allocation : Single Block Allocation struct>
   | 11 <Fixed Allocation : Fixed Allocation struct>
   | 00 <Exension>}
      {0 | 1 < EGPRS_MCS_MODE : bit (4) >
         < RESEGMENT : bit (1) >
         < EGPRS Window Size : < EGPRS Window Size IE >>}
      { 0 | 1 < Packet Extended Timing Advance : bit (2) >}
< SPARE_BITS : bit** > ;

      <Extension> : := -- Future extension can be done by modifying this structure
      null ;
<Dynamic Allocation struct > ::=
      < Extended Dynamic Allocation : bit(1)>
      {0 | 1 < P0 : bit (4) >
         < PR_MODE : bit (1) > }
      < USF_GRANULARITY : bit (1) >
      { 0 | 1 < UPLINK_TFI_ASSIGNMENT : bit (5) > }
      { 0 | 1 < RLC_DATA_BLOCKS_GRANTED : bit (8) > }
         { 0                          -- Timeslot Allocation
         { 0 | 1 < USF_TN0 : bit (3) >}
         { 0 | 1 < USF_TN1 : bit (3) >}
         { 0 | 1 < USF_TN2 : bit (3) >}
         { 0 | 1 < USF_TN3 : bit (3) >}
         { 0 | 1 < USF_TN4 : bit (3) >}
         { 0 | 1 < USF_TN5 : bit (3) >}
         { 0 | 1 < USF_TN6 : bit (3) >}
         { 0 | 1 < USF_TN7 : bit (3) >}
          | 1                         -- Timeslot Allocation with Power Control Parameters
            < ALPHA : bit (4) >
            { 0 | 1 < USF_TN0 : bit (3) >
            < GAMMA_TN0 : bit (5) > }
            { 0 | 1 < USF_TN1 : bit (3) >
            < GAMMA_TN1 : bit (5) > }
            { 0 | 1 < USF_TN2 : bit (3) >
            < GAMMA_TN2 : bit (5) > }
            { 0 | 1 < USF_TN3 : bit (3) >
            < GAMMA_TN3 : bit (5) > }
            { 0 | 1 < USF_TN4 : bit (3) >
            < GAMMA_TN4 : bit (5) > }
            { 0 | 1 < USF_TN5 : bit (3) >
            < GAMMA_TN5 : bit (5) > }
            { 0 | 1 < USF_TN6 : bit (3) >
            < GAMMA_TN6 : bit (5) >
            { 0 | 1 < USF_TN7 : bit (3) >
            < GAMMA_TN7 : bit (5) > }};

<Single Block Allocation struct > ::=
      < TIMESLOT_NUMBER : bit (3) >
      { 0 | 1 < ALPHA : bit (4) >
         < GAMMA_TN : bit (5) >}
      { 0 | 1 < P0 : bit (4) >
         < BTS_PWR_CTRL_MODE : bit (1) >
      < PR_MODE : bit (1) > } ;
<Fixed Allocation struct > ::=
      { 0 | 1 < UPLINK_TFI_ASSIGNMENT : bit (5) > }
      < FINAL_ALLOCATION : bit (1)>
      < DOWNLINK_CONTROL_TIMESLOT: bit(3)>
      { 0 | 1 < P0 : bit (4)
         < BTS_PWR_CTRL_MODE : bit (1) >
      < PR_MODE : bit (1) > }
```

```
        { 0 < TIMESLOT_ALLOCATION : bit (8) >
            | 1 < Power Control Parameters : Power Control Parameters IE > }
        < HALF_DUPLEX_MODE : bit (1) >
        { 0 { 0       -- with length of allocation bitmap
            < BLOCKS_OR_BLOCK_PERIODS : bit (1) >
            < ALLOCATION_BITMAP_LENGTH : bit (7) >
            < ALLOCATION_BITMAP : bit (val(ALLOCATION_BITMAP_LENGTH) >
            | 1       -- without length of Allocation Bitmap (fills remainder ofthis IE)
                < ALLOCATION_BITMAP : bit ** > }
            ! < Message escape : 1 bit (*) = <no string> > } ;
```

```
< RR Packet Uplink Assignment IE > ::=
            < LENGTH_IN_OCTETS : bit (8) >
            < CHANNEL_CODING_COMMAND : bit (2) >
            < TLLI_BLOCK_CHANNEL_CODING : bit (1) >
            < Packet Timing Advance : Packet Timing Advance IE >
            {01 <Dynamic Allocation : Dynamic Allocation struct>
            | 10 <Single Block Allocation : Single Block Allocation struct>
            | 11 <Fixed Allocation : Fixed Allocation struct>
            | 00 <Exension>}
                {0 | 1 < EGPRS_MCS_MODE : bit (4) >
                        < RESEGMENT : bit (1) >
                        < EGPRS Window Size : < EGPRS Window Size IE >>}
                { 0 | 1 < Packet Extended Timing Advance : bit (2) >}
< SPARE_BITS : bit** > ;

                    <Extension> : := -- Future extension can be done by modifying this structure
                    null ;
<Dynamic Allocation struct > ::=
                    < Extended Dynamic Allocation : bit(1)>
                    {0 | 1 < P0 : bit (4) >}
                    < USF_GRANULARITY : bit (1) >
                    { 0 | 1 < UPLINK_TFI_ASSIGNMENT : bit (5) > }
                    { 0 | 1 < RLC_DATA_BLOCKS_GRANTED : bit (8) > }
                        { 0                                       -- Timeslot Allocation
                        { 0 | 1 < USF_TN0 : bit (3) >}
                        { 0 | 1 < USF_TN1 : bit (3) >}
                        { 0 | 1 < USF_TN2 : bit (3) >}
                        { 0 | 1 < USF_TN3 : bit (3) >}
                        { 0 | 1 < USF_TN4 : bit (3) >}
                        { 0 | 1 < USF_TN5 : bit (3) >}
                        { 0 | 1 < USF_TN6 : bit (3) >}
                        { 0 | 1 < USF_TN7 : bit (3) >}
                        | 1                                     -- Timeslot Allocation with Power Control Parameters
                            < ALPHA : bit (4) >
                            { 0 | 1 < USF_TN0 : bit (3) >
                            < GAMMA_TN0 : bit (5) > }
                            { 0 | 1 < USF_TN1 : bit (3) >
                            < GAMMA_TN1 : bit (5) > }
                            { 0 | 1 < USF_TN2 : bit (3) >
                            < GAMMA_TN2 : bit (5) > }
                            { 0 | 1 < USF_TN3 : bit (3) >
                            < GAMMA_TN3 : bit (5) > }
                            { 0 | 1 < USF_TN4 : bit (3) >
                            < GAMMA_TN4 : bit (5) > }
                            { 0 | 1 < USF_TN5 : bit (3) >
                            < GAMMA_TN5 : bit (5) > }
                            { 0 | 1 < USF_TN6 : bit (3) >
                            < GAMMA_TN6 : bit (5) >
                            { 0 | 1 < USF_TN7 : bit (3) >
                            < GAMMA_TN7 : bit (5) > }};

<Single Block Allocation struct > ::=
                    < TIMESLOT_NUMBER : bit (3) >
                    { 0 | 1 < ALPHA : bit (4) >
                        < GAMMA_TN : bit (5) >}
                    { 0 | 1 < P0 : bit (4) >
                            < BTS_PWR_CTRL_MODE : bit (1) > } ;
<Fixed Allocation struct > ::=
```

```
{ 0 | 1 < UPLINK_TFI_ASSIGNMENT : bit (5) > }
< FINAL_ALLOCATION : bit (1)>
< DOWNLINK_CONTROL_TIMESLOT: bit(3)>
{ 0 | 1 < P0 : bit (4)
        < BTS_PWR_CTRL_MODE : bit (1) > }
{ 0 < TIMESLOT_ALLOCATION : bit (8) >
   | 1 < Power Control Parameters : Power Control Parameters IE > }
< HALF_DUPLEX_MODE : bit (1) >
{ 0 { 0      -- with length of allocation bitmap
        < BLOCKS_OR_BLOCK_PERIODS : bit (1) >
        < ALLOCATION_BITMAP_LENGTH : bit (7) >
        < ALLOCATION_BITMAP : bit (val(ALLOCATION_BITMAP_LENGTH) >
   | 1      -- without length of Allocation Bitmap (fills remainder of the information element)
        < ALLOCATION_BITMAP : bit ** > }
        ! < Message escape : 1 bit (*) = <no string> > } ;
```

Editors note: This IE has a number of differences to the contents of the PACKET UPLINK ASSIGNMENT message described in GSM 04.60:

- the PAGE_MODE is not included because this IE is sent on a DCCH, not on the PCH/AGCH;
- the Referenced Address is not included because this IE is sent in a dedicated mode message and hence has only one intended recipient;
- the CONTENTION_RESOLUTION_TLLI is not included because this IE is sent after dedicated mode contention resolution;
- the GSM 04.60 Frequency Parameters are not included because the dedicated mode message(s) carry this information in other information elements (eg Mobile Allocation);
- the TBF_STARTING_TIME is not included because it duplicates the information in the *Starting Time* IE;
- the ALLOCATION_REFERENCE is not included because this IE is in a message sent in dedicated mode using a reliable data link.

Table 10.5.61: RR PACKET UPLINK ASSIGNMENT information element details

LENGTH_IN_OCTETS (8 bit field) This field encodes (in binary) the number that is equal to one eighth of the number of bits in the *RR Packet Uplink Assignment* information element that follow the end of this field. **TIMESLOT_ALLOCATION** (8 bit field) This field is encoded as the TIMESLOT_ALLOCATION field in the PACKET UPLINK ASSIGNMENT message in GSM 04.60. **CHANNEL_CODING_COMMAND** (2 bit field) This field is encoded as the CHANNEL_CODING_COMMAND field in the PACKET UPLINK ASSIGNMENT message in GSM 04.60. **EGPRS_MCS_MODE** (4 bit field) For backward compatibility reasons, the receiver of this message shall consider the case that the EGPRS_MCS_MODE parameter may not be present in the message. EGPRS_MCS_MODE is present for EGPRS only and if present the CHANNEL_CODING_COMMAND which is for GPRS mobiles is not valid. This field is coded as the EGPRS Modulation and Coding Scheme IE in the PACKET UPLINK ASSIGNMENT message in GSM 04.60. **RESEGMENT** (1 bit field) This field is coded as the RESEGMENT bit in the PACKET UPLINK ASSIGNMENT message in GSM 04.60. **EGPRS Window Size IE** This field is encoded as the EGPRS window size IE in the PACKET DOWNLINK ASSIGNMENT message in GSM 04.60. **TLLI_BLOCK_CHANNEL_CODING** (1 bit field) This field is encoded as the TLLI_BLOCK_CHANNEL_CODING field in the PACKET UPLINK ASSIGNMENT message in GSM 04.60.

Packet Timing Advance IE
This field is encoded as the Packet Timing Advance IE in the PACKET UPLINK ASSIGNMENT message in GSM 04.60.

Dynamic Allocation struct
This information element contains parameters necessary to define the radio resources of a dynamic allocation or an extended dynamic allocation.

Extended Dynamic Allocation (1 bit field)
This information field indicates the medium access mode to be used during the TBF.
0 Dynamic Allocation
1 Extended Dynamic Allocation

UPLINK_TFI_ASSIGNMENT (5 bit field)
If present, this field is encoded as the UPLINK_TFI_ASSIGNMENT information element in the PACKET UPLINK ASSIGNMENT message in GSM 04.60.

Power Control Parameters IE
If present, this field is encoded as the Power Control Parameters IE in the PACKET UPLINK ASSIGNMENT message in GSM 04.60.

RLC_DATA_BLOCKS_GRANTED (8 bit field)
If present, this field is encoded as the RLC_DATA_BLOCKS_GRANTED field in the PACKET UPLINK ASSIGNMENT message in GSM 04.60.

USF for Timeslot Number 0 (TN0) (3 bit field)
USF for Timeslot Number 1 (TN1) (3 bit field)
USF for Timeslot Number 2 (TN2) (3 bit field)
USF for Timeslot Number 3 (TN3) (3 bit field)
USF for Timeslot Number 4 (TN4) (3 bit field)
USF for Timeslot Number 5 (TN5) (3 bit field)
USF for Timeslot Number 6 (TN6) (3 bit field)
USF for Timeslot Number 7 (TN7) (3 bit field)
If present, these fields are encoded as the USF for Timeslot Number X field (where 0=<X<8) in the PACKET UPLINK ASSIGNMENT message in GSM 04.60.

Single Block Allocation struct
This information element contains parameters necessary to define the radio resources of a Single Block allocation. For example for sending of a PACKET RESOURCE REQUEST message in a two phase access or a Measurement report.

ALPHA (4 bit field)
The ALPHA Power control parameter field is coded according to the following table:
bits
4 3 2 1
0 0 0 0 $\alpha = 0.0$
0 0 0 1 $\alpha = 0.1$
: : :
1 0 0 1 $\alpha = 0.9$
1 0 1 0 $\alpha = 1.0$
All other values are reserved.

TIMESLOT_NUMBER (3 bit field)
If present, this field is encoded as the TIMESLOT_NUMBER field in the PACKET UPLINK ASSIGNMENT message in GSM 04.60.

GAMMA_TN (5 bit field)
The GAMMA_TN field is the binary representation of the parameter Γ_{CH} for MS output power control in units of 2 dB, see GSM 05.08.

P0, BTS_PWR_CTRL_MODE and PR_MODE fields

These fields are optional downlink power control parameters and are encoded as in the PACKET UPLINK ASSIGNMENT message in GSM 04.60.

Fixed Allocation struct
This information element contains parameters necessary to define the radio resources of a fixed allocation.

FINAL_ALLOCATION (1 bit field)
This field indicates whether this allocation is the last allocation of the TBF.

0 this allocation is not the last allocation of the TBF
1 this allocation is the last allocation of the TBF

DOWNLINK_CONTROL_TIMESLOT (3 bit field)
This information field indicates the downlink timeslot that mobile station operating in fixed allocation mode shall monitor for downlink PACCH. This field is coded as the binary representation of the timeslot number as defined in GSM 05.10.
Range 0 to 7

HALF_DUPLEX_MODE (1 bit field)
This information field indicates, for multislot class 19 to 29, whether the mobile station shall operate in half duplex mode.

Bit
0 the MS shall not operate in half duplex mode
1 the MS shall operate in half duplex mode

BLOCKS_OR_BLOCK_PERIODS (1 bit field)
If present, this field is encoded as the BLOCKS_OR_BLOCK_PERIODS field in the PACKET UPLINK ASSIGNMENT message in GSM 04.60.

ALLOCATION_BITMAP_LENGTH (7 bit field)
If present, this field is encoded as the ALLOCATION_BITMAP_LENGTH field in the PACKET UPLINK ASSIGNMENT message in GSM 04.60.

ALLOCATION_BITMAP (variable length field)
If present, this field is encoded as the ALLOCATION_BITMAP field in the PACKET UPLINK ASSIGNMENT message in GSM 04.60.

Packet Extended Timing Advance (2 bit field)
This bit field is used to support Extended Timing Advance.

Bit
1 bit 7 of the Timing Advance IE defined in section 10.5.2.40
2 bit 8 of the Timing Advance IE defined in section 10.5.2.40

Extension and Message escape fields
For mobile stations implemented according to this version of the protocol, those fields shall be considered as reserved values.

10.5.2.25d RR Packet Downlink Assignment

The *RR Packet Downlink Assignment* information element is sent by the network to the mobile station to indicate the assigned downlink resources.

The *RR Packet Downlink Assignment* information element is coded as shown in tables 10.5.62/GSM 04.18 and 10.5.63/GSM 04.18.

The *RR Packet Downlink Assignment* is a type 4 information element.

For a mobile station assigned to operate in the fixed allocation MAC mode, the network may assign regularly repeating intervals during which the mobile station shall measure neighbour cell power levels.

Table 10.5.62: RR PACKET DOWNLINK ASSIGNMENT information element

```
< RR Packet Downlink Assignment IE > ::=
    < LENGTH_IN_OCTETS : bit (8) >
    < MAC_MODE : bit (2) >
    < RLC_MODE : bit (1) >
    < TIMESLOT_ALLOCATION : bit (8) >
            < Packet Timing Advance : Packet Timing Advance IE >
    { 0 | 1 < P0 : bit (4) >
        < BTS_PWR_CTRL_MODE : bit(1) >
        < PR_MODE : bit (1) >}}
    { 0 | 1 < Power Control Parameters : Power Control Parameters IE > }
    { 0 | 1 < DOWNLINK_TFI_ASSIGNMENT: bit (5) > }
    { 0 | 1 < MEASUREMENT_STARTING_TIME : bit (16) >
            < MEASUREMENT_INTERVAL : bit (5) >
            < MEASUREMENT_BITMAP : bit (8) > }
    { 0 | 1-- indicates EGPRS TBF mode, see 04.60
            < EGPRS Window Size : < EGPRS Window Size IE >>}
            < LINK_QUALITY_MEASUREMENT_MODE : bit (2)>}
    { 0 | 1 <Packet Extended timing Advance : bit (2)> }
    < SPARE_BITS : bit **> ;
                    < LENGTH_IN_OCTETS : bit (8) >
            < MAC_MODE : bit (2) >
            < RLC_MODE : bit (1) >
            < TIMESLOT_ALLOCATION : bit (8) >
            < Packet Timing Advance : Packet Timing Advance IE >
            { 0 | 1 < P0 : bit (4) >
                    < BTS_PWR_CTRL_MODE : bit(1) > }
            { 0 | 1 < Power Control Parameters : Power Control Parameters IE > }
            { 0 | 1 < DOWNLINK_TFI_ASSIGNMENT: bit (5) > }
            { 0 | 1 < MEASUREMENT_STARTING_TIME : bit (16) >
                    < MEASUREMENT_INTERVAL : bit (5) >
                    < MEASUREMENT_BITMAP : bit (8) > }
            { 0 | 1< TBF_MODE : bit (2)>
                    < EGPRS Window Size : < EGPRS Window Size IE >>}
                    < TIMESLOT_QUAL_REP : bit (1) >}
            { 0 | 1 <Packet Extended timing Advance : bit (2)> }
            < SPARE_BITS : bit **> ;
```

Editors note: This IE has a number of differences to the contents of the PACKET DOWNLINK ASSIGNMENT message described in GSM 04.60:

- the PAGE_MODE is not included because this IE is sent on a DCCH not on the PCH/AGCH;
- Referenced Address is not included because this IE is sent in a dedicated mode message and hence has only one intended recipient.
- the GSM 04.60 Frequency Parameters are not included because the dedicated mode message(s) carry this information in other information elements (eg Mobile Allocation);
- the TBF_STARTING_TIME is not included because it duplicates the information in the *Starting Time* IE.

Table 10.5.63: RR PACKET DOWNLINK ASSIGNMENT information element details

LENGTH_IN_OCTETS (8 bit field)
This field encodes (in binary) the number that is equal to one eighth of the number of bits in the *RR Packet Downlink Assignment* information element that follow the end of this field.

MAC_MODE (2 bit field)
This field is encoded as the MAC_MODE information field in the PACKET DOWNLINK ASSIGNMENT message in GSM 04.60.

RLC_MODE (1 bit field)

This field is encoded as the RLC_MODE field in the PACKET DOWNLINK ASSIGNMENT message in GSM 04.60.

TIMESLOT_ALLOCATION (8 bit field)
This field is encoded as the TIMESLOT_ALLOCATION field in the PACKET DOWNLINK ASSIGNMENT message in GSM 04.60.

Packet Timing Advance IE
This field is encoded as the Packet Timing Advance IE in the PACKET DOWNLINK ASSIGNMENT message in GSM 04.60.

P0, BTS_PWR_CTRL_MODE and PR_MODE fields
These fields are optional downlink power control parameters and are encoded as in the PACKET UPLINK ASSIGNMENT message in GSM 04.60.

Power Control Parameters IE
This field is encoded as the Power Control Parameters IE in the PACKET DOWNLINK ASSIGNMENT message in GSM 04.60.

DOWNLINK_TFI_ASSIGNMENT (5 bit field)
If present, this field is encoded as the DOWNLINK_TFI_ASSIGNMENT information element in the PACKET DOWNLINK ASSIGNMENT message in GSM 04.60.

MEAUREMENT_STARTING_TIME (16 bit field)
If present, this field is encoded as the MEASUREMENT_STARTING_TIME field in the PACKET DOWNLINK ASSIGNMENT message in GSM 04.60.

MEASUREMENT_BITMAP (8 bit field)
If present, this field is encoded as the MEASUREMENT BITMAP information field in the PACKET DOWNLINK ASSIGNMENT message in GSM 04.60.

MEASUREMENT_INTERVAL (5 bit field)
If present, this field is encoded as the MEASUREMENT_INTERVAL field in the PACKET DOWNLINK ASSIGNMENT message in GSM 04.60.

EGPRS Window Size IE
This field is encoded as the EGPRS window size IE in the PACKET UPLINK ASSIGNMENT message in GSM 04.60.

LINK_QUALITY_MEASUREMENT_MODE (2 bit field)
This field is encoded as the LINK_QUALITY_MEASUREMENT_MODE in the PACKET DOWNLINNK ASSIGNMENT message in GSM 04.60.

Packet Extended Timing Advance (2 bit field)
This bit field is used for support of Extended Timing Advance.

Bit
1 bit 7 of the Timing Advance IE defined in section 10.5.2.40
2 bit 8 of the Timing Advance IE defined in section 10.5.2.40

10.5.2.26 Page Mode

The purpose of the *Page Mode* information element is to control the action of the mobile station belonging to the paging subgroup corresponding to the paging subchannel.

The *Page Mode* information element is coded as shown in figure 10.5.56/GSM 04.18 and table 10.5.64/GSM 04.18.

The *Page Mode* is a type 1 information element.

8	7	6	5	4	3	2	1	
	Page Mode IEI			0 spare	0 spare	PM		octet 1

Figure 10.5.56/GSM 04.18: *Page Mode* information element

Table 10.5.64/GSM 04.18: *Page Mode* information element

```
PM (octet 1)
Bits
2 1
0 0       Normal paging.
0 1       Extended paging.
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 with another
      meaning in an upwards compatible way
      in later phases of the GSM system.
```

10.5.2.26a Spare

10.5.2.26b Spare

10.5.2.26c Spare

10.5.2.26d Spare

10.5.2.27 NCC Permitted

The purpose of the *NCC Permitted* information element is to provide a definition of the allowed NCCs on the BCCH carriers to be reported in the MEASUREMENT REPORT message by the mobile stations in the cell.

The *NCC Permitted* information element is coded as shown in figure 10.5.57/GSM 04.18 and table 10.5.65/GSM 04.18.

The *NCC Permitted* is a type 3 information element with 2 octets length.

8	7	6	5	4	3	2	1	
	NCC Permitted IEI							octet 1
NCC permitted								octet 2

Figure 10.5.57/GSM 04.18: *NCC Permitted* information element

Table 10.5.65/GSM 04.18: *NCC Permitted* information element

```
NCC permitted (octet 2)
The  NCC permitted field is coded as a bit map, i.e.
bit N is coded with a "0" if the BCCH carrier with
NCC = N-1 is not permitted for monitoring and with a
"1" if the BCCH carrier with NCC = N-1 is permitted
for monitoring; N = 1,2,..,8.
```

10.5.2.28 Power Command

The purpose of the *Power Command* information element is to provide the power level to be used by the mobile station.

The *Power Command* information element is coded as shown in figure 10.5.58/GSM 04.18 and table 10.5.66/GSM 04.18.

The *Power Command* is a type 3 information element with 2 octets length.

8	7	6	5	4	3	2	1	
	Power Command IEI							octet 1
0 spare	0 spare	FPC	POWER LEVEL					octet 2

Figure 10.5.58/GSM 04.18: *Power Command* information element

Table 10.5.66/GSM 04.18: *Power Command* information element

```
FPC (octet 2)
The FPC field (octet 2) indicates whether Fast Measurement
Reporting and Power Control mechanism is used. It is coded as
follows:

Value

0  FPC not in use
1  FPC in use

Power level (octet 2)
The  power  level  field  is  coded  as the binary
representation of the "power control level", see TS
GSM 05.05.
This value shall be used by the mobile station
according to GSM 05.08.

Range: 0 to 31.
```

10.5.2.28a Power Command and access type

The purpose of the *Power Command and access type* information element is to provide the power level to be used by the mobile station and the indication that the mobile station can avoid the transmission of handover access.

The *Power Command and access type* information element is coded as shown in figure 10.5.59/GSM 04.18 and table 10.5.67/GSM 04.18.

The *Power Command and access type* is a type 3 information element with 2 octets length.

8	7	6	5	4	3	2	1	
	Power Command and Access Type IEI							octet 1
ATC	0 spare	FPC	POWER LEVEL					octet 2

Figure 10.5.59/GSM 04.18: *Power Command and access type* information element

Table 10.5.67/GSM 04.18: *Power Command and access type* information element

```
ATC (Access Type Control)  (octet 2)
bit 8
0   Sending of Handover access is mandatory
1   Sending of Handover access is optional

FPC (octet 2)
The FPC field (octet 2) indicates whether Fast Measurement
Reporting and Power Control mechanism is used. It is coded as
follows:

Value
```

0 FPC not in use 1 FPC in use Power level (octet 2) The power level field is coded as the binary representation of the "power control level", see TS GSM 05.05. This value shall be used by the mobile station according to GSM 05.08. Range: 0 to 31.

10.5.2.29 RACH Control Parameters

The purpose of the *RACH Control Parameters* information element is to provide parameters used to control the RACH utilization. This information element is broadcast to mobile stations in SYSTEM INFORMATION TYPE 1, 2, 2bis, 3, and 4 messages.

The *RACH Control Parameters* information element is coded as shown in figure 10.5.60/GSM 04.18 and table 10.5.68/GSM 04.18.

The *RACH Control Parameters* is a type 3 information element with 4 octets length.

<table>
<tr><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td></td></tr>
<tr><td></td><td colspan="7">RACH Control Parameters IEI</td><td>octet 1</td></tr>
<tr><td colspan="2">Max retrans</td><td colspan="4">Tx-integer</td><td>CELL BARR ACCESS</td><td>RE</td><td>octet 2</td></tr>
<tr><td>AC C15</td><td>AC C14</td><td>AC C13</td><td>AC C12</td><td>AC C11</td><td>AC C10</td><td>AC C09</td><td>AC C08</td><td>octet 3</td></tr>
<tr><td>AC C07</td><td>AC C06</td><td>AC C05</td><td>AC C04</td><td>AC C03</td><td>AC C02</td><td>AC C01</td><td>AC C00</td><td>octet 4</td></tr>
</table>

Figure 10.5.60/GSM 04.18: *RACH Control Parameters* information element

Table 10.5.68/GSM 04.18: *RACH Control Parameters* information element

```
Max  retrans,  Maximum  number  of retransmissions
(octet 2)

Bits
8  7
0  0  Maximum 1 retransmission
0  1  Maximum 2 retransmissions
1  0  Maximum 4 retransmissions
1  1  Maximum 7 retransmissions

Tx-integer, Number of slots to spread transmission
(octet 2)
Bits
6  5  4  3
0  0  0  0     3 slots used to spread transmission
0  0  0  1     4 slots used to spread transmission
0  0  1  0     5 slots used to spread transmission
0  0  1  1     6 slots used to spread transmission
0  1  0  0     7 slots used to spread transmission
0  1  0  1     8 slots used to spread transmission
0  1  1  0     9 slots used to spread transmission
0  1  1  1    10 slots used to spread transmission
1  0  0  0    11 slots used to spread transmission
1  0  0  1    12 slots used to spread transmission
1  0  1  0    14 slots used to spread transmission
1  0  1  1    16 slots used to spread transmission
1  1  0  0    20 slots used to spread transmission
1  1  0  1    25 slots used to spread transmission
1  1  1  0    32 slots used to spread transmission
1  1  1  1    50 slots used to spread transmission
```

Table 10.5.68/GSM 04.18: *RACH Control Parameters* information element (continued)

```
  CELL_BAR_ACCESS, Cell Barred for Access (octet 2)
Bit
2
0  The cell is not barred, see 3G TS 23.022
1  The cell is barred, see 3G TS 23.022

RE, Call reestablishment allowed (octet 2)
Bit
1
0  Call Reestablishment allowed in the cell
1  Call Reestablishment not allowed in the cell

EC Emergency Call allowed (octet 3 bit 3)
3
0  Emergency call allowed in the cell to all MSs
1  Emergency call not allowed in the cell except
   for the MSs 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 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.
```

10.5.2.30 Request Reference

The purpose of the *Request Reference* information element is to provide the random access information used in the channel request and the frame number, FN modulo 42432 in which the channel request was received.

The *Request Reference* information element is coded as shown in figure 10.5.61/GSM 04.18 and table 10.5.69/GSM 04.18.

The *Request Reference* is a type 3 information element with 4 octets length.

<table>
<tr><th>8</th><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th></th></tr>
<tr><td></td><td colspan="7">Request Reference IEI</td><td>octet 1</td></tr>
<tr><td colspan="8">RA</td><td>octet 2</td></tr>
<tr><td colspan="5">T1'</td><td colspan="3">T3
(high part)</td><td>octet 3</td></tr>
<tr><td colspan="3">T3
(low part)</td><td colspan="5">T2</td><td>octet 4</td></tr>
</table>

Figure 10.5.61/GSM 04.18: *Request Reference* information element

Table 10.5.69/GSM 04.18: *Request Reference* information element

RA, Random Access Information (octet 2) This is an unformatted 8 bit field. Typically the contents of this field are coded the same as the CHANNEL REQUEST message shown in Table 9.9, section 9.1.8 T1' (octet 2) The T1' field is coded as the binary representation of (FN div 1326) mod 32. T3 (octet 3 and 4) The T3 field is coded as the binary representation of FN mod 51. Bit 3 of octet 2 is the most significant bit and bit 6 of octet 3 is the least significant bit. T2 (octet 4) The T2 field is coded as the binary representation of FN mod 26. NOTE 1: The frame number, FN modulo 42432 can be calculated as 51x((T3-T2) mod 26)+T3+51x26xT1'

10.5.2.31 RR Cause

The purpose of the *RR Cause* information element is to provide the reason for release or the reason for completion of an assignment or handover.

The *RR Cause* information element is coded as shown in figure 10.5.62/GSM 04.18 and table 10.5.70/GSM 04.18.

The *RR Cause* is a type 3 information element with 2 octets length.

<table>
<tr><th>8</th><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th></th></tr>
<tr><td></td><td colspan="7">RR Cause IEI</td><td>octet 1</td></tr>
<tr><td colspan="8">RR cause value</td><td>octet 2</td></tr>
</table>

Figure 10.5.62/GSM 04.18: *RR Cause* information element

Table 10.5.70/GSM 04.18: *RR Cause* information element

```
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 0   Handover impossible, timing advance
                  out of range
0 0 0 0 1 0 0 1   Channel mode unacceptable
0 0 0 0 1 0 1 0   Frequency not implemented
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 non-existent or not
                    implemented
0 1 1 0 0 0 1 0   Message type not compatible with
                  protocol state
0 1 1 0 0 1 0 0   Conditional IE error
0 1 1 0 0 1 0 1   No cell allocation available
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.
```

10.5.2.32 SI 1 Rest Octets

The *SI 1 Rest Octets* information element contains the position about the NCH and spare bits.

The *SI 1 Rest Octets* information element is a type 5 information element with 1 octet length.

<SI1 Rest Octets> ::=
{**L** |**H** <NCH Position : bit (5)> };
<spare padding> ;

Table 10.5.71/GSM 04.18: *SI 1 Rest Octets* information element

NCH Position on the CCCH

The values in the NCH Position field indicates the block number of the CCCH block which is used for the first NCH block and the number of blocks used for the NCH. (The block numbering corresponds to table 5 in section 7 of GSM 05.02)

The absence of the NCH position field indicates that there is no NCH in the cell/on the carrying CCCH slot

The following coding applies if 1 or more basic physical channels are used for CCCH, not combined with SDCCHs.

Value	No of blocks	Number of first block
0 0 0 0 0	1	0
0 0 0 0 1	1	1
0 0 0 1 0	1	2
0 0 0 1 1	1	3
0 0 1 0 0	1	4
0 0 1 0 1	1	5
0 0 1 1 0	1	6
0 0 1 1 1	2	0
0 1 0 0 0	2	1
0 1 0 0 1	2	2
0 1 0 1 0	2	3
0 1 0 1 1	2	4
0 1 1 0 0	2	5
0 1 1 0 1	3	0
0 1 1 1 0	3	1
0 1 1 1 1	3	2
1 0 0 0 0	3	3
1 0 0 0 1	3	4
1 0 0 1 0	4	0
1 0 0 1 1	4	1
1 0 1 0 0	4	2
1 0 1 0 1	4	3
1 0 1 1 0	5	0
1 0 1 1 1	5	1
1 1 0 0 0	5	2
1 1 0 0 1	6	0
1 1 0 1 0	6	1
1 1 0 1 1	7	0

Other values are reserved for future use. A mobile station receiving a reserved value shall behave as if the NCH position was not present

In the case the CCCH configuration is not compatible with the NCH position (e.g., CCCH with combined SDCCH and the value different from 00000, 00001 or 00111), the mobile station shall behave as if the NCH Position field was not present.

10.5.2.33 SI 2bis Rest Octets

The *SI 2bis Rest Octets* information element contains only spare bits. Its purpose is to allow the upward compatible introduction of new information on the BCCH in later phases.

The *SI 2bis Rest Octets* information element is a type 5 information element with1 octet length.

```
<SI2bis Rest Octets> ::=
    <spare padding> ;
```

10.5.2.33a SI 2ter Rest Octets

SI2ter Rest Octets information element contains optional information of UMTS cell to be monitored by the mobile in the cell. Optionally it may in addition include thresholds that the mobile shall use for cell reselection.

The *SI 2ter Rest Octets* information element is a type 5 information element with 4 octets length.

```
<SI2ter Rest Octets> ::=
    {L|H        {0<Optional UTRAN Cell reselection 1>|1<Optional UTRAN Cell reselection 2>}}

                <spare padding> ;

    <Optional UTRAN Cell reselection 1>::=
                <Qsearch1_high: bit (3)>
                <Qsearch1_low: bit (3)>
                {0      { 0 < FDD-ARFCN : bit (9) > | 1 < FDD-ARFCN-INDEX : bit (3)  > }  --FDD case----
                        <UMTS Scrambling code:bit(9)>
                |1      { 0 < TDD-ARFCN : bit (9) > | 1 < TDD-ARFCN-INDEX : bit (3)  > }       --TDD case
                        <Cell Parameter: bit (7) >
                        <Sync case: bit(1)> }
                {0|1<Qaccept: bit(3)>}


    <Optional UTRAN Cell reselection 2>::=
                {0      { 0 < FDD-ARFCN : bit (9) > | 1 < FDD-ARFCN-INDEX : bit (3)  > }
                        <UMTS Scrambling code:bit(9)><UMTS Scrambling code:bit(9)>-----FDD case-----
                |1      { 0 < TDD-ARFCN : bit (10) > | 1 < 0TDD-ARFCN-INDEX : bit (3)  > }
                        < Cell Parameter: bit (7) ><Sync case: bit(1)>
                        < Cell Parameter: bit (7) ><Sync case: bit(1)>}              -----TDD case-----
```

Qsearch_high and Qsearch_low (3 bit field)

Qsearch_high and Qsearch_low are two RXLEV thresholds. The MS shall perform UMTS measurements when RXLEV is above Qsearch_high or below Qsearch_low. Both Qsearch,high and Qsearch,low are encoded according to the table given in TS 05.08.

Qaccept (3 bit field)

For any UMTS Neighbouring Cell Ec/Io measurement exceeding the Qaccept threshold the cell is a candidate for UMTS cell re-selection.

Qaccept represents an absolute value of acceptable interference level in the UTRAN cell.The range and encoding of Qaccept is defined in TS 25.304.

UMTS frequency, UMTS Scrambling code, Cell Parameter and Sync case are defined and encoded in TS 25.304.

10.5.2.33b SI 2quater Rest Octets

The *SI 2quater Rest Octets* information element contains neighbour cell lists for UTRAN cells.

The *SI 2quater Rest Octets* information element is a type 5 information element with 20 octet length.

Table 10.5.71a: SI2quater **message content**

< SI2quater Rest Octets > ::=

< **SI2quater_CHANGE_MARK** : bit (1) >
< **SI2quater_INDEX** : bit (4) >
< **SI2quater_COUNT** : bit (4) >

{ 0 | 1 < **UMTS FDD Description** : UMTS FDD Description > }
{ 0 | 1 < **UMTS TDD Description** : UMTS TDD Description > }
{ 0 | 1 < **3G MEASUREMENT Parameters Description** : 3G MEASUREMENT Parameters Description >}
< spare padding > ;

< UMTS FDD Description > : :=
{ 1 { < **Repeated UMTS FDD Neighbour Cells** : Repeated UMTS FDD Neighbour Cells struct > } ** 0 }

< Repeated UMTS FDD Neighbour Cells struct > ::=
{ 0 < **FDD-ARFCN** : bit (14) > | 1 < **FDD-ARFCN-INDEX** : bit (3) > }
< **Number_of_Scrambling_Codes_and_Diversity** : bit (5) >
< **Range-1024-Format Scrambling Codes and Diversity Field** :
bit(p(**Number_of_Scrambling_Codes_and_Diversity**)) > ; -- p(x) defined in table 10.5.71.a1/GSM 04.18

< UMTS TDD Description > : :=
{ 1 { < **Repeated UMTS TDD Neighbour Cells** : Repeated UMTS TDD Neighbour Cells struct > } ** 0 }

< Repeated UMTS TDD Neighbour Cells struct > ::=
{ 0 < **TDD-ARFCN** : bit (14) > | 1 < **TDD-ARFCN-INDEX** : bit (3) > }
< **Number_of_Cell Parameters_and_sync cases_and_Diversity** : bit (5) >
< **Range-512-Format Cell Parameters and syncs cases and Diversity** :
bit(q(Number_of_Scrambling_Codes_and_Diversity) > ; -- q(x) defined in table10.5.71.a2/GSM04.18

< 3G MEASUREMENT PARAMETERS Description > : :=
{
{ < **Qsearch :** bit (4) > }
{ 0 | 1 < **FDD_QOffset** : bit (3) > }
{ 0 | 1 < **TDD_QOffset** : bit (3) > }
}

SI2quater _CHANGE_MARK (1 bit)

The **SI2quater** change mark field is changed each time information has been updated in any instance of the **SI2quater** messages. A new value indicates that the mobile station shall re-read the information from all the **SI2quater** messages. The coding of this field is network dependent.

SI2quater _INDEX (4 bit field)
The SI2quater _INDEX field is used to distinguish individual **SI2quater** messages containing information about different neighbour cells. The field can take the binary representation of the values 0 to n, where n is the index of the last SI2quater message. (SI2 **SI2quater** count).

SI2quater _COUNT (4 bit field)
This field is coded as the binary representation of the **SI2quater** _INDEX for the last (highest indexed) individual **SI2quater** message.

UMTS FDD DESCRIPTION

FDD_ARFCN (14 bit field)
Bits 1-9 of this optional information element are defined in GSM 05.05. Any parameter received with bits 10, 11, 12, 13 or 14 equal to 1 are ignored in this version of the protocol.

Number_of_Scrambling_Codes_and_Diversity (n) (5 bit field)
This optional field defines the binary value of the number of Scrambling Codes/Diversity parameters (0–31).

Range-1024-Format Scrambling Codes and Diversity Field (p bit field)
This field allows to compute a set of 10-bit-long Scrambling Codes and Diversity Parameters, re-using the *Range 1024 format* compression algorithm, see Annex J: ‘Algorithm to encode frequency list information’. The computation formulas for decoding are given in the ‘Range 1024 format’ sub-clause, 10.5.2.13.3. The consecutive parameters of this

field are concatened, starting with the bit FDD_Indic0, and then w1, w2… Each parameter starts with the Most Significant Bit.

FDD_Indic0, information 0 indicator (1 bit):
0 information '0000000000' is not a member of the set
1 information '0000000000' is a member of the set
NOTE: This bit FDD_Indic0 is equivalent than the bit F0 bit in the frequency list information element.

For each (10-bit-long) decoded Parameter, bits 1-9 are the Scrambling Codes and bit 10 is the corresponding Diversity Parameter.

The total number of bits p of this field depends on the value of the parameter Number_of_Scrambling_Codes_and_Diversity = n, as follows (with p=0 if n=0):

n	**p**	**n**	**p**	**n**	**p**	**n**	**p**	**n**	**p**	**n**	**p**
1	11	6	53	11	89	16	123	21	153	26	183
2	20	7	61	12	96	17	129	22	159	27	189
3	29	8	68	13	103	18	135	23	165	28	195
4	37	9	75	14	110	19	141	24	171	29	201
5	45	10	82	15	117	20	147	25	177	30	207

Table 10.5.71.a1.

UMTS Scrambling code (9 bit field)
This parameter is defined in 3GPP TS 25.304.

TDD_ARFCN (14 bit field)
Bits 1-10 of this optional information element are defined in GSM 05.05. Any parameter received with bits 11, 12, 13 or 14 equal to 1 are ignored in this version of the protocol.

Number_of_Cell Parameters_and_Sync Sases_and_Diversity (m) (5 bit field)
This optional field defines the decimal value of the number of Cell Parameters/Sync Case/Time Diversity parameters (0–31).

Range-512-Format Cell Parameters and syncs cases and Diversity (q bit field)
This field allows to compute a set of 9-bit-long Scrambling Codes and Diversity Parameters, re-using the *Range 512 format* compression algorithm, see Annex J: 'Algorithm to encode frequency list information'. The computation formulas for decoding are given in the 'Range 512 format' sub-clause, 10.5.2.13.4, with w0=0. The consecutive parameters of this field are concatened, starting with the bit TDD_Indic0, and then w1, w2… Each parameter starts with the Most Significant Bit.

TDD_Indic0, information 0 indicator (1 bit):
0 information '000000000' is not a member of the set
1 information '000000000' is a member of the set
NOTE: This bit TDD_Indic0 is equivalent than the bit F0 bit in the frequency list information element.

For each (9-bit-long) decoded Parameter, bits 1-7 are the Cell Parameters, bit 8 is the Sync Case and bit 9 is the Diversity bit..

The total number of bits q of this field depends on the value of the parameter **Number_of_Cell Parameters_and_Sync Cases_and_Diversity** = m, as follows (with q=0 if m=0):

m	**q**	**m**	**q**	**m**	**q**	**m**	**q**	**m**	**q**	**m**	**q**
1	10	6	47	11	78	16	106	21	132	26	157
2	18	7	54	12	84	17	112	22	137	27	161
3	26	8	60	13	90	18	117	23	142	28	166
4	33	9	66	14	96	19	122	24	147	29	171
5	40	10	72	15	102	20	127	25	152	30	176

Table 10.5.71.a2.

Cell Parameter (7 bit field)
This parameter is defined in 3GPP TS 25.304.

Sync Case (1 bit field)
This parameter is defined in 3GPP TS 25.304.

3G MEASUREMENT PARAMETERS Description

QSEARCH (4 bit field)
This parameter is defined in GSM 05.08.

FDD_Qoffset (3 bit field)
This parameter is defined in GSM 05.08.

TDD_Qoffset (3 bit field)
This parameter is defined in GSM 05.08.

10.5.2.34 SI 3 Rest Octets

The *SI 3 Rest Octets* information element is coded according to the syntax specified below and described in tables 10.5.72/GSM 04.18, 10.5.73/GSM 04.18 and 10.5.74/GSM 04.18(See section 10.5.2.35).

The *SI 3 Rest Octets* information element is a type 5 information element with 4 octets length.

Table 10.5.72/GSM 04.18: *SI 3 Rest Octets* information element

<SI3 Rest Octet> ::= <Optional selection parameters>
<Optional Power offset>
<System Information 2ter Indicator>
<Early Classmark Sending Control>
<Scheduling if and where>
{ L | H <GPRS Indicator> }
<spare padding> :

<Optional Selection Parameters> ::= **L** | **H** <Selection Parameters>;

<Selection Parameters> ::=
<**CBQ**: bit (1)>
<**CELL_RESELECT_OFFSET**: bit (6)>
<**TEMPORARY_OFFSET**: bit (3)>
<**PENALTY_TIME**: bit (5)>;

<Optional Power Offset> ::= **L** | **H** <**Power Offset**: bit (2)>;<System Information 2ter Indicator> ::= **L | H;**

<Early Classmark Sending Control> ::= **L | H;**

<Scheduling if and where>::= **L | H** <**WHERE**: bit (3)>;

<GPRS Indicator> ::= < **RA COLOUR** : bit (3) >
< **SI13 POSITION** : bit >;

CBQ, CELL_BAR_QUALIFY (1 bit field)

CELL_BAR_QUALIFY is used by the network to control mobile station cell selection and reselection. The use and coding of this parameter is defined in GSM 05.08.

CELL_RESELECT_OFFSET (6 bit field)

CELL_RESELECT_OFFSET is coded as the binary representation of the "CELL_RESELECT_OFFSET" in GSM 05.08. It is a value used by the mobile station to apply a positive or negative offset to the value of C2 as defined in TS 23.022 and GSM 05.08.

TEMPORARY_OFFSET (3 bit field)

The TEMPORARY_OFFSET field is coded as the binary representation of the "TEMPORARY_OFFSET" in GSM 05.08. It is used by the mobile station as part of its calculation of C2 for the cell reselection process as described in GSM 05.08. It is used to apply a negative offset to C2 for the duration of PENALTY_TIME.

PENALTY_TIME (5 bit field)

The PENALTY_TIME is coded as the binary representation of the "PENALTY_TIME" in GSM 05.08. It defines the length of time for which TEMPORARY_OFFSET is active. The usage of PENALTY_TIME is described in TS 23.022

and GSM 05.08.

WHERE (3 bit field)

If the **WHERE** field is not contained in the information element, this indicates that BCCH scheduling information is not sent in SYSTEM INFORMATION TYPE 9 on the BCCH.

If the **WHERE** field is contained in the information element, this indicates that BCCH scheduling information is sent in SYSTEM INFORMATION TYPE 9 on the BCCH and that SYSTEM INFORMATION TYPE 9 messages are sent in the blocks of the BCCH norm for which ((FN DIV 51) mod (8) = 4 AND (((FN DIV 51) DIV 8) mod (n+1))= 0), where n is the value encoded in binary in WHERE.

GPRS Indicator
The **GPRS Indicator** contains the RA COLOUR field and the SI13_POSITION field. If the GPRS Indicator is contained in the information element, it indicates that GPRS is supported in the cell.

RA COLOUR (3 bit field)
If the mobile station receives different values of the RA COLOUR field in different cell, the mobile station shall interpret the cell re-selection information as if the two cells belong to different routeing areas.

SI13_POSITION (1 bit field)
The SI13 POSITION field indicates the minimum schedule for where the SYSTEM INFORMATION TYPE 13 message is sent on BCCH, see GSM 05.02:

0 SYSTEM INFORMATION TYPE 13 message is sent on BCCH Norm;
1 SYSTEM INFORMATION TYPE 13 message is sent on BCCH Ext.

10.5.2.35 SI 4 Rest Octets

The *SI 4 Rest Octets* information element includes parameters which are used by the mobile station for cell selection and reselection purposes. It may also include the POWER OFFSET parameter used by DCS 1800 Class 3 MS.

Its content is described in Table 10.5.73/GSM 04.18 and 10.5.74/GSM 04.18.

NOTE: In the future evolution of this standard the values 64h and 72h shall not be used as values of the first octet when this information element is used in the SYSTEM INFORMATION TYPE 4 message. This will prevent mobile stations misinterpreting this information as the CBCH IEIs.

The *SI 4 Rest Octets* information element is a type 5 information element with 0 to 10 octets length.

```
<SI4 Rest Octets> ::=
{               <SI4 Rest Octets_O>
                {L <Break indicator> | H <SI Rest Octets_S>}

                <spare padding>
}    -- truncation allowed, bits 'L' assumed;

<SI4 Rest Octets_O> ::=
{               <Optional selection parameters>
                <Optional Power offset>
                {L | H < GPRS Indicator >}
}    -- truncation allowed, bits 'L' assumed
;

<SI4 Rest Octets_S> ::=
                {L | H <LSA Parameters>}
                {L | H <Cell Identity : bit(16)>}
                {L | H <LSA ID information>} ;

<Break Indicator> : :=    L | H ;

<SI7 Rest Octets> ::=    <SI4 Rest Octets_O><SI4 Rest Octets_S> |<SI4 Rest Octets_S> ;

<SI8 Rest Octets> ::=    <SI4 Rest Octets_O><SI4 Rest Octets_S> |<SI4 Rest Octets_S> ;

<Optional Selection Parameters> ::=    L | H <Selection Parameters>  ;

<Selection Parameters> ::=     <CBQ : bit (1)>
                               <CELL_RESELECT_OFFSET : bit (6)>
                                      <TEMPORARY_OFFSET : bit (3)>
                               < PENALTY_TIME : bit (5)> ;

<Optional Power Offset> ::=     L | H <Power Offset : bit(2)> ;

<GPRS Indicator> ::=            < RA COLOUR : bit (3) >
                                       < SI13 POSITION : bit > ;

<LSA Parameters> ::=            <PRIO_THR : bit (3)>
                                <LSA_OFFSET : bit (3)>
                                {0 | 1 <MCC : bit (12)>
                                 <MNC : bit (12)>} ;

<LSA ID information> ::=     <LSA identity>
                                    {0 | 1 <LSA ID information>} ;

<LSA identity> : :=          {0 <LSA_ID : bit (24)>
                                  |1 <ShortLSA_ID : bit (10)>} ;
```

If "ACS " in the System information type 4 message is set to "1" then the SI 7 and SI 8 rest octets consists of "SI4 Rest Octets_O" and "SI4 Rest Octets_S", otherwise of only "SI4 Rest Octets_S".

Table 10.5.73/GSM 04.18

CBQ, CELL_BAR_QUALIFY (1 bit field)

CELL_BAR_QUALIFY is used by the network to control mobile station cell selection and reselection. The use and coding of this parameter is defined in GSM 05.08.

CELL_RESELECT_OFFSET (6 bit field)

CELL_RESELECT_OFFSET is coded as the binary representation of the "CELL_RESELECT_OFFSET" in GSM 05.08. It is a value used by the mobile station to apply a positive or negative offset to the value of C2 as defined in TS 23.022 and GSM 05.08.

TEMPORARY_OFFSET (3 bit field)

The TEMPORARY_OFFSET field is coded as the binary representation of the "TEMPORARY_OFFSET" in GSM 05.08. It is used by the mobile station as part of its calculation of C2 for the cell reselection process as described in GSM 05.08. It is used to apply a negative offset to C2 for the duration of PENALTY_TIME.

PENALTY_TIME (5 bit field)

The PENALTY_TIME is coded as the binary representation of the "PENALTY_TIME" in GSM 05.08. It defines the length of time for which TEMPORARY_OFFSET is active. The usage of PENALTY_TIME is described in TS 23.022 and GSM 05.08.

Table 10.5.74/GSM 04.18

POWER OFFSET (2 bit field)

POWER OFFSET is used only by DCS 1800 Class 3 MSs to add a power offset to the value of MS_TXPWR_MAX_CCH used for its random access attempts. It is also used by the MS in its calculation of C1 and C2 parameters. Its use is defined in GSM 05.08.

If this parameter is transmitted on a BCCH carrier within the DCS 1800 band, its meaning shall be described below:

Value	Meaning
00	0 dB power offset
01	2 dB power offset
10	4 dB power offset
11	6 dB power offset

If this parameter is transmitted on a BCCH carrier outside the DCS 1800 band, then all bit positions shall be treated as spare.

GPRS Indicator
The **GPRS Indicator** contains the RA COLOUR field and the SI13_POSITION field. If the GPRS Indicator is contained in the information element, it indicates that GPRS is supported in the cell.

RA COLOUR (3 bit field)
If the mobile station receives different values of the RA COLOUR field in different cell, the mobile station shall interpret the cell re-selection information as if the two cells belong to different routeing areas.

SI13_POSITION (1 bit field)
The SI13 POSITION field indicates the minimum schedule for where the SYSTEM INFORMATION TYPE 13 message is sent on BCCH, see GSM 05.02:

0 SYSTEM INFORMATION TYPE 13 message is sent on BCCH Norm;
1 SYSTEM INFORMATION TYPE 13 message is sent on BCCH Ext.

Break Indicator
The Break Indicator indicates if parameters in addition to those in SI 4 rest octets are sent in SI7 and SI8.
L Additional parameters are not sent in SYSTEM INFORMATION TYPE 7 and 8.
H Additional parameters, “SI4 Rest Octets_S”, are sent in SYSTEM INFORMATION TYPE 7 and 8.

PRIO_THR (3 bit field)
The PRIO_THR field is a signal threshold used by the mobile station to determine whether prioritised cell re-selection shall apply. The use and coding of this parameters is defined in GSM 05.08.

LSA_OFFSET (3 bit field)
The LSA_OFFSET field applies an offset for LSA reselection between cells with same LSA priorities. The use and coding of this parameters is defined in GSM 05.08.

MCC and MNC (24 bit field)
If the escape PLMN is broadcast in SI3 and SI4 the cell is used for SoLSA exclusive access and the MCC and MNC field shall be included. The MS shall then for all purposes use the MCC and MNC values received in the LSA Parameters instead of the ones received in the Location Area information element in SI3 and 4, eg when deriving the PLMN identity, the Location Area Identity and Cell Global Identity broadcast by the cell. The MCC and MNC value field is coded as specified in Figure 10.5.3/GSM 04.18 and Table 10.5.3/GSM 04.18.

Cell Identity (16 bit field)
The purpose of the Cell Identity is to identify a cell within a location area. The Cell Identity is coded as shown in figure 10.2/GSM 04.18 and table 10.5/GSM 04.18

LSA_ID (24 bit field)
The purpose of the LSA_ID field is to identify a LSA. The LSA ID value field is specified in TS 23.003.

Short LSA_ID (10 bit field)

The purpose of the Short LSA_ID field is to identify a LSA. The LSA ID defined by the Short LSA_ID is a LSA_ID as specified in GSM 03.03 with bit 0 set to "0" bit 1 to 10 set to the value of the Short LSA_ID field (LSB in bit 1, MSB in bit 10) and bit 11 to 23 set to "0".

10.5.2.35a SI 6 Rest Octets

The *SI 6 Rest Octet* information element may contain information concerning the paging, notification channels, VBS and VGCS services of the cell.

Mobile stations not supporting VGCS listening or VBS listening can ignore the information contained in this information element.

The *SI 6 Rest Octets* information element is a type 5 information element with 7 octets length.

The value part is as shown below:

```
<SI6 rest octets> ::=      {L I H <PCH and NCH info>}
                           {L I H <VBS/VGCS options : bit(2)>}
                           <implicit spare >;

<PCH and NCH info> ::=     <Paging channel restructuring>
                              <NLN(SACCH) : bit(2)>
                              {0 I 1 <Call priority : bit (3)>}
                              <NLN status : bit >;

<paging channel restructuring> ::=
    1|      -- paging channel is restructured
    0       -- paging channel is not restructured


<VBS/VGCS options> ::=        <inband notifications>
                              <inband pagings>;

<inband notifications>::=
    0|      -- the network does not provide notification on FACCH so that the mobile should
               inspect the NCH for notifications
    1       -- the mobile shall be notified on incoming high priority VBS/VGCS calls through
                     NOTIFICATION/FACCH, the mobile need not to inspect the NCH

<inband pagings>::=
    0|      -- the network does not provide paging information on FACCH so that the mobile
                     should inspect the PCH for pagings
    1       -- the mobile shall be notified on incoming high priority point-to-point calls
               through NOTIFICATION/FACCH, the mobile need not to inspect the PCH
```

Attributes, field contents:

1. For <NLN(SACCH): bit(2)>: see 10.5.2.23.

2. For <call priority>: see 10.5.2.23. Indication of the highest priority associated with VBS/VGCS calls in a cell.

10.5.2.36 SI 7 Rest Octets

The *SI 7 Rest Octets* information element includes parameters which are used by the mobile station for cell selection and reselection purposes. It may also include the POWER OFFSET parameter used by a DCS 1800 Class 3 MS.

The *SI 7 Rest Octets* information element is a type 5 information element with 20 octets length.

The *SI 7 Rest Octets* information element is coded as the *SI 4 Rest Octets*. Its contents is described in Table 10.5.2.35a-b/GSM 04.18.

10.5.2.37 SI 8 Rest Octets

The *SI 8 Rest Octets* information element includes parameters which are used by the mobile station for cell selection and reselection purposes. It may also include the POWER OFFSET parameter used by a DCS 1800 Class 3 MS.

The *SI 8 Rest Octets* information element is a type 5 information element with 20 octets length.

The *SI 8 Rest Octets* information element is coded as the *SI 4 Rest Octets*. Its contents is described in Table 10.5.73/GSM 04.18 and 10.5.74/GSM 04.18.

10.5.2.37a SI 9 Rest Octets

The *SI 9 Rest Octet*s information element contains information about scheduling of some or all of the information on the BCCH.

The *SI 9 Rest Octet*s information element is a type 5 information element with 17 octets length.

```
<SI9 rest octets>        ::=
                         {L | H <Scheduling info>}
                         <spare padding>;

<Scheduling info>        ::=      <Info type> <Positions>
                         {0 | 1 <Scheduling info>};

<Info type>          ::=      0 <Info_type_4: bit (4)>
                         | 1 0 <Info_type_5: bit (5)>
                         | 1 1 <Info_type_6: bit6)>;

<Positions>          ::=      <Position> {0 | 1 <Position>}

<Position>               ::= <Modulus: bit(4)>
                     <Relative_position: <bit>> --length depends on modulus
                     <Bcch_type: bit(1)>;
```

Attributes

The *scheduling info* indicates one or more information types (in *info type*) together with their *position*s. Here, a *position* specifies at which relative position P (specified in **relative_position**) modulo a position modulus M (specified in **modulus**) messages of the given information type are sent, on the BCCH norm or BCCH ext (see GSM 05.02) as indicated in **bcch_type**. Precisely, messages of the given information type are sent in the multiframes for which

((frame number) DIV 51) mod (M)) = P.

If the position modulus M equals 0, the information type is not sent.

Field contents

The fields of the *SI 9 Rest Octets* information element are coded as shown in table 10.75/GSM 04.18.

Table 10.5.75/GSM 04.18: *SI 9 rest octet* information element

Info_type_4_(4 bits)

This field contains a binary encoded non-negative integer number assigned to a type of information sent on the BCCH. All values indicate unknown, unnecessary information and are reserved for future use.

Info_type_5 (5 bits)

This field contains a binary encoded non-negative integer number assigned to a type of information sent on the BCCH. All values except those defined below indicate unknown, unnecessary information and are reserved for future use.

Info_type_5:

0 0000	System Information type 1
0 0001	System Information type 2
0 0010	System Information type 2bis
0 0011	System Information type 2ter
0 0100	System Information type 3
0 0101	System Information type 4

0 0110 System Information type 7

0 0111 System Information type 8

0 1000 System Information type 9

0 1001 System Information type 13

0 1011 System Information type 16

0 1100 System Information type 17

0 1101 System Information type 18

0 1110 System Information type 19

0 1111 System Information type 20

Info_type_6_(6 bits)

This field contains a binary encoded non-negative integer number assigned to a type of information sent on the BCCH. All values indicate unknown, unnecessary information and are reserved for future use.

modulus (4 bits)

This field encodes the **position modulus**, according to the following encoding method. Let N be the integer encoded in binary in the **modulus** field; the **position modulus** is then defined as follows :

If N=0, the **position modulus** is 0,

if N>0, the **position modulus** is $2^{N+1.}$

relative position (0 bits if the non-negative integer n contained in the **modulus** field is 0; n+1 bits, if the non-negative integer N encoded in the **modulus** field is > 0.

This field contains the N+1 bit binary encoding of a non-negative integer number < 2^{N+1}.

bcch_type (1 bit)

0 BCCH norm(as defined in GSM 05.08)
1 BCCH ext (as defined in GSM 05.08)

10.5.2.37b SI 13 Rest Octets

The *SI 13 Rest Octets* information element is coded according to the syntax specified below and described in tables 10.5.76/GSM 04.18.

The *SI 13 Rest Octets* information element is a type 5 information element with 20 octets length.

```
< SI 13 Rest Octets > ::=
    { L | H
        < BCCH_CHANGE_MARK : bit (3) >
        < SI_CHANGE_FIELD : bit (4) >

        { 0 | 1  < SI13_CHANGE_MARK : bit (2) >
                 < GPRS Mobile Allocation : GPRS Mobile Allocation IE > }          -- Defined in GSM 04.60

        { 0                      -- PBCCH not present in cell :
            < RAC : bit (8) >
            < SPGC_CCCH_SUP : bit >
            < PRIORITY_ACCESS_THR : bit (3) >
            < NETWORK_CONTROL_ORDER : bit (2) >
            < GPRS Cell Options : GPRS Cell Options IE >                           -- Defined in GSM 04.60
            < GPRS Power Control Parameters : GPRS Power Control Parameters struct >

        | 1                      -- PBCCH present in cell :
            < PSI1_REPEAT_PERIOD : bit (4) >
            < PBCCH Description : PBCCH Description struct >
        }
        { null | L           -- Receiver compatible with ealier release
         | H                 -- Additions in release 99 :
            < SGSNR : bit > }
    }
    < spare padding > ;

< GPRS Power Control Parameters struct > ::=
    < ALPHA : bit (4) >
    < T_AVG_W : bit (5) >
    < T_AVG_T : bit (5) >
    < PC_MEAS_CHAN : bit >
    < N_AVG_I : bit (4) >;

< PBCCH Description struct > ::=
    <Pb : bit (4)
    < TSC : bit (3) >
    < TN : bit (3) >
    { 00    -- BCCH carrier
     | 01    < ARFCN : bit (10) >
   | 1   < MAIO : bit (6) >} ;
```

Table 10.5.76/GSM 04.18: *SI 13 Rest Octets* information element

BCCH_CHANGE_MARK (3 bit field)
This field indicates the status of the information on BCCH. The value of this field may be changed when information on BCCH is changed, see GSM 04.60.

SI_CHANGE_FIELD (4 bit field)
This field is the binary representation of which information was changed at the last indication in BCCH_CHANGE_MARK, see GSM 04.60. Range 0 to 15:

0 Update of *unspecified* SI message or SI messages;
1 Update of SI1 message;
2 Update of SI2, SI2 bis or SI2 ter message;
3 Update of SI3, SI4, SI7 or SI8 message;
4 Update of SI9 message; 5 Update of SI18 or SI20 message;
6 Update of SI19 message;

All other values shall be interpreted as ‘update of unknown SI message type’.

SI13_CHANGE_MARK (2 bit field)
This field is the binary representation of the SI change mark identifying the GPRS Mobile Allocation provided in SI13 and PSI13 messages. Range: 0 to 3.

GPRS Mobile Allocation (information element)
This information element is the representation of the GPRS mobile allocation provided in SI13 and PSI13 messages. It is identified by MA_NUMBER = 14 when referenced from a packet assignment message. The *GPRS Mobile Allocation* information element is defined in GSM 04.60. When used in SI13 or PSI13 message, this information element shall refer to the cell allocation defined for the cell in SI1 or PSI2.

RAC (8 bit field)
This field is the binary representation of the Routing Area Code, see TS 23.003.

SPGC_CCCH_SUP (bit field)
This field indicates the support of the parameter SPLIT_PG_CYCLE on CCCH from the network side:

0 SPLIT_PG_CYCLE is not supported on CCCH in this cell;
1 SPLIT_PG_CYCLE is supported on CCCH in this cell.

The **PRIORITY_ACCESS_THR** field (3 bit) is the binary representation of the parameter PRIORITY_ACCESS_THR:

0 0 0 packet access is not allowed in the cell;
0 0 1 spare, shall be interpreted as '000' (packet access not allowed);
0 1 0 spare, shall be interpreted as '000' (packet access not allowed);
0 1 1 packet access is allowed for priority level 1;
1 0 0 packet access is allowed for priority level 1 to 2;
1 0 1 packet access is allowed for priority level 1 to 3;
1 1 0 packet access is allowed for priority level 1 to 4;
1 1 1 spare, shall be interpreted as '110' (packet access allowed).

The **NETWORK_CONTROL_ORDER** field (2 bit) is the binary representation of the parameter NETWORK_CONTROL_ORDER, see GSM 04.60:

0 0 NC0: MS controlled cell re-selection, no measurement reporting.
0 1 NC1: MS controlled cell re-selection, MS sends measurement reports.
1 0 NC2: Network controlled cell re-selection, MS sends measurement reports.
1 1 Reserved for future use, interpreted as NC0 by mobile station.

GPRS Cell Options (information element)
The *GPRS Cell Option* information element is defined in GSM 04.60.

PSI1_REPEAT_PERIOD (4 bit field)
This field is the representation of the PSI1 repeat period. The field is coded according to the following table:

0000 PSI1 repeat period = 1 multiframe
0001 PSI1 repeat period = 2 multiframes
:
1111 PSI1 repeat period = 16 multiframes

GPRS Power Control Parameters struct

The **ALPHA** field (4 bit) is the binary representation of the parameter α for MS output power control in units of 0.1, see GSM 05.08: Range: 0 to 10. Values greater than 10 shall be interpreted as 10 by the mobile station.

The **T_AVG_W** field (5 bit) is the binary representation of the parameter T_{AVG_W} for MS output power control, see GSM 05.08: Range: 0 to 25. Values greater than 25 shall be interpreted as 25 by the mobile station.

The **T_AVG_T** field (5 bit) is the binary representation of the parameter T_{AVG_T} for MS output power control, see GSM 05.08: Range: 0 to 25. Values greater than 25 shall be interpreted as 25 by the mobile station.

The **PC_MEAS_CHAN** field (bit) indicates the type of channel which shall be used for downlink measurements for power control:

0 BCCH;
1 PDCH.

The **N_AVG_I** field (4 bit) is the binary representation of the parameter N_{AVG_I} for MS output power control, see

GSM 05.08: Range: 0 to 15.

PBCCH Description struct
The PBCCH description struct provides the channel description for the PBCCH. The frequency description for the PBCCH may be specified by an ARFCN (non-hopping radio frequency channel) or a MAIO (hopping radio frequency channel) field. In case of a hopping radio frequency channel, the PBCCH shall use the GPRS mobile allocation specified in this message. If none of the ARFCN or MAIO fields are present, the PBCCH shall use the BCCH carrier.

Pb (4bit) (for encoding and description see the Global Power Control Parameters IE)

The **TSC** field (3 bit) is the binary representation of the training sequence code used for PBCCH and PCCCHs. Range: 0 to 7.

The **TN** field (3 bit) is the binary representation of the timeslot number for the PBCCH and the corresponding PCCCH. Range: 0 to 7.

The **ARFCN** field (10 bit) is the binary representation of the absolute RF channel number. Range: 0 to 1023.

The **MAIO** field (6 bit) is the binary representation of the mobile allocation index offset. Range: 0 to 63.

SGSNR, SGSN Release (bit field)

0 SGSN is Release ’98 or older
1 SGSN is Release ’99 onwards

10.5.2.37c [Spare]

10.5.2.37d [Spare]

10.5.2.37e SI 16 Rest Octets

The *SI 16 Rest Octets* information element includes parameters which are used by the mobile station for cell selection and reselection purposes.

The *SI 16 Rest Octets* information element is coded according to the syntax specified below. Its contents is described in Table 10.52c/GSM 04.18.

The *SI 16 Rest Octets* information element is a type 5 information element with 20 octets length.

```
<SI16 Rest Octets> ::=  {L | H <LSA Parameters>}
                             <spare padding> ;

<SI17 Rest Octets> ::=  < SI16 Rest Octets> ;

<LSA Parameters> ::=          <PRIO_THR : bit (3)>
                              <LSA_OFFSET : bit (3)>
                              {0 | 1 <MCC : bit (12)>
                              <MNC : bit (12)>}
                              <LSA ID information>;

<LSA ID information> ::=<LSA identity>
                              {0 | 1 <LSA ID information>} ;

<LSA identity> : :=     {0 <LSA_ID : bit (24)>
                            |1 <ShortLSA_ID : bit (10)>} ;
```

Table 10.52c/GSM 04.18

PRIO_THR (3 bit field)

The PRIO_THR field is a signal threshold used by the mobile station to determine whether prioritised cell re-selection shall apply. The use and coding of this parameters is defined in GSM 05.08.

LSA_OFFSET (3 bit field)

The LSA_OFFSET field applies an offset for LSA reselection between cells with same LSA priorities. The use and coding of this parameters is defined in GSM 05.08.

MCC and MNC (24 bit field)

If the escape PLMN is broadcast in SI3 and SI4 the cell is used for SoLSA exclusive access and the MCC and MNC field shall be included. The MS shall then for all purposes use the MCC and MNC values received in the LSA Parameters instead of the ones received in the Location Area information element in SI3 and 4, eg when deriving the PLMN identity, the Location Area Identity and Cell Global Identity broadcast by the cell. The MCC and MNC value field is coded as specified in Figure 10.5.3/GSM 04.18 and Table 10.5.3/GSM 04.18.

LSA_ID (24 bit field)

The purpose of the LSA_ID field is to identify a LSA. The LSA ID value field is coded as specified in TS 23.003.

Short LSA_ID (10 bit field)

The purpose of the Short LSA_ID field is to identify a LSA. The LSA ID defined by the Short LSA_ID is a LSA_ID as specified in GSM 03.03 with bit 0 set to “0” bit 1 to 10 set to the value of the Short LSA_ID field (LSB in bit 1, MSB in bit 10) and bit 11 to 23 set to “0”.

10.5.2.37f SI 17 Rest Octets

The *SI 17 Rest Octets* information element includes parameters, which are used by the mobile station for cell selection and reselection purposes.

The *SI 17 Rest Octets* information element is a type 5 information element with 20 octets length.

The *SI 17 Rest Octets* information element is coded as the *SI 16 Rest Octets*. Its contents is described in Table 10.52c/GSM 04.18.

10.5.2.37g SI 19 Rest Octets

The *SI 19 Rest Octets* information element contains information for cell re-selection to COMPACT channels.

The *SI 19 Rest Octets* information element is a type 5 information element with 20 octets length.

The value part is coded as shown below:

```
< SI 19 Rest Octets > ::=
        < SI19_CHANGE_MARK : bit (2) >
        < SI19_INDEX : bit (3) >
        < SI19_LAST : bit (1) >
        < COMPACT Neighbour Cell Parameters : COMPACT Neighbour Cell params struct >
        < spare padding >;

< COMPACT Neighbour Cell params struct > ::=
        { 1  < START_FREQUENCY : bit (10) >
            < COMPACT Cell selection params : COMPACT Cell Selection struct >
            < NR_OF_REMAINING_CELLS : bit (4) >
            < FREQ_DIFF_LENGTH : bit (3) >
            { < FREQUENCY_DIFF : bit (n) >
                < COMPACT Cell selection params : COMPACT Cell Selection struct > } *  } * 0 ;

< COMPACT Cell Selection struct > ::=
        { 0 <BCC : bit (3)> | 1 <BSIC : bit (6)> }
        < CELL_BARRED : bit (1) >
        { LA Different parameters : LA Different struct }
        { 0 | 1 < MS_TXPWR_MAX_CCH : bit (5) > }
        { 0 | 1 < RXLEV ACCESS MIN : bit (6) > }
        { 0 | 1 < CELL_RESELECT_OFFSET : bit (6) > }
        { 0 | 1 < TEMPORARY_OFFSET: bit (3)
                < PENALTY_TIME : bit (5) > }
        { 0 | 1 < TIME_GROUP : bit (2) > }
        { 0 | 1 < GUAR_CONSTANT_PWR_BLKS : bit (2) >} ;

< LA Different struct > : :=
        { 0 | 1 < CELL_RESELECT_HYSTERISIS : bit (3) > ;
```

SI19_CHANGE_MARK (2 bit field)

The SI19 change mark field is changed each time information has been updated in any of the SI19 messages. A new value indicates that the mobile station shall re-read the information from all the SI19 messages. The coding of this field is network dependent.

Range: 0-3.

SI19_INDEX (3 bit field)

The SI19_INDEX field is used to distinguish individual SI19 messages containing information about different neighbour cells. The field can take the binary representation of the values 0 to n, where n is the index of the last SI19 message.

Range: 0-7.

SI19_LAST (1 bit field)

This field is coded as binary one if the SI19_INDEX in this message is the last SI19 message (*i.e.*, it represents the highest SI19_INDEX being broadcast). If the field is coded as binary zero, then this is not the last SI19 message.

Range: 0-1.

START_FREQUENCY (10 bit field)

The Start Frequency defines the ARFCN for the BCCH frequency of the first cell in the list.

FREQ_DIFF_LENGTH (3 bit field)

The Freq Diff length field specifies the number of bits to be used for the Frequency diff field in the current Frequency group. The field is coded according to the following table

3 2 1

0 0 0 1 bit

0 0 1 2 bits

. . .

1 1 1 8 bits

NR_OF_REMAINING_CELLS (4 bit field)

This field specifies the remaining number of cells that are defined in the frequency group. For each of them the parameters ‘Frequency diff’ and ‘Cell selection params’ will be repeated.

Range 1-16.

COMPACT Cell Selection params

This struct contains information about COMPACT neighbour cells. The first field of the COMPACT Cell Selection struct, BSIC, defines the BSIC of the cell and then comes the field same RA as serving cell. Then follows none, some, or all of the fields MS_TXPWR_MAX_CCH, RXLEV ACCESS MIN, CELL_RESELECT_OFFSET, TEMPORARY_OFFSET, PENALTY_TIME, TIME_GROUP, GUAR_CONSTANT_PWR_BLKS. If fields are omitted, the values for these parameters are the same as for the preceding cell.

FREQUENCY_DIFF (“Freq Diff length” bit field)

The Frequency Diff field specifies the difference in ARFCN to the BCCH carrier in the next cell to be defined. Note that the difference can be zero if two specified cells use the same frequency.

BSIC (6 bit field)

The BSIC field is coded as the “Base Station Identity Code” defined in GSM 03.03.

BCC (3 bit field)

The BCC is specified by encoding its binary representation; it specifies the BSIC given by that BCC and the NCC of the BSIC specified by the previous occurrence of <BCC : bit(3)> or <BSIC : bit(6)>.

CELL_BARRED (1 bit field)

0 The cell is not barred
1 The cell is barred

LA Different parameters

If <LA Different struct> contains a < CELL_RESELECT_HYSTERISIS : bit (3)>, this means that the cell is to be considered by the mobile station to belong to a different location area and that for the cell, the cell reselect hysteresis specified in < CELL_RESELECT_HYSTERISIS : bit (3)> applies.

If <LA Different struct> doesn’t contain a < CELL_RESELECT_HYSTERISIS : bit (3)>, this means that the cell is to be considered by the mobile station to belong to the same location area.

For < CELL_RESELECT_HYSTERISIS : bit (3)>: see 10.5.2.4.

For < MS_TXPWR_MAX_CCH : bit (5)>: see 10.5.2.4.

For < RXLEV_ACCESS_MIN : bit (6)> see 10.5.2.4.

For < CELL_RESELECT_OFFSET : bit (6)>: see 10.5.2.35.

For < TEMPORARY_OFFSET : bit (3)>: see 10.5.2.35.

For < PENALTY_TIME : bit (5)>: see 10.5.2.35.

TIME_GROUP (2 bit field)

The TIME_GROUP defines which time group (see GSM 05.02) the cell belongs to

Bit

2 1

0 0 Time Group 0
0 1 Time Group 1
1 0 Time Group 2
1 1 Time Group 3

GUAR_CONSTANT_PWR_BLKS (2 bit field)
This field indicates the guaranteed number of constant power blocks in the neighbour cell. These are the blocks that the MS can use to perform neighbour cell measurements (see GSM 05.08). Note that there may be more CPBCCH blocks or allowed paging blocks in the neighbour cell than what is indicated in this field, but never less.

Bit
2 1 Blocks at constant power
0 0 4
0 1 5
1 0 6
1 1 12 (i.e. BS_PAG_BLKS_RES = 0 in that cell)

10.5.2.37h SI 18 Rest Octets

The *SI 18 Rest Octets* information element includes parameters for non-GSM networks.

The *SI 18 Rest Octets* information element is a type 5 information element and is 20 octets long.

```
< SI 18 Rest Octets > ::=
    < NonGSM Message : < NonGSM Message struct > > *
                -- may be repeated many times until
            --  A) val(NonGSM Message.NR_OF_CONTAINER_OCTETS)=0 when the
            --        < padding bits > follows immediately or
            --  B) the SI message is fully used
    < padding bits >
     ! < Distribution part error : bit (*) = < no string > > ;

< NonGSM Message struct > ::=
    < NonGSM Protocol Discriminator : bit(3) >
    < NR_OF_CONTAINER_OCTETS : bit(5) >
    { < CONTAINER : bit(8) > } * (val(NR_OF_CONTAINER_OCTETS)) ;
```

Table XX: SI 18 information element details

NonGSM Protocol Discriminator (3 bit field)
This information element is used to identify the non-GSM network for which a SI18 message is transmitted and is coded as shown below.

bit
3 2 1

0 0 1 TIA/EIA-136

All other values are reserved

NR_OF_CONTAINER_OCTETS (5 bit field)
This field indicates the number of CONTAINER octets that forms a specific non-GSM message and is coded as shown

below.

bit
5 4 3 2 1
0 0 0 0 0 Zero octets, There are no more **NonGSM Message**s embedded in this SI message

0 0 0 0 1 1 octet **CONTAINER** length
0 0 0 1 0 2 octets **CONTAINER** length
…. through …
0 1 0 1 1 19 octets **CONTAINER** length

1 1 1 1 1 The remaining portion of the SI message is used by the associated **CONTAINER**. The Non-GSM message continues with the next **CONTAINER** that has the same **NonGSM Protocol Discriminator** as the current one.

All other values are reserved.

CONTAINER (8 bits)
The concatenation of one or several CONTAINER octets forms the actual contents, specific to the non-GSM network soliciting the transmission of a SI18 message.

NOTE: The format of SI 18 when 2 different non-GSM messages are sent is exemplified below

Bit 8 7 6	5 4 3 2 1	
NonGSM Protocol Discriminator	NR_OF_CONTAINER_OCTETS	Octet 1
. Non-GSM CONTAINER.1 .		. . .
NonGSM Protocol Discriminator	NR_OF_CONTAINER_OCTETS	Octet M (optional)
. . Non-GSM CONTAINER 2 . .		Octet M+1 . . . Octet N-1 Octet N
Padding bits		(if present)

10.5.2.37i SI 20 Rest Octets

The *SI 20 Rest Octets* information element includes parameters for non-GSM networks.

The *SI 20 Rest Octets* information element is a type 5 information element and is 20 octets long.

The *SI 20 Rest Octets* are defined as the *SI 18 Rest Octets*, see also 10.5.2.37h

10.5.2.38 Starting Time

The purpose of the *Starting Time* information element is to provide the start TDMA frame number, FN modulo 42432.

The *Starting Time* information element is coded as shown in figure 10.5.65/GSM 04.18 and table 10.5.79/GSM 04.18.

The *Starting Time* is a type 3 information element with 3 octets length.

8	7	6	5	4	3	2	1	
	Starting Time IEI							octet 1
T1'					T3 (high part)			octet 2
T3 (low part)								octet 3

Figure 10.5.65/GSM 04.18 *Starting Time* information element

Table 10.5.79/GSM 04.18: *Starting Time* information element

```
T1' (octet 2)
The T1' field is coded as the binary representation
of (FN div 1326) mod 32.

T3  (octet 2 and 3)
The T3 field is coded as the binary representation
of  FN  mod  51.  Bit  3  of  octet  2  is  the most
significant  bit  and  bit 6 of octet 3 is the least
significant bit.

T2  (octet 3)
The T2 field is coded as the binary representation
of FN mod 26.

NOTE 1: The frame number, FN modulo 42432 can be cal-
        culated as 51x((T3-T2) mod 26)+T3+51x26xT1'
```

The starting time and the times mentioned above are with reference to the frame numbering in the concerned cell. They are given in units of frames (around 4.615 ms).

The *Starting Time* IE can encode only an interval of time of 42 432 frames, that is to say around 195.8 seconds. To remove any ambiguity, the specification for a reception at time T is that the encoded interval is (T-10808, T+31623). In rigorous terms, if we note ST the starting time:

if 0 <= (ST-T) mod 42432 <= 31623, the indicated time is the next time when FN mod 42432 is equal to ST

if 32024 <= (ST-T) mod 42432 <= 42431, the indicated time has already elapsed.

The reception time T is not specified here precisely. To allow room for various MS implementations, the limit between the two behaviours above may be anywhere within the interval defined by

31624 <= (ST-T) mod 42432 <= 32023.

10.5.2.39 Synchronization Indication

The purpose of *Synchronization Indication* information element is to indicate which type of handover is to be performed.

The *Synchronization Indication* information element is coded as shown in figure 10.5.66/GSM 04.18 and table 10.5.80/GSM 04.18.

The *Synchronization Indication* is a type 1 information element.

8	7	6	5	4	3	2	1	
	Synch. Indic. IEI			NCI	ROT	SI		octet 1

Figure 10.5.66/GSM 04.18 *Synchronization Indication* information element

Table 10.5.80/GSM 04.18: *Synchronization Indication* information element

```
ROT: Report Observed Time Difference (Octet1 bit 3)
0    Mobile Time Difference IE shall not be included
     in the HANDOVER COMPLETE message

1    Mobile Time Difference IE shall be included in
     the HANDOVER COMPLETE message

SI: Synchronization indication (octet 1)
Bit
2 1
0 0  Non-synchronized
0 1  Synchronized
1 0  Pre-synchronised
1 1  Pseudo-synchronised

NCI: Normal cell indication (octet 1, bit 4)
0    Out of range timing advance is ignored
1    Out of range timing advance shall trigger
     a handover failure procedure
```

10.5.2.40 Timing Advance

The purpose of the *Timing Advance* information element is to provide the timing advance value.

The *Timing Advance* information element is coded as shown in figure 10.5.67/GSM 04.18 and table 10.5.81/GSM 04.18

The *Timing Advance* is a type 3 information element with 2 octets length.

8	7	6	5	4	3	2	1	
Timing Advance IEI								octet 1
Timing advance value								octet 2

Figure 10.5.67/GSM 04.18 *Timing Advance* information element

Table 10.5.81/GSM 04.18: *Timing Advance* information element

```
Timing advance value (octet 2)
The  coding of the timing advance value field is the
binary  representation  of the timing advance in bit
periods; 1 bit period = 48/13 µs.

For all the bands except GSM 400, the values 0 - 63 are valid TA
values, and bit 7 and bit 8 are set to spare. For GSM 400, the
values 0 to 219 are vaild TA values. The remaining values 220 to
255 decimal are reserved.
```

10.5.2.41 Time Difference

The purpose of the *Time Difference* information element is to provide information about the synchronization difference between the time bases of two Base Stations. This type of information element is used in relation with the pseudo-synchronization scheme, see GSM 05.10.

The *Time Difference* information element is coded as shown in figure 10.5.68/GSM 04.18 and table 10.5.82/GSM 04.18.

The *Time Difference* information element is a type 4 information element with 3 octets length.

8	7	6	5	4	3	2	1	
	Time Difference IEI							octet 1
Length of Time Difference contents								octet 2
Time difference value								octet 3

Figure 10.5.68/GSM 04.18 *Time Difference* information element

Table 10.5.82/GSM 04.18: *Time Difference* information element

Time Difference value (octet 3) The coding of the time difference value field is the binary representation of time difference in half bit periods, modulo 256 half bit periods; 1/2 bit period = 24/13 µs.

10.5.2.41a TLLI

The purpose of the *TLLI* information element is to provide the Temporary Logical Link Identifier.

The *TLLI* information element is coded as shown in figure 10.5.69/GSM 04.18 and table 10.5.83/GSM 04.18.

The *TLLI* is a type 3 information element with 5 octets length.

8	7	6	5	4	3	2	1	
	TLLI IEI							octet 1
TLLI value								octet 2
TLLI value (contd)								octet 3
TLLI value (contd)								octet 4
TLLI value (contd)								octet 5

Figure 10.5.69/GSM 04.18 *TLLI* information element

Table 10.5.83/GSM 04.18: *TLLI* information element

TLLI value (octet 2, 3, 4 and 5) Bit 8 of octet 2 is the most significant bit and bit 1 of octet 5 is the least significant bit. The TLLI is encoded as a binary number with a length of 4 octets. TLLI is defined in 3G TS 23.003

10.5.2.42 TMSI/P-TMSI

The purpose of the *TMSI/P-TMSI* information element is to provide the Temporary Mobile Subscriber Identity for paging purposes.

The *TMSI/P-TMSI* information element is coded as shown in figure 10.5.70/GSM 04.18 and table 10.5.84/GSM 04.18.

The *TMSI/P-TMSI* is a type 3 information element with 5 octets length.

8	7	6	5	4	3	2	1	
	TMSI/P-TMSI IEI							octet 1
TMSI/P-TMSI value								octet 2
TMSI/P-TMSI value (contd)								octet 3
TMSI/P-TMSI value (contd)								octet 4
TMSI/P-TMSI value (contd)								octet 5

Figure 10.5.70/GSM 04.18 *TMSI/P-TMSI* information element

Table 10.5.84/GSM 04.18: *TMSI/P-TMSI* information element

TMSI/P-TMSI value (octet 2, 3, 4 and 5) Bit 8 of octet 2 is the most significant bit and bit 1 of octet 5 is the least significant bit. The coding of the TMSI/P-TMSI is left open for each administration according to TS 23.003. The length is 4 octets.

NOTE: For purposes other than paging the TMSI/P-TMSI should be provided using the mobile identity information element.

10.5.2.42a VGCS target mode Indication

The *VGCS target mode Indication* information element is a type 3 information element with 2 octets length.

8	7	6	5	4	3	2	1	
	VGCS target mode Indic. IEI							octet 1
Length of VGCS target mode Indic.								octet 2
Target mode		Group cipher key number				1 spare	1 spare	octet 3

Figure 10.5.71/GSM 04.18 *VGCS target mode Indication* information element

Table 10.5.85/GSM 04.18 *VGCS target mode* information element

```
Target mode (octet 3)
Bit
8 7
0 0        dedicated mode
0 1        group transmit mode
Other values are reserved for future use.

Group cipher key number (octet 3)
Bit
6 5 4 3
0 0 0 0    no ciphering
0 0 0 1    cipher key number 1
0 0 1 0    cipher key number 2
0 0 1 1    cipher key number 3
0 1 0 0    cipher key number 4
0 1 0 1    cipher key number 5
0 1 1 0    cipher key number 6
0 1 1 1    cipher key number 7
1 0 0 0    cipher key number 8
1 0 0 1    cipher key number 9
1 0 1 0    cipher key number A
1 0 1 1    cipher key number B
1 1 0 0    cipher key number C
1 1 0 1    cipher key number D
1 1 1 0    cipher key number E
1 1 1 1    cipher key number F
```

10.5.2.43 Wait Indication

The purpose of the *Wait Indication* information element is to provide the time the mobile station shall wait before attempting another channel request.

The *Wait Indication* information element is coded as shown in figure 10.5.72/GSM 04.18 and table 10.5.86/GSM 04.18.

The *Wait Indication* is a type 3 information element with 2 octets length.

8	7	6	5	4	3	2	1	
	Wait Indication IEI							octet 1
T3122/T3142 timeout value								octet 2

Figure 10.5.72/GSM 04.18 *Wait Indication* information element

Table 10.5.86/GSM 04.18: *Wait Indication* information element

```
T3122/T3142 timeout value (octet 2)
This  field is coded as the binary representation of
the T3122/T3142 timeout value in seconds.
```

Note1 The timeout value is used for T3122 when received in IMMEDIATE_ASSIGNMENT REJECT message for RR connection establishment. For GPRS MS the timeout value isused for T3142 when received in IMMEDIATE ASSIGNMENT REJECT message for TBF establishment.

10.5.2.44 SI10 rest octets $(ASCI)$

The *SI 10 rest octets* information element contains information for cell re-selection in group receive mode.

The *SI 10 Rest Octets* information element is a type 5 information element with 20 octets length.

The value part is coded as shown below:

```
<SI10 rest octets> ::=        <BA ind : bitstring(1)>
                { L <implicit spare> | H <neighbour information> };
<neighbour information> ::= <first frequency: bitstring(5)>  <cell info>
                { H <info field> }* L  <implicit spare>;
<cell info>  ::=        <bsic : bitstring(6)> { H <cell parameters> | L }
<cell parameters> ::=     <cell barred> | L  <further cell info>
<cell barred>  ::=      H
<further cell info>  ::=     <la different>
                <ms txpwr max cch : bitstring(5)>
                <rxlev access min : bitstring(6)>
                <cell reselect offset : bitstring(6)>
                <temporary offset : bitstring(3)>
                <penalty time : bitstring(5)>
<la different> ::=      { H <cell reselect hysteresis : bitstring(3)> | L }
<info field> ::=            <next frequency>* L  <differential cell info>;
<next frequency> ::=      H;
<differential cell info> ::=     { H <BCC : bitstring(3)> | L <bsic : bitstring(6)> }
                { H <diff cell pars> | L }
<diff cell pars> ::=        <cell barred> | L  <further diff cell info>
<further diff cell info> ::=     <la different>
                { H <ms txpwr max cch : bitstring(5)> | L }
                { H <rxlev access min : bitstring(6)> | L }
                { H <cell reselect offset : bitstring(6)> | L }
                { H <temporary offset : bitstring(3)> | L }
                { H <penalty time : bitstring(5)> | L }
```

Static and dynamic conditions:

1. 1) Information from the last received neighbour cells description in SYSTEM INFORMATION TYPE 5/5bis/5ter is necessary for the mobile station to interpret <neighbour information>. If <BA ind> is different from the last received BA IND value indicated in SYSTEM INFORMATION TYPE 5/5bis/5ter, <neighbour information> cannot be interpreted by the mobile station.

2. 2) If the correspondence between neighbour cell frequencies and sets of pairs (BSIC, cell information) cannot be established following the rules below, or if more than one set of such pairs corresponds to one neighbour cell frequency, the mobile station shall diagnose an imperative message part error.

Attributes, field contents:

1) <cell info> defines a BSIC given by <bsic : bitstring(6)>. It also defines cell information. If <cell parameters> is contained in <cell info>, this cell information is the cell information given by <cell parameters>; if <cell parameters> is not contained in <cell info>, this cell information is empty.

2) <differential cell info> defines a BSIC given by <bsic : bitstring(6)> or by <BCC : bitstring(3)>, see below. It also defines cell information. If <diff cell pars> is contained in <differential cell info>, this cell information is the cell information given by <diff cell pars>; if <diff cell pars> is not contained in <differential cell info>, this cell information is empty.

3) <cell parameters> either indicates a barred cell (by presence of <cell barred>)or specifies cell information given by <further cell info>.

4) Each occurrence of <diff cell pars> either indicates a barred cell (by presence of <cell barred>)or specifies cell information given by <further diff cell info>.

5) <further cell info> specifies cell information given by its components

- <la different>
- <ms txpwr max cch : bitstring(5)>
- <rxlev access min : bitstring(6)>
- <cell reselect offset : bitstring(6)>
- <temporary offset : bitstring(3)>
- <penalty time : bitstring(5)>,

as defined below.

6) For each occurrence of <further diff cell info>, a cell information is defined. This information is given by <la different> and remaining cell information established as follows:

   The remaining cell information defined for the first occurrence of <further diff cell info> consists of the cell information given by its actual components plus the cell information specified by <further cell info> corresponding to its missing components.

   The remaining cell information defined for a later occurrence of <further diff cell info> consists of the cell information given by its actual components plus the remaining cell information corresponding to its missing components which is defined for the previous occurrence of <further diff cell info>.

   Here, the

   "actual components" of an occurrence of <further diff cell info> denotes those parameters among

   - <ms txpwr max cch : bitstring(5)>

   - <rxlev access min : bitstring(6)>

   - <cell reselect offset : bitstring(6)>

   - <temporary offset : bitstring(3)>

   - <penalty time : bitstring(5)>

   which are present in that occurrence.

   "missing components" of an occurrence of <differential cell info> denote those parameters among

   - <ms txpwr max cch : bitstring(5)>

   - <rxlev access min : bitstring(6)>

   - <cell reselect offset : bitstring(6)>

   - <temporary offset : bitstring(3)>

   - <penalty time : bitstring(5)>

   which are not present in that occurrence.

7) Each occurrence of <bsic : bitstring(6)> specifies a BSIC by encoding its binary representation. <BCC : bitstring(3)> specifies a BCC by encoding its binary representation; it specifies the BSIC given by that BCC and the NCC of the BSIC specified by the previous occurrence of <BCC : bitstring(3)> or <bsic : bitstring(6)>. All occurrences of <bsic: bitstring(6)> and <BCC : bitstring(3)> establish a list of BSIC.

8) <first frequency : bitstring(5)> is the 5 bit binary coding of an integer n with 0 <= n <= 31. It specifies a first frequency number n+1.

9) <SI10 rest octets> defines a correspondence between neighbour cell frequencies and sets of pairs (BSIC, cell information) defining the parameters for cell re-selection of any corresponding neighbour cell with BCCH on that frequency and having that BSIC:

   Let a(1),..., a(n) be the list of neighbour cell frequencies, in the order determined by the mobile station. Let i be the first frequency number specified by <first frequency : bitstring(5)> (see above).

   The first BSIC and the cell information specified by <cell info> build a pair belonging to the set corresponding to a(i).

   If an m-th occurrence of <info field> is present (where m >=2), having established the correspondence of the (m-1)-th BSIC to a neighbour frequency a(k), the m-th BSIC and following <differential cell info>

   - belong to a(k), if <next frequency> is not present in the m-th occurrence of <info field>,

   - belong to a((smod(k+t)), if <next frequency> is present exactly t times in the m-th occurrence of <info field>.

Here, for an integer j, smod(j) := ((j-1) mod n) + 1.

10) If <la different> contains a <cell reselect hysteresis : bitstring(3)>, this means that the cell is to be considered by the mobile station to belong to a different location area and that for the cell, the cell reselect hysteresis specified in <cell reselect hysteresis : bitstring(3)> applies.
If <la different> doesn't contain a <cell reselect hysteresis : bitstring(3)>, this means that the cell is to be considered by the mobile station to belong to the same location area.

11) <same LA indicator : bitstring(1)> defines whether the location area is the same as the location area of the serving cell

12) For <cell reselect hysteresis : bitstring(3)>: see 10.5.2.4.

13) For <ms txpwr max cch : bitstring(5)>: see 10.5.2.4.

14) For <rxlev access min : bitstring(6)> see 10.5.2.4.

15) For <cell reselect offset : bitstring(6)>: see 10.5.2.35.

16) For <temporary offset : bitstring(3)>: see 10.5.2.35.

17) For <penalty time : bitstring(5)>: see 10.5.2.35.

10.5.2.45 EXTENDED MEASUREMENT RESULTS

The purpose of the *Extended Measurement Results* information element is to provide the results of the measurements made by the mobile station on the carriers specified in the EXTENDED MEASUREMENT ORDER.

The *Extended Measurement Results* information element is coded as shown in figure 10.5.73/GSM 04.18 and table 10.5.87/GSM 04.18.

The *Extended Measurement Results* is a type 3 information element with 17 octets length.

<table>
<tr><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td></td></tr>
<tr><td></td><td colspan="7">Extended Measurement Results IEI</td><td>octet 1</td></tr>
<tr><td>SC USED</td><td>DTX USED</td><td colspan="6">RXLEV carrier 0</td><td>octet 2</td></tr>
<tr><td colspan="6">RXLEV carrier 1</td><td colspan="2">RXLEV carrier 2 (high part)</td><td>octet 3</td></tr>
<tr><td colspan="4">RXLEV carrier 2 (low part)</td><td colspan="4">RXLEV carrier 3 (high part)</td><td>octet 4</td></tr>
<tr><td colspan="2">RXLEV carrier 3 (low part)</td><td colspan="6">RXLEV carrier 4</td><td>octet 5</td></tr>
<tr><td colspan="6">RXLEV carrier 5</td><td colspan="2">RXLEV carrier 6 (high part)</td><td>octet 6</td></tr>
<tr><td colspan="4">RXLEV carrier 6 (low part)</td><td colspan="4">RXLEV carrier 7 (high part)</td><td>octet 7</td></tr>
<tr><td colspan="2">RXLEV carrier 7 (low part)</td><td colspan="6">RXLEV carrier 8</td><td>octet 8</td></tr>
<tr><td colspan="6">RXLEV carrier 9</td><td colspan="2">RXLEV carrier 10 (high part)</td><td>octet 9</td></tr>
<tr><td colspan="4">RXLEV carrier 10 (low part)</td><td colspan="4">RXLEV carrier 11 (high part)</td><td>octet 10</td></tr>
<tr><td colspan="2">RXLEV carrier 11 (low part)</td><td colspan="6">RXLEV carrier 12</td><td>octet 11</td></tr>
<tr><td colspan="6">RXLEV carrier 13</td><td colspan="2">RXLEV carrier 14 (high part)</td><td>octet 12</td></tr>
<tr><td colspan="4">RXLEV carrier 14 (low part)</td><td colspan="4">RXLEV carrier 15 (high part)</td><td>octet 13</td></tr>
<tr><td colspan="2">RXLEV carrier 15 (low part)</td><td colspan="6">RXLEV carrier 16</td><td>octet 14</td></tr>
<tr><td colspan="6">RXLEV carrier 17</td><td colspan="2">RXLEV carrier 18 (high part)</td><td>octet 15</td></tr>
<tr><td colspan="4">RXLEV carrier 18 (low part)</td><td colspan="4">RXLEV carrier 19 (high part)</td><td>octet 16</td></tr>
<tr><td colspan="2">RXLEV carrier 19 (low part)</td><td colspan="6">RXLEV carrier 20</td><td>octet 17</td></tr>
</table>

Figure 10.5.73/GSM 04.18 *Extended Measurement Results* information element

Table 10.5.87/GSM 04.18: *Extended Measurement Results* information element

SC USED (octet 2), indicates the value of the SEQ-CODE in the extended measurement frequency list information element used for defining the list of frequencies reported on. Range: 0 to 1. DTX USED (octet 2) This bit indicates whether or not the mobile station used DTX during the previous measurement period. Bit 7 0 DTX was not used 1 DTX was used RXLEV carrier 'N' (octets 2 to 17). This field is coded as the binary representation of a value M. M corresponds according to the mapping defined in TS. GSM 05.08 to the received signal strength on carrier N. N is the index to the frequency in the sorted list of frequencies defined in the EXTENDED MEASUREMENT ORDER message. The list is sorted in increasing order of ARFCN, except that ARFCN 0, if included in th e EXTENDED MEASUREMENT ORDER, is put in the last position of the sorted list. If the EXTENDED MEASUREMENT ORDER contains more than 21 carriers, only the signal strength of the carriers 0-20 shall be measured and reported. Range: 0 to 63 If the EXTENDED MEASUREMENT ORDER message contains less than 21 carriers, the fields in the EXTENDED MEASUREMENT REPORT not referring to any specified carrier shall have RXLEV values set to zero.

10.5.2.46 Extended Measurement Frequency List

The purpose of *Extended Measurement Frequency List* information element is to provide the absolute radio frequency channel numbers of carriers to measure signal strength on.

The *Extended Measurement Frequency List* information element is coded as the *Cell Channel Description* information element, as specified in section 10.5.2.1b, with the exception of bit 5 of octet 2. figure 10.5.74/GSM 04.18 and table 10.5.88/GSM 04.18 contains the difference of specifications.

The *Extended Measurement Frequency List* information element is a type 3 information element with 17 octets length.

8	7	6	5	4	3	2	1	
	Extended Measurement Frequency List IEI							octet 1
Bit 128	Bit 127	0 spare	SEQ-CODE	Bit 124	Bit 123	Bit 122	Bit 121	octet 2
Bit 120	Bit 119	Bit 118	Bit 117	Bit 116	Bit 115	Bit 114	Bit 113	octet 3
Bit 008	Bit 007	Bit 006	Bit 005	Bit 004	Bit 003	Bit 002	Bit 001	octet 17

Figure 10.5.74/GSM 04.18 *Extended Measurement Frequency List* information element

Table 10.5.88/GSM 04.18: *Extended Measurement Frequency List* information element

SEQ-CODE, Sequence code (octet 2, bit 5). Range 0 to 1.

10.5.2.47 Suspension Cause

The purpose of the *Suspension Cause* information element is to provide the reason for the establishment of the dedicated circuit which generated the GPRS suspension.

The *Suspension Cause* information element is coded as shown in figure 10.5.2.47/GSM 04.18 and table 10.5.2.47/GSM 04.18.

The *Suspension Cause* is a type 3 information element with 2 octets length.

8	7	6	5	4	3	2	1	
	Suspension Cause IEI							octet 1
Suspension cause value								octet 2

Figure 10.5.2.47/GSM 04.18 *Suspension Cause* information element

Table 10.5.2.47/GSM 04.18: *Suspension Cause* information element

```
Suspension cause value (octet 2)
Bits
8 7 6 5 4 3 2 1
0 0 0 0 0 0 0 0 Emergency call, mobile originating call or call
                    re-establishment
0 0 0 0 0 0 0 1   Location Area Update
0 0 0 0 0 0 1 0   MO Short message service (note 1)
0 0 0 0 0 0 1 1 Other procedure which can be completed with an
                    SDCCH
0 0 0 0 0 1 0 0   MO Voice broadcast or group call (note 2)
0 0 0 0 0 1 0 1   Mobile terminating CS connection

Note 1:  As an option, cause value 0000 0011 may be used for an
         MO Short message service

Note 2:  As an option, cause value 0000 0000 may be used for an
         MO Voice broadcast or group call

All other cause values shall be treated as 0000 0000
```

10.5.2.48 APDU ID

The *APDU ID* information element identifies the particular protocol and associated application for an APDU.

The *APDU ID* information element is coded as shown in figure 10.5.2.48/GSM 04.18 and table 10.5.2.48/GSM 04.18.

The *APDU ID* is a type 1 information element.

8	7	6	5	4	3	2	1	
	APDU ID IEI			Protocol identifier				oktet 1

Figure 10.5.2.48/GSM 04.18: *APDU ID* information element

Table 10.5.2.48/GSM 04.18: *APDU ID* information element format

Protocol identifier (octet 1)	
Bits	Protocol / Application
4 3 2 1	
0 0 0 0	RRLP (GSM 04.31)/ LCS
0 0 0 1	
to	reserved for future use
1 1 1 1	

10.5.2.49 APDU Flags

The *APDU Flags* information element provides segmentation and control information for an associated APDU.

The *APDU Flags* information element is coded as shown in figure 10.5.2.49/GSM 04.18 and table 10.5.2.49/GSM 04.18.

The *APDU Flags* is a type 1 information element.

8	7	6	5	4	3	2	1	
	APDU Flags IEI			0 spare	C/R	first seg.	last seg.	oktet 1

Figure 10.5.2.49/GSM 04.18: *APDU Flags* information element

Table 10.5.2.49/GSM 04.18: *APDU Flags* information element format

Last Segment (octet 1) bit 1 0 Last or only segment 1 Not last or only segment
First Segment (octet 1) bit 2 0 First or only segment 1 Not first or only segment
C/R (octet 1) If last seg. = 0, then: bit 3 0 Command or Final Response 1 Not Command or Final Response
If last seg. = 1, then bit 3 is spare and set to 0

10.5.2.50 APDU Data

The purpose of the information element is to provide an APDU or APDU segment.

The *APDU Data* information element is coded as shown in figure 10.5.2.50/GSM 04.18 and table 10.5.2.50/GSM 04.18.

The APDU Data is a type 4 information element with minimum length of 2 octets. No upper length limit is specified except for that given by the maximum number of octets in a L3 message (GSM 04.06).

8	7	6	5	4	3	2	1	
	APDU IEI							octet 1
Length of APDU contents								octet 2
APDU Information								octet 3-n

Figure 10.5.2.50/GSM 04.18: *APDU Data* information element

Table 10.5.2.50/GSM 04.18: *APDU Data* information element format

APDU Information (octets 3-n) Contains an APDU message or APDU segment as follows: Protocol ID   APDU Message or Segment -----------   ------------------- RRLP   RRLP message in GSM 04.31 (1) NOTE 1: Messages are segmented on octet boundaries. Zero bits are used, where necessary, to pad out the last segment to an octet boundary.

10.5.2.51 Handover To UTRAN Command

The purpose of Handover To UTRAN Command information element is to provide information to the mobile of handover to UTRAN.The Handover to UTRAN Command information element contains all information needed by the mobile for handover to UTRAN.

The Handover To UTRAN Command IE is coded as defined in TS 25.331.

The Handover To UTRAN Command is a type 3 IE with length 19.

10.5.2.52 Handover To cdma2000 Command

The purpose of Handover To cdma2000 Command information element is to provide information to the mobile of handover to cdma2000.The Handover to cdma2000 Command information element contains all information needed by the mobile for handover to cdma2000.

The Handover To cdma2000 Command IE is coded as follows:

8	7	6	5	4	3	2	1	
cdma2000 MSG_TYPE IEI								octet 1
Length								octet 2
cdma2000 message payload								octet 3-n

The ‘cdma2000 MSG_TYPE IEI’ shall be coded as the MSG_TYPE of the cdma2000 message used for the intersystem handover, as specified in TIA/EIA/IS-2000-4-A and in TIA/EIA/IS-833. (E.g. MSG_TYPE::= {00010001} if Extended Handoff Direction Message (EHDM) is used, MSG_TYPE::= {00011111} if General Handoff Direction Message is used, etc.). The order of the bits in the octet representing ‘cdma2000 MSG_TYPE IEI’ is given by the following example. If MSG_TYPE::={00010001} (EHDM), the bit number 1 of ‘cdma2000 MSG_TYPE IEI’ shall be ‘0’, the bit number 2 shall be ‘0’, etc., and the bit number 8 shall be ‘1’, as illustrated below.

8	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**bit**
1	0	0	0	1	0	0	0	

The ‘cdma2000 message payload’ shall be coded as the payload of the message used for the inter system handover, as specified in TIA/EIA/IS-2000-5-A and in TIA/EIA/IS-833. The bit ordering shall be similar to the case described above. The bit number 1 of ‘cdma2000 message payload’ shall be coded as the first bit of the first record of the message defined in TIA/EIA/IS-2000-5-A and in TIA/EIA/IS-833, reading the records defined in TIA/EIA/IS-2000-5-A and in TIA/EIA/IS-833 from left to right.

The Handover To cdma2000 Command is a LV IE with length 4 to n.

10.5.3 Mobility management information elements.

See TS 24.008.

10.5.4 Call control information elements.

See TS 24.008.

10.5.5 GPRS mobility management information elements

See TS 24.008.

10.5.6 Session management information elements

See TS 24.008.

10.5.7 GPRS Common information elements

See TS 24.008.

11 List of system parameters

The description of timers in the following table should be considered a brief summary. The precise details are found in sections 3 to 6, which should be considered the definitive descriptions.

11.1 Timers and counters for radio resource management

11.1.1 Timers on the mobile station side

T3122: This timer is used during random access, after the receipt of an IMMEDIATE ASSIGN REJECT message.

Its value is given by the network in the IMMEDIATE ASSIGN REJECT message.

T3124: This timer is used in the seizure procedure during a hand-over, when the two cells are not synchronized.

Its purpose is to detect the lack of answer from the network to the special signal.

Its value is set to 675 ms if the channel type of the channel allocated in the HANDOVER COMMAND is an SDCCH (+ SACCH); otherwise its value is set to 320 ms.

T3126: This timer is started either

after sending the maximum allowed number of CHANNEL REQUEST messages during an immediate assignment procedure.

or

on receipt of an IMMEDIATE ASSIGNMENT REJECT message,

whichever occurs first.

It is stopped at receipt of an IMMEDIATE ASSIGNMENT message, or an IMMEDIATE ASSIGNMENT EXTENDED message.

At its expiry, the immediate assignment procedure is aborted.

The minimum value of this timer is equal to the time taken by T+2S slots of the mobile station's RACH. S and T are defined in section 3.3.1.2. The maximum value of this timer is 5 seconds.

T3128: This timer is started when the mobile station starts the uplink investigation procedure and the uplink is busy.

It is stopped at receipt of the first UPLINK FREE message.

At its expiry, the uplink investigation procedure is aborted.

The value of this timer is set to 1 second.

T3130: This timer is started after sending the first UPLINK ACCESS message during a VGCS uplink access procedure.

It is stopped at receipt of a VGCS ACCESS GRANT message.

At its expiry, the uplink access procedure is aborted.

The value of this timer is set to 5 seconds.

T3110: This timer is used to delay the channel deactivation after the receipt of a (full) CHANNEL RELEASE. Its purpose is to let some time for disconnection of the main signalling link.

Its value is set to 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.)

T3134 This timer is used in the seizure procedure during an RR network commanded cell change order procedure. Its purpose is to detect the lack of answer from the network or the lack of availability of the target cell.

Its value is set to 5 seconds.

T3142: The timer is used during packet access on CCCH and during packet access while in dedicated mode. It is started after the receipt of an IMMEDIATE ASSIGNMENT REJECT or a DTM REJECT message.

Its value is given by the network in the IMMEDIATE ASSIGNMENT REJECT or DTM REJECT message.

T3148: This timer is used during DTM establishment in dedicated mode.

It is started after sending a DTM REQUEST message during a packet access procedure while in dedicated mode.

It is stopped at the receipt of one of the following messages:

- DTM ASSIGNMENT COMMAND
- PACKET ASSIGNMENT COMMAND
- MAIN DCCH ASSIGNMENT COMMAND
- DTM REJECT
- ASSIGNMENT COMMAND
- HANDOVER COMMAND

At its expiry, the packet access procedure is aborted.

Its value is 4 seconds.

T3146: This timer is started either

after sending the maximum allowed number of CHANNEL REQUEST or EGPRS PACKET CHANNEL REQUEST messages during a packet access procedure.

or

on receipt of an IMMEDIATE ASSIGNMENT REJECT message during a packet access procedure, whichever occurs first.

It is stopped at receipt of an IMMEDIATE ASSIGNMENT message, or an IMMEDIATE ASSIGNMENT EXTENDED message.

At its expiry, the packet access procedure is aborted.

The minimum value of this timer is equal to the time taken by T+2S slots of the mobile station's RACH. S and T are defined in section 3.3.1.2. The maximum value of this timer is 5 seconds.

T3164: This timer is used during packet access using CCCH. It is started at the receipt of an IMMEDIATE ASSIGNMENT message.

It is stopped at the transmission of a RLC/MAC block on the assigned temporary block flow, see GSM 04.60.

At expire, the mobile station returns to the packet idle mode.

The value of the timer is 5 seconds.

T3190: The timer is used during packet downlink assignment on CCCH. It is started at the receipt of an IMMEDIATE ASSIGNMENT message or of an PDCH ASSIGNMENT COMMAND message when in dedicated mode.

It is stopped at the receipt of a RLC/MAC block on the assigned temporary block flow, see GSM 04.60.

At expiry, the mobile station returns to the packet idle mode.

The value of the timer is 5 seconds.

T3204: This timer is used by a mobile station with non-GSM capabilities. The timer is started after sending the first CHANNEL REQUEST during a packet access procedure. The CHANNEL REQUEST was sent requesting a single block packet access and the purpose of the packet access procedure is to send a PACKET PAUSE message.

It is stopped at the receipt of an IMMEDIATE ASSIGNMENT message granting a single block period on an assigned packet uplink resource.

At expiry, the packet access procedure is aborted.

The value of the timer is 1 second.

11.1.2 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 MS has correctly seized the channels.

Its value is network dependent.

NOTE: It could be higher than the maximum time for a L2 establishment attempt.

T3103: This timer is started by the sending of a HANDOVER message and is normally stopped when the MS has correctly seized the new channel. Its purpose is to keep the old channels sufficiently long for the MS to be able to return to the old channels, and to release the channels if the MS is lost.

Its value is network dependent.

NOTE: It could be higher than the maximum transmission time of the HANDOVER COMMAND, plus the value of T3124, plus the maximum duration of an attempt to establish a data link in multiframe mode.)

T3105: This timer is used for the repetition of the PHYSICAL INFORMATION message during the hand-over procedure.

Its value is network dependent.

NOTE: This timer may be set to such a low value that the message is in fact continuously transmitted.

T3107: This timer is started by the sending of an ASSIGNMENT COMMAND or a DTM ASSIGNMENT COMMAND message and is normally stopped when the MS has correctly seized the new RR channels.

Its purpose is to keep the old channel sufficiently long for the MS to be able to return to the old channels, and to release the channels if the MS is lost.

Its value is network dependent.

NOTE: It could be higher than the maximum transmission time of the ASSIGNMENT COMMAND message plus twice the maximum duration of an attempt to establish a data link multiframe mode.

T3109: This timer is started when a lower layer failure is detected by the network, when it is not engaged in a 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: Its value should be large enough to ensure that the MS 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 let some 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: The value could allow for repetitions of the Channel Request message and the requirements associated with T3101.

T3115: This timer is used for the repetition of the VGCS UPLINK GRANT message during the uplink access procedure.

Its value is network dependent.

NOTE: This timer may be set to such a low value that the message is in fact continuously transmitted.

T3117: This timer is started by the sending of a PDCH ASSIGNMENT COMMAND message and is normally stopped when the MS has correctly accessed the target TBF.

Its purpose is to keep the old channel sufficiently long for the MS to be able to return to the old channels, and to release the channels if the MS is lost.

Its value is network dependent.

NOTE: It could be higher than the maximum transmission time of the PDCH ASSIGNMENT COMMAND message plus T3132 plus the maximum duration of an attempt to establish a data link in multiframe mode.

T3119: This timer is started by the sending of a RR-CELL CHANGE ORDER message and is normally stopped when the MS has correctly accessed the new cell. Its purpose is to keep the old channels sufficiently long for the MS to be able to return to the old channels, and to release the channels if the MS is lost.

Its value is network dependent.

NOTE: It could be higher than the maximum transmission time of the RR_CELL CHANGE ORDER, plus T3134, plus the maximum duration of an attempt to establish a data link in multiframe mode.

T3141: This timer is started when a temporary block flow is allocated with an IMMEDIATE ASSIGNMENT message during a packet access procedure. It is stopped when the mobile station has correctly seized the temporary block flow.

Its value is network dependent.

11.1.3 Other parameters

Ny1: The maximum number of repetitions for the PHYSICAL INFORMATION message during a handover (see section 3.4.4.2.2). The value is network dependent.

Ny2: The maximum number of repetitions for the VGCS UPLINK GRANT message during an uplink access procedure (see section 3.3.1.2.2). The value is network dependent.

11.2 Timers of mobility management

See TS 24.008.

11.3 Timers of circuit-switched call control

See TS 24.008.

Annex A (informative): Example of subaddress information element coding

See TS 24.008.

Annex B (normative): Compatibility checking

See TS 24.008.

Annex C (normative): Low layer information coding principles

See TS 24.008.

Annex D (informative): Examples of bearer capability information element coding

See TS 24.008.

Annex E (informative): Comparison between call control procedures specified in GSM [24.008] and CCITT Recommendation Q.931

See TS 24.008.

Annex F (informative): GSM specific cause values for radio resource management

This annex is informative.

Cause value = 0 Normal event;

indicates that the channel is released because of a normal event or that an assignment or handover is successfully, and normally, completed.

Cause value = 1 Abnormal release, unspecified;

indicates that the channel is released because of an abnormal event without specifying further reasons.

Cause value = 2 Abnormal release, channel unacceptable;

indicates that the channel type or channel characteristics are not acceptable.

Cause value = 3 Abnormal release, timer expired;

indicates that the release is caused by a timer expiry.

Cause value = 4 Abnormal release, no activity on the radio path;

indicates that some supervisory function has detected that the channel is not active.

Cause value = 5 Pre-emptive release;

indicates that the channel is released in order to be allocated to a call with priority (e.g. an emergency call).

Cause value = 8 Handover impossible, timing advance out of range;

indicates that a handover is unsuccessful because the target BTS is beyond the normal range and the target BTS would not accept an out of range timing advance.

Cause value = 9 Channel mode unacceptable

indicates that the MS does not have the capability to handle the requested mode or type of channel.

Cause value = 10 Frequency not implemented

indicates that the MS does not have the capability to operate on (at least one of) the requested frequency(ies).

Cause value = 65 Call already cleared;

indicates that a handover is unsuccessful because the connection has been released by the network or the remote user.

Cause value = 95 Semantically incorrect message;

See annex H, section H5.10.

Cause value = 96 Invalid mandatory information;

See annex H, section H6.1.

Cause value = 97 Message type non-existent or not implemented;

See annex H, section H6.2.

Cause value = 98 Message type not compatible with protocol state;

See annex H, section H6.3

Cause value = 100 Conditional IE error;

See annex H, section H6.5

Cause value = 101 No cell allocation available;

indicates that an assignment or handover is unsuccessful because the MS has no current CA.

Cause value = 111 Protocol error unspecified;

See annex H, section H6.8.

Annex G (informative):
GSM specific cause values for mobility management

See TS 24.008.

Annex H (informative): GSM specific cause values for call control

See TS 24.008.

Annex I (informative): GSM specific cause values for session management

See TS 24.008.

Annex J (informative): Algorithm to encode frequency list information elements

This annex is informative.

J.1 Introduction

Some information elements encode frequency lists with a special method. The main specification specifies the meaning of the fields and hence the way to decode them, but the corresponding encoding algorithm is difficult to infer from the decoding algorithm. This annex is intended as an aid for implementers of the encoding algorithm.

It could be shown that any set of frequency with less or the same number of frequencies as the number of words can be encoded with a careful choice of F1, F2, and so on, i.e. that a set of Wi can be found so that the decoding algorithm given in the main section will give back the frequency set. The right order is not the order of the frequency values.

J.2 General principle

The encoding algorithm is based on a recursive dichotomy of both the range (i.e. the set of values that are possible) and the subset (the values to encode).

The dichotomy is best understood if the range is seen as a circle. For instance, for the 1023 range:

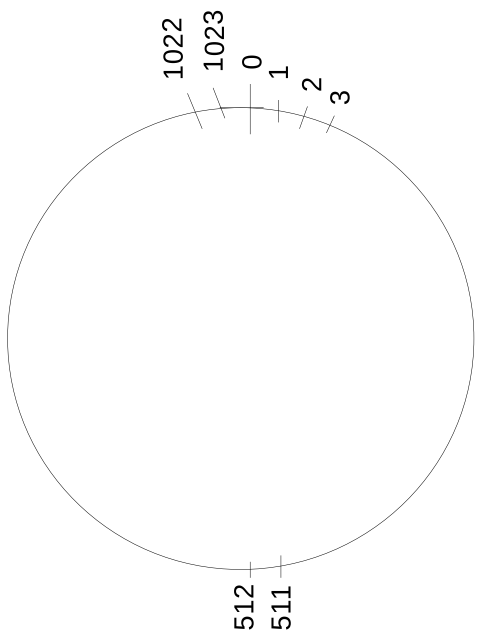


Figure J.1: Circular arrangement of 0..1023

The dichotomy consists in finding a value in the subset such that the diameter determined by this value splits the subset in two equal or nearly equal sub-subsets. In the following case, we see that value 290 is acceptable (the two sub-subsets have 3 elements), when value 250 is not acceptable (the two sub-subsets have 4 and 2 elements):

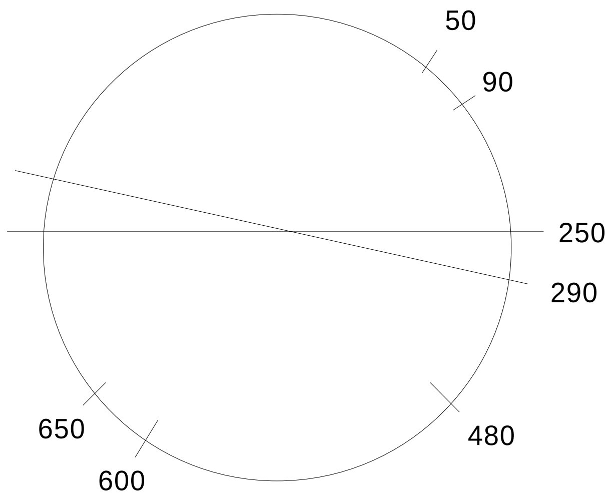


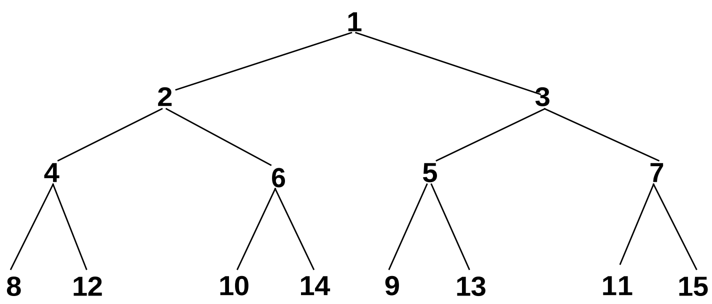
Figure J.2: Example of dichotomy

The pivot value is part of the information field, then the two sub-subsets are renumbered and the same algorithm is applied again on each of them. Because the range is halved at each step, the number of bits needed to encode a pivot value is 1 bit less than the number of bits needed to encode the parent pivot value.

The convention is that if the number of values is even, the left sub-subset (that is to say the values that can be expressed as the pivot value minus some integer between 1 and half the range) will have 1 element more than the right subset.

At each step the subset is numbered from 0 to the range minus 1. The coding in the information field of the pivot value is its value as renumbered, plus 1. Value 0 is reserved to indicate no element.

The order of appearance in the information field of the successive pivot values is particular. If we present the values as organized as a tree, with the left child being the pivot of the left sub-subset and the right child the pivot of the right sub-subset, the order of appearance is given by the following tree:



(and so on)

This order has been chosen so that

a) whatever the number N of elements in the set, the meaningful nodes are the first N and the value for all nodes from N+1 on are null (if sent),

b) the tree and all subtrees are balanced.

Important properties of these trees are used in the algorithms (with generation 1 corresponding to the root):

Generation g contains 2^{g-1} nodes, and their indices are 2^{g-1} to 2^{g}-1;

For generation g, nodes 2^{g-1} to $2^{g-1}+2^{g-2}-1$ are left children, the others are right children;

If node k belongs to generation g, its left child is node k + 2^{g-1} , and its right child is k + 2^{g};

Reciprocally, if k is a left child from generation g, its parent node is node k - 2^{g-2}, and if k is a right child of generation g, its parent is node k - 2^{g-1}.

J.3 Performances

The number of bits needed to encode a given set of values depends on the number of values and on the range they can span.

For the application on the BCCH and the SACCH (CA and BA information) 16 octets are available, and the number of frequencies that can be encoded in one information element is the following:

Range	Number of frequencies
513 to 1024	2 to 16 (17 if frequency 0 is in)
257 to 512	2 to 18
129 to 256	2 to 22
113 to 128	2 to 29
up to 112	any

With two messages (for the BA) the number of frequencies that can be encoded is the following:

Range	Number of frequencies
513 to 1024	2 to 36 (NOTE 1)
257 to 512	2 to 40 (NOTE 2)
225 to 256	2 to 51 (NOTE 3)
up to 224	any

NOTE 1: A 1024 range can be split cyclically in to two 512 ranges each with less than 18 frequencies; each subset is coded in one message with 512 range format.

NOTE 2: A 512 range can be split in to two consecutive 256 ranges. If both sub-ranges contain 22 frequencies or less, it is possible to code each of these in a messages using the 256 range format. Otherwise one of the two ranges contains 23 frequencies or more: 22 of them can be coded in one message using the 256 range format and the remaining frequencies (numbering less than or equal to 18) can be coded in the other message using the 512 range format.

NOTE 3: The principles described in notes 1 and 2, above apply in this case.

The frequency short list information element allows the following:

Range	Number of frequencies
513 to 1024	2 to 7 (8 if frequency 0 is in)
257 to 512	2 to 8
129 to 256	2 to 9
57 to 128	2 to 12
up to 56	any

The number of frequencies as a function of the range and the length in octets of the variable length frequency list information element (including the message type and length fields) is given by the following table:

Table J.1/GSM 04.18: Performance of the variable length frequency list information element

Range	513 to 1024	257 to 512	129 to 256	up to 128	variable bit map
octets					
5	1	1	1	1	8
6	2	2	3	3	16
7	3	3	4	4	24
8	4	4	5	6	32
9	5	6	6	8	40
10	6	7	8	10	48
11	7	8	9	12	56
12	9	9	11	14	64
13	10	11	13	16	72
14	11	12	14	18	80
15	12	13	16	21	88
16	13	15	18	24	96
17	14	16	20	26	104
18	16	18	22	29	112
19	17	19	24	32	120
20	18	21	26	--	128
21	20	22	28		136
22	21	24	30		144
23	22	26	32		152
24	24	27	34		160
25	25	29	37		168
26	26	30	40		176
27	28	32	42		184
28	29	34	45		192
29	30	36	48		200
30	32	38	50		208
31	33	40	53		216
32	35	42	56		224

J.4 Encoding algorithm

The choice is done recursively as given by the following programs, written in ADA:

Let us define the recursive procedure:

```
    procedure ENCODE_SUBTREE(in INDEX : INTEGER;
                             in SET : SET_OF_VALUE;
                             in RANGE : INTEGER);
```

This procedure is given a set of integer values and an index. It chooses one of those values and computes the corresponding W(INDEX) (considered as a global variable), it splits the set less the value in two equal or nearly equal subsets, and calls itself recursively for each of those subsets, with suitable INDEX.

Assumption: all values in SET lie (inclusively) between 0 and RANGE-1, and they are all distinct.

As written, the program does not assume special values for the range. With a range such as 2^k-1, some expressions can be simplified.

```
Declarative part:
        INDEX_IN_SET : INTEGER;
      begin
```

First the program tests the leaf conditions :

```
        if SET'SIZE=0 then
          W(INDEX) := 0;
          return;
        elsif SET'SIZE=1 then
          W(INDEX) := 1 + SET(1);
```

```
      return;
    end if;
```

The following program finds a value in the set such that exactly (SET'SIZE-1)/2 values from the set are between this value plus 1 and this value plus half the range :

```
  declare
    N : INTEGER;
    J : INTEGER;
  begin
    for I in 1..SET'SIZE loop
      N:=0;
      for J in 1..SET'SIZE loop
        if (SET(J)-SET(I)) mod RANGE <= (RANGE-1)/2 then
          N := N+1;
        end if;
      end loop;
```

The test compares N-1 because the possible pivot value is counted.

```
      if N-1 = (SET'SIZE-1)/2 then
        INDEX_IN_SET := I;
        exit;
      end if;
    end loop;
  end;
```

INDEX_IN_SET is then the index in the list of the pivot value.

The following sets W(INDEX)

```
    W(INDEX) := SET(INDEX_IN_SET) + 1;
```

Then the program does the same thing for the two halves of the range delimited by W(INDEX) and W(INDEX)+RANGE/2. First the left subset:

```
  declare
    SUBSET : SET_OF_VALUE(1..SET'SIZE/2);
    SUBSET_INDEX : INTEGER;
    ORIGIN_VALUE : INTEGER;
  begin
    ORIGIN_VALUE := (SET(INDEX_IN_SET] + (RANGE-1)/2
                    + 1) mod RANGE;
    SUBSET_INDEX:=1;
    for I in 1..SET'SIZE loop
      if (SET(I)-ORIGIN_VALUE) mod RANGE) < RANGE/2 then
        SUBSET(SUBSET_INDEX) :=
          (SET(I) - ORIGIN_VALUE) mod RANGE;
        SUBSET_INDEX := SUBSET_INDEX + 1;
      end if;
    end loop;

    ENCODE_SUBTREE(
        INDEX := INDEX +
          GREATEST_POWER_OF_2_LESSER_OR_EQUAL_TO(INDEX),
        SET := SUBSET,
        RANGE := RANGE/2);
  end;
```

Then the right subset:

```
  declare
    SUBSET : SET_OF_VALUE(1..(SET'SIZE-1)/2);
    SUBSET_INDEX : INTEGER;
    ORIGIN_VALUE : INTEGER;
  begin
    ORIGIN_VALUE := (SET(INDEX_IN_SET] + 1) mod RANGE;
    SUBSET_INDEX:=1;
    for I in 1..SET'SIZE loop
      if (SET(I)-ORIGIN_VALUE) mod RANGE) < RANGE/2 then
        SUBSET(SUBSET_INDEX) :=
          (SET(I) - ORIGIN_VALUE) mod RANGE;
        SUBSET_INDEX := SUBSET_INDEX + 1;
      end if;
    end loop;
    ENCODE_SUBTREE(
```

```
          INDEX := INDEX +
            2*GREATEST_POWER_OF_2_LESSER_OR_EQUAL_TO(INDEX),
          SET := SUBSET,
          RANGE := (RANGE-1)/2);
    end;

      end ENCODE_SUBTREE;
```

The initial call of the procedure depends on the format. Given some set to encode, the first problem is to verify that it can be encoded, and by so doing to choose the format.

First the encoding process must find the minimum range of the set, that is to say the minimum value R such that there exists one frequency F_0 in the set such that all frequencies in the set can be written (F_0 + N) mod 1024, with some N, 0 = N = R-1. The choice of the format depends on R and the number of frequencies : the 512 range format can be chosen only if Rµ512, the 256 range format can be chosen only if R=256, the 128 range format can be chosen only if Rµ128.

If the chosen format is "1024 range", then the program must first check if frequency 0 is in the set. If so the F0 subfield is set to 1, and frequency 0 is removed from the set. Otherwise, the F0 subfield is set to 0. Then ENCODE_SUBTREE is called with INDEX := 1, SET set to the set of values equal to the ARFCN of all frequencies minus 1, and RANGE := 1023.

If the chosen format is "512 range", "256 range" or "128 range", F_0 is chosen as ORIG-ARFCN and ENCODE_SUBTREE is called with INDEX := 1, SET set to the set of values equal to the ARFCN of all frequencies except F_0, minus F_0+1, and RANGE set respectively to 511, 255 or 127.

J.5 Decoding

The decoding algorithm, as given below, is the inverse transform of the program given in the previous section, for the specific case where the original range is a power of 2 minus 1. It is given a set of integer values W(i), and an original range R, and it builds a set of values from 0..R-1.

The program is here written so that the fact that it is the inverse of the encoding program needs no more proof.

```
procedure DECODE(in W : array <> of INTEGER;
                           out SET : SET_OF_VALUE;
                           in ORIGINAL_RANGE : INTEGER);

     -- local variables
      INDEX : 1..W'SIZE;      RANGE : INTEGER;
        N : INTEGER;

    begin
      for K in 1..W'SIZE loop
```

The next loop follows the tree from child to parent, from the node of index K to the root (index 1). For each iteration the node of index INDEX is tackled. The corresponding range is RANGE, and N is the value of the element in the range defined by the node.

The data are set to their initial values :

```
       INDEX := K;
       RANGE := ORIGINAL_RANGE / GREATEST_POWER_OF_2_LESSER_OR_EQUAL_TO(INDEX);
       N := W(INDEX) - 1;

    while INDEX>1 loop
```

Due to the assumption that the original range is a power of two minus one, the range for the parent node can be easily computed, and does not depend upon whether the current node is a left or right child :

```
    RANGE := 2*RANGE + 1;
```

Let us note J := 2^{g-1}, g being the generation of node INDEX. We have
J = GREATEST_POWER_OF_2_LESSER_OR_EQUAL_TO(INDEX).
The numbering used in the tree is such that the nodes of index J to J + J/2 - 1 are left children, and the nodes of index J/2 to J+J-1 are right children. Hence an easy test to distinguish left and right children:

```
      if 2*INDEX <
            3*GREATEST_POWER_OF_2_LESSER_OR_EQUAL_TO(INDEX)
```

```
        then         -- left child
```

The next computation gives the index of the parent node of the node of index INDEX, for a left child :

```
         INDEX := INDEX -
            GREATEST_POWER_OF_2_LESSER_OR_EQUAL_TO(INDEX)/2;
```

The next formula is the inverse of the renumbering appearing in the encoding for a left child. It gives the value of the parent node in the range defined by the grand-parent node:

```
        N := (N + W(INDEX) - 1 + (RANGE-1)/2 + 1)
                         mod RANGE;
      else                          -- right child
```

The next computation gives the index of the parent node of the node of index INDEX, for a right child :

```
        INDEX := INDEX - GREATEST_POWER_OF_2_LESSER_OR_EQUAL_TO(INDEX);
```

The next formula is the inverse of the renumbering appearing in the encoding for a right child:

```
            N := (N + W(INDEX) - 1 + 1) mod RANGE;
          end if;
        end loop;
        F(K) := N;
      end loop;
    end;
```

A careful study will show that the programs given in the main part of the Technical Specification are equivalent to the one presented here. The main difference is the use of different remnant variables to remove most of the calls to the function giving the greatest power of 2 less than or equal to some integer.

The decoding must be terminated by the correction specific to the format.

J.6 A detailed example

Let us take the following subset of 16 elements of the set [0..1023] : [13, 71, 122, 191, 251, 321, 402, 476, 521, 575, 635, 701, 765, 831, 906, 981]

Range 1024 format will be used. Frequency 0 is not in the set, thus field F0 is set to 0. The set is renumbered, so as to give a subset of 0..1022 : [12, 70, 121, 190, 250, 320, 401, 475, 520, 574, 634, 700, 764, 830, 905, 980].

For the first node (corresponding to W(1)), the value 121 satisfies the requirements. The opposite value is 121 + 511 = 632. There are 8 values between 633 and 120 (namely the left-hand subset 634, 700, 764, 830, 905, 980, 12 and 70), and 7 values between 122 and 632 (namely the right-hand subset 190, 250, 320, 401, 475, 520 and 574).

The encoded value W(1) is 121 + 1, i.e. 122.

The second node (corresponding to W(2)) is the left-hand child of the first node. The corresponding subtree has to encode for the left-hand subset, renumbered beginning at 633. This gives the following 8 element subset of 0..510, ordered as resulting from the example of algorithm : [402, 460, 1, 67, 131, 197, 272, 347]. Out of these values, 1 splits the set in 4 and 3, and the encoded value W(2) is 2.

Similarly, the third node (W(3)) is the right-hand child of the first node and then the corresponding subtree encodes for the right-hand subset, renumbered starting at 122. This gives the following set of 0..510 : [68, 128, 198, 279, 353, 398, 452]. Out of these values, 68 splits the set into 3 and 3, and the encoded value W(3) is 69.

The same method is applied for all nodes, giving the following encoded values per node:

node	value	node	value
1	122	9	83
2	2	10	3
3	69	11	24
4	204	12	67
5	75	13	54
6	66	14	64

7	60	15	70
8	70	16	9

The encoding then consists in formatting, in that order :

> 122 on 10 bits, then 2 and 69 on 9 bits each, then 204, 75, 66 and 60 on 8 bits each, then 70, 83, 3, 24, 67, 54, 64 and 70 on 7 bits each, and finally 9 on 6 bits.

Conversely the decoding can be done easily. For instance for node 2, the original value is:

> (122 - 512 + 2) smod 1023 = 635

For node 14, we have as original value:

> (122 - 512 + (2 + (66 + 64)smod 255)smod 511)smod 1023 = 765

Annex K (informative): Default Codings of Information Elements

This annex is informative.

The information in this annex does NOT define the value of any IEI for any particular message. This annex exists to aid the design of new messages, in particular with regard to backward compatibility with phase 1 mobile stations.

K.1 Common information elements.

For the common information elements see TS 24.008 Annex K.

K.2 Radio Resource management information elements.

For the Radio Resource management information elements listed below, the default coding of the information element identifier bits is summarized in table K.2/GSM 04.18.

Table K.2/GSM 04.18 (page 1 of 2): Default information element identifier coding for Radio Resource management information elements

8 7 6 5 4 3 2 1		Reference section
1 : : : - - - -	Type 1 info elements	
1 0 0 1 - - - -	Cipher Mode Setting	10.5.2.9
1 0 1 0 - - - -	Cipher Response	10.5.2.10
1 0 1 1 - - - -	Note	
1 1 0 1 - - - -	Synchronization Indication	10.5.2.39
1 1 1 0 - - - -	Channel Needed	10.5.2.8
0 : : : : : : :	Type 3 & 4 info elements	
0 0 0 0 0 0 1 0	Frequency Short List	10.5.2.14
0 0 0 0 0 1 0 1	Frequency List	10.5.2.13
0 1 1 0 0 0 0 1	Note	
0 1 1 0 0 0 1 0	Cell Channel Description	10.5.2.1b
0 1 1 0 0 0 1 1	Channel Mode	10.5.2.6
0 1 1 0 0 1 0 0	Channel Descrip- tion	10.5.2.5
0 1 1 0 0 1 1 0	Channel Mode 2	10.5.2.7
0 1 1 0 1 0 0 0	Note	
0 1 1 0 1 0 0 1	Frequency Chan- nel Sequence	10.5.2.12
0 1 1 0 1 0 1 0	Note	
0 1 1 0 1 0 1 1	Note	
0 1 1 0 1 1 0 0	Note	
0 1 1 1 0 0 0 1	Note	
0 1 1 1 0 0 1 0	Mobile Allocation 10.5.2.21	
0 1 1 1 0 0 1 1	BA range 10.5.2.1	
0 1 1 1 0 1 0 0	Note	
0 1 1 1 0 1 0 1	Note	
0 1 1 1 0 1 1 0	Note	
0 1 1 1 0 1 1 1	Mobile Time difference10.5.2.21a	
0 1 1 1 1 0 0 0	Note	
0 1 1 1 1 0 0 1	Note	
0 1 1 1 1 0 1 0	Note	
0 1 1 1 1 0 1 1	Time Difference10.5.2.41	
0 1 1 1 1 1 0 0	Starting Time 10.5.2.38	
0 1 1 1 1 1 0 1	Timing Advance 10.5.2.40	
0 1 1 1 1 1 1 0	TMSI 10.5.2.42	
0 1 1 1 1 1 1 1	Note	

NOTE: These values were allocated but never used in earlier phases of the protocol.

Annex L (normative): Additional Requirements for backward compatibility with PCS 1900 for NA revision 0 ME

See TS 24.008.

Annex M (informative): Change Record

Based on GSM 04.08 version 7.1.0 and inclusion of CRs.

TDoc	SPEC	CR	RE	VER	SUBJECT	CAT	NEW
P-99-510	04.08	A371	2	7.1.0	BCIE modifications due to EDGE	B	8.0.0
P-99-523	04.08	A515	1	7.1.0	Split of 04.08 in RR and CN parts (Section 7, "L3 stage2")	F	8.0.0
P-99-388	04.08	A562		7.1.0	CR to 04.08 due to EDGE SMG2 EDGE WS	B	8.0.0
P-99-523	04.08	A567	1	7.1.0	Split of 04.08 in RR and CN parts	F	8.0.0
P-99-390	04.08	A592	1	7.1.0	GSM 400 and Mobile Station Classmark	B	8.0.0
P-99-523	04.08	A611	1	7.1.0	Split of 04.08 in RR and CN parts	F	8.0.0
P-99-523	04.08	A613	1	7.1.0	Split of 04.08 in RR and CN parts	F	8.0.0
P-99-512	04.08	A621	2	7.1.0	IE Daylight saving time	B	8.0.0
P-99-461	04.08	A687		7.1.0	Transfer of the LSA Information to the MS	B	8.0.0

Version 8.1.0 based on version 8.0.0 and CRs approved at SMG#30.

TDoc	SPEC	CR	RE	VER	SUBJECT	CAT	NEW
896/99	04.18	A002		8.0.0	Correction of Mobile Station Classmark 2 in the Talker	A	8.1.0
1000/99	04.18	A004		8.0.0	Modification due to ECSD Asymmetry	B	8.1.0
1006/99	04.18	A005		8.0.0	Fast power control	B	8.1.0
1419/99	04.18	A006	1	8.0.0	Compact Cell Reselection	B	8.1.0
1403/99	04.18	A008	1	8.0.0	EGPRS support on 04.18 Immediate Assignment & PDCH	B	8.1.0
1322/99	04.18	A009	1	8.0.0	Alignment on 04.60 of information elements RR Packet	A	8.1.0
1415/99	04.18	A010	1	8.0.0	Clarification of MCC and MNC in SI 4/16/17 rest octets	A	8.1.0
1082/99	04.18	A011		8.0.0	Length of BA List Pref IE in the Channel Release	A	8.1.0
1327/99	04.18	A013	1	8.0.0	Alignment of RLC_OCTET_COUNT in 04.08 with 04.60	A	8.1.0
1139/99	04.18	A014		8.0.0	System information type 14 and 15	A	8.1.0
1133/99	04.18	A015		8.0.0	EDGE Compact and support for EGPRS in ANSI-136	B	8.1.0
1348/99	04.18	A016	1	8.0.0	Introduction of short LSA ID.	A	8.1.0
1330/99	04.18	A018	1	8.0.0	New coding of SI 4/7/8 Rest Octets.	A	8.1.0
1252/99	04.18	A019		8.0.0	Correction to handling of GPRS suspension cause	A	8.1.0
1353/99	04.18	A022	2	8.0.0	Alignment between 04.08 & 04.60 on the packet access	A	8.1.0
1452/99	04.18	A023		8.0.0	Addition of 3rd MNC digit in Routing Area Identification	A	8.1.0
1358/99	04.18	A024		8.0.0	Addition of new SI type in SI 9 Rest Octets.	A	8.1.0
1458/99	04.18	A025		8.0.0	Addition of PR mode in ASSIGNMENT message in 04.08	A	8.1.0

Version 8.2.0 based on version 8.1.0 and CRs approved at SMG#30bis.

1908/99	04.18	A007	2	8.1.0	Definition of extended TA layer 3 information	C	.2.0
1510/99	04.18	A028		8.1.0	Applicability of "Uplink Reply"	B	8.2.0
1511/99	04.18	A029		8.1.0	Removal of old message types	F	8.2.0
1512/99	04.18	A030		8.1.0	Corrections in Uplink management procedures	F	8.2.0
1513/99	04.18	A031		8.1.0	NCH parameters & combined CCCH	F	8.2.0
1628/99	04.18	A037		8.1.0	Editorial (misleading reference) (R99)	A	8.2.0
1646/99	04.18	A041		8.1.0	Handover execution in cells that support extended TA	C	.2.0
1733/99	04.18	A042		.1.0	Introduction of two 'Release Indication' bits in the	C	.2.0
1839/99	04.18	A051		8.1.0	Multiband on early classmark sending	B	.2.0
1957/99	04.18	A052	1	8.1.0	Packet extended timing advance	B	.2.0
1918/99	04.18	A053		8.1.0	Correction to Packet Access Reject procedure	A	8.2.0

CRs agreed at SMG#31:

04.18	A003	3	R99	8.2.0	Non-GSM Broadcast Information	B	8.3.0
04.18	A038	2	R99	8.2.0	EGPRS COMPACT Cell Selection, Cell Bar Qualify 2	B	8.2.0
04.18	A063	1	R99	8.2.0	Alignment of 04.18 with 04.60 for EGPRS Downlink	F	8.3.0
04.18	A064		R99	8.2.0	Support for packet pause procedure for mobile stations	B	8.3.0
04.18	A065		R99	8.2.0	COMPACT Cell Selection, Cell Bar Qualify 2 removal	B	8.3.0
04.18	A068		R99	8.2.0	Emergency Call Handling in COMPACT	B	8.3.0
04.18	A001	3	R99	8.2.0	Immediate assignment	B	8.3.0
04.18	A033	5	R99	8.2.0	PR_MODE field in assignment message	A	8.3.0
04.18	A040	2	R99	8.2.0	Channel Request Description IE length and Packet	A	8.3.0
04.18	A054		R99	8.2.0	Clarification of the RLC/MAC segmentation in single	A	8.3.0
04.18	A073		R99	8.2.0	Suspension Cause IE	A	8.3.0
04.18	A075		R99	8.2.0	Clarification of starting timer T3134	A	8.3.0
04.18	A043	1	R99	8.2.0	Uplink L3 Message Sequencing	C	8.3.0
04.18	A035	2	R99	8.1.0	Intorduction of LCS into GSM 04.08	A	7.2.0

After SMG#31bis:

First some purely editorial changes have been made implementing ETSIs stylesheet in a noticebly better way, and figures in LD (linedraw) format have been corrected to table format which is also readable in Windows 2000. Corroded bullit styles in subclause 3.4.17 which consistently crashed the PCs have been corrected. All those framed CSN.1 parts have been corrected to 'real' tables, which is much more stable and easier to maintain. CRs agreed at SMG#31bis:

A082 Addition of CSCH description

A084 Inconsistent Rest Octet length indication

A091 Inter System Handover Command (scls 10.5.2.48 in CR is added as scls 10.5.2.51

A094 Correction of SI 4 Rest Octets

A080 Moving NOTIFICATION RESPONSE from MM to GSM RR

A101r1 Downlink and Uplink information for Measurement Reporting and Enhanced Measurement Reporting on 3G Cells. Note that scls 9.1.53 and 54 in the CR has been added as 9.1.54 and 9.1.55.

A081r1 COMPACT: impact of new block ordering on SI19

A097r1 EGPRS and IA Rest Octets IE

A098r2 DTM: definition of new procedures while in dedicated mode

A092r2 Support of Handover from GSM to cdma2000

A056r4 EGPRS mode TBF establishment on CCCH

A086r2 Clarification of power control requirements during TBF establishment

A085r2 Incomplete Rest Octet information

A090r2 New measurement order - Idle mode

A099r2 DTM: definition of new messages

A057r5 Blind search Idle Mode – SI2ter

A062r3 RR UTRAN Classmark Change

A089r1 RR Pre-configuration Command

A095r3 Distributing UMTS frequencies to the mobiles

A104r2 UE Classmark Enquiry

History

Document history				
V8.3.0	May 2000	One-step Approval Procedure	OAP 20000901:	2000-05-03 to 2000-09-01
V8.4.0	June 2000	One-step Approval Procedure	OAP 20001013:	2000-06-14 to 2000-10-13