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CHANGE REQUEST

⌘ **24.008** **CR** **532** ⌘ ev **-** ⌘ Current version: **5.1.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network **X** Core Network **X**

Title:	⌘	Correction of references in 24.008
Source:	⌘	Rapporteur
Work item code:	⌘	TEI5
Date:	⌘	11-12-2001
Category:	⌘	**A**
Release:	⌘	REL-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change: ⌘ Some of the references in 24.008 are still using pre-Release 5 numbering (e.g. 04.84 instead of 24.084)

Summary of change: ⌘ The following references are updated:

02.09 to 42.009
02.17 to 42.017
02.42 to 22.042 and reference included in Section 2
03.03 to 23.003
03.13 to 43.013
03.20 to 43.020
03.22 to 43.022
03.40 to 23.040 and reference included in Section 2
03.55 to 43.055
03.60 to 23.060
03.64 to 43.064
04.08 to 24.008
04.31 to 44.031
04.56 to 44.056 and reference included in Section 2
04.83 to 24.083
04.84 to 24.084
05.02 to 45.002
05.05 to 45.005
05.08 to 45.008
05.10 to 45.010
11.10 to 51.010
11.21 to 51.021

References [1] and [2] are set to void as they are not used in the specification.

Consequences if ⌘ 24.008 will reference non existant specifications

not approved:	

Clauses affected:	⌘	1.5, 1.7.2.1, 2, 2.1, 2.2.2, 4.2, 4.2.1.1, 4.2.2.4, 4.2.3, 4.2.4, 4.2.4.1.1, 4.2.4.2.5, 4.2.4.3, 4.2.5, 4.2.5.1.1, 4.2.5.1.3, 4.2.5.1.5, 4.2.5.1.6, 4.2.5.1.7, 4.3.1, 4.3.1.1, 4.3.2b, 4.3.2.1, 4.3.2.3, 4.3.2.4, 4.3.3, 4.3.4, 4.4.1, 4.4.4.3, 4.4.4.9, 4.5.1.5, 4.5.1.6, 4.7.2.1.1, 4.7.3.1.1, 4.7.6, 4.7.7a, 4.7.7b, 4.7.7.1, 4.7.7.3, 4.7.7.4, 4.7.8, 10.5.1.6, 10.5.1.7, 10.5.1.9, 10.5.3.8, 10.5.3.9, 10.5.4.4, 10.5.4.7, 10.5.5.4, 10.5.5.12a, 10.5.6.1, 10.5.6.10
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	This corresponds to CR 531 which updates the references in the Release 4 version of 24.008

How to create CRs using this form:

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2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

1.5 Use of logical channels in A/Gb mode

The logical control channels are defined in 3GPP TS ~~05.02~~45.002 [32]. 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 3GPP TS 44.006):

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 3GPP TS 44.005 and 3GPP TS 44.006) as required for each individual message.

********** Next Modified Section **********

1.7.2.1 Packet services in GSM (GSM only)

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 ~~03.60~~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 ETS do not support combinations of VGCS, VBS and GPRS. The possible interactions are not studied yet.

********** Next Modified Section **********

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

[1] ~~3GPP TS 01.02: "Digital cellular telecommunications system (Phase 2+); General description of a GSM Public Land Mobile Network (PLMN)"~~Void.

[2] ~~3GPP TS 01.04: "Digital cellular telecommunications system (Phase 2+); Abbreviations and acronyms"~~Void.

[2a] 3GPP TS 21.905 "3G Vocabulary for 3GPP Specifications"

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

[4] 3GPP TS 22.003: "Teleservices supported by a GSM Public Land Mobile Network (PLMN)".

[5] 3GPP TS ~~02.09~~42.009: "Digital cellular telecommunications system (Phase 2+); Security aspects".

[6] 3GPP TS 22.011: "Digital cellular telecommunications system (Phase 2+); Service accessibility".

[7] 3GPP TS ~~02.17~~42.017: "Digital cellular telecommunications system (Phase 2+); Subscriber identity modules Functional characteristics".

[8] 3GPP TS 02.40: "Digital cellular telecommunications system (Phase 2+); Procedures for call progress indications".

[9] 3GPP TS 03.01: "Digital cellular telecommunications system (Phase 2+); Network functions".

[10] 3GPP TS 23.003: "Digital cellular telecommunications system (Phase 2+); Numbering, addressing and identification".

[11] 3GPP TS ~~03.13~~43.013: "Digital cellular telecommunications system (Phase 2+); Discontinuous Reception (DRX) in the GSM system".

[12] 3GPP TS 23.014: "Digital cellular telecommunications system (Phase 2+); Support of Dual Tone Multi-Frequency signalling (DTMF) via the GSM system".

[12a] 3GPP TS 23.071: "Digital cellular telecommunications system (Phase 2+); Location Services; Functional description – Stage 2".

[13] 3GPP TS ~~03.20~~43.020: "Digital cellular telecommunications system (Phase 2+); Security related network functions".

[14] 3GPP TS 23.122: "NAS Functions related to Mobile Station (MS) in idle mode".

[15] 3GPP TS 24.002: "GSM-UMTS Public Land Mobile Network (PLMN) access reference configuration".

[16] 3GPP TS 44.003: "Digital cellular telecommunications system (Phase 2+); Mobile Station - Base Station System (MS - BSS) interface Channel structures and access capabilities".

[17] 3GPP TS 44.004: "Digital cellular telecommunications system (Phase 2+); layer 1 General requirements".

[18] 3GPP TS 44.005: "Digital cellular telecommunications system (Phase 2+); Data Link (DL) layer General aspects".

[19] 3GPP TS 44.006: "Digital cellular telecommunications system (Phase 2+); Mobile Station - Base Station System (MS - BSS) interface Data Link (DL) layer specification".

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

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

[22] 3GPP TS 24.011: "Point-to-Point (PP) Short Message Service (SMS) support on mobile radio interface".

[23] 3GPP TS 24.012: "Short Message Service Cell Broadcast (SMSCB) support on the mobile radio interface".

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

[23b] 3GPP TS ~~04.31~~44.031 "Digital cellular telecommunication system (Phse 2+);Location Services;Mobile Station (MS) – Serving Mobile Location Centre (SMLC); Radio Resource LCS Protocol (RRLP)".

[23c] 3GPP TS 25.331 : "3rd Generation Partnership Project;Technical Specification Group Radio Access Network; RRC Protocol Specification"

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

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

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

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

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

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

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

[31] 3GPP TS 24.088: "Call Barring (CB) supplementary services - Stage 3".

[32] 3GPP TS ~~05.02~~45.002: "Digital cellular telecommunications system (Phase 2+); Multiplexing and multiple access on the radio path".

[33] 3GPP TS ~~05.05~~45.005: "Digital cellular telecommunications system (Phase 2+); Radio transmission and reception".

[34] 3GPP TS ~~05.08~~45.008: "Digital cellular telecommunications system (Phase 2+); Radio subsystem link control".

[35] 3GPP TS ~~05.10~~45.010: "Digital cellular telecommunications system (Phase 2+); Radio subsystem synchronization".

[36] 3GPP TS 27.001: "General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS)".

[37] 3GPP TS 29.002: "Digital cellular telecommunications system (Phase 2+); Mobile Application Part (MAP) specification".

[38] 3GPP 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] 3GPP TS ~~11.10~~51.010: "Digital cellular telecommunications system (Phase 2+); Mobile Station (MS) conformity specification".

[40] 3GPP TS ~~11.21~~51.021: "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] ITU-T Recommendation E.163: "Numbering plan for the international telephone service".

[45] ITU-T Recommendation E.164: "Numbering plan for the ISDN era".

[46] ITU-T Recommendation E.212: "Identification plan for land mobile stations".

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

[48] ITU-T Recommendation I.330: "ISDN numbering and addressing principles".

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

[50] ITU-T 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] ITU-T Recommendation T.50: "International Alphabet No. 5".

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

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

[55] ITU-T 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] ITU-T 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] Void.

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

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

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

[63] Void.

[64] Void.

[65] ITU-T 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] ITU-T Recommendation X.31: "Support of packet mode terminal equipment by an ISDN".

[67] Void.

[68] Void.

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

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

[71] ETSI 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] 3GPP TS 22.060: "General Packet Radio Service (GPRS); Service Description; Stage 1".

[74] 3GPP TS 23.060: "General Packet Radio Service (GPRS); Service Description; Stage 2".

[75] 3GPP TS ~~03.64~~43.064: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Overall description of the GPRS radio interface; Stage 2".

[76] 3GPP TS 44.060: "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] 3GPP TS 44.065: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Subnetwork Dependent Convergence Protocol (SNDCP)".

[79] ITU Recommendation I.460: "Multiplexing, rate adaption and support of existing services".

[80] 3GPP TS 26.111: "Codec for Circuit Switched Multimedia Telephony Service; Modifications to H.324"

[81] 3GPP TS 23.107: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; QoS Concept and Architecture"

[82] 3GPP TS ~~03.22~~43.022: " Digital cellular telecommunications system (Phase 2+); Functions related to Mobile Station (MS) in idle mode and group receive mode".

[83] 3GPP TS 26.103: "3rd Generation Partnership Project; TSG-SA Codec Working Group; Speech Codec List for GSM and UMTS"

[84] 3GPP TS 44.018: "3rd Generation Partnership Project; Technical Specification Group GSM EDGE Radio Access Network; Mobile radio interface layer 3 specification, Radio Resource Control Protocol (Release 4)"

[85] 3GPP TS 48.008: "3rd Generation Partnership Project; Technical Specification Group GSM EDGE Radio Access Network; Mobile-services Switching Centre – Base Station System (MSC – BSS) interface; layer 3 specification (Release 4)"

[86] 3GPP TS 48.018: "3rd Generation Partnership Project; Technical Specification Group GSM EDGE Radio Access Network; General Packet Radio Service (GPRS); Base Station System (BSS) – Serving GPRS Support Node (SGSN); BSS GPRS Protocol (BSSGP) (Release 4)".

[87] 3GPP TS ~~03.55~~43.055: "Dual Transfer Mode; Stage 2".

[88] 3GPP TS 23.067: "enhanced Multi-Level Precedence and Pre-emption service (eMLPP) - Stage 2"

[89] 3GPP TS 23.226: "Global Text Telephony; Stage 2 "

[90] 3GPP TS 26.226: "Cellular Text Telephone Modem (CTM), General Description "

[91] 3GPP TS 22.042: "Network Identity and Timezone (NITZ), Stage 1"

[92] 3GPP TS 23.040: "Technical realization of the Short Message Service (SMS)"

[93] 3GPP TS 44.056: "CTS radio interface layer 3 specification"

2.1 Definitions and abbreviations

Abbreviations used in this specification are listed in 3GPP TS ~~01.04~~21.905 [2a].

********** Next Modified Section **********

2.2.2 Vocabulary

The following terms are used in this Technical Specification:

- A **GSM security context** is established and stored in the MS and the network as a result of a successful execution of a GSM authentication challenge. The GSM security context consists of the GSM ciphering key and the ciphering key sequence number.

- A **UMTS security context** is established and stored in the MS and the network as a result of a successful execution of a UMTS authentication challenge. The UMTS security context consists of the UMTS ciphering key, the UMTS integrity key, the GSM ciphering key and the cipher key sequence number.

- **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 ~~03.22~~43.022 [82] and ~~05.08~~45.008 [34];

- **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 3GPP TS 44.060 [76].

- **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 3GPP TS 44.060 [76].

- **RLC/MAC block:** A RLC/MAC block is the protocol data unit exchanged between RLC/MAC entities, see 3GPP TS 44.060 [76].

- 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 3GPP 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 3GPP TS 23.060 [74].

- **RR connection:** A RR connection is a dedicated physical circuit switched domain connection used by the two RR or RRC peer entities to support the upper layers' exchange of information flows.

- **PS signalling connection** is a peer to peer UMTS connection between MS and CN packet domain node.

- **Inter-System change** is a change of radio access between different radio access technologies such as GSM and UMTS.

- **GPRS:** Packet Services for GSM and UMTS system.

- The label **(GSM only)** indicates this section or paragraph applies only to GSM system. For multi system case this is determined by the current serving radio access network.

- The label **(UMTS only)** indicates this section or paragraph applies only to UMTS system. For multi system case this is determined by the current serving radio access network.

- **In GSM,...** Indicates this paragraph applies only to GSM System. For multi system case this is determined by the current serving radio access network.

- **In UMTS,...** Indicates this paragraph applies only to UMTS System. For multi system case this is determined by the current serving radio access network.

- **SIM,** Subscriber Identity Module (see 3GPP TS ~~02.17~~42.017 [7]). This specification makes no distinction between SIM and USIM.

- **MS,** Mobile Station. This specification makes no distinction between MS and UE.

- **Cell Notification** is an (optimised) variant of the Cell Update Procedure which uses the LLC NULL frame for cell change notification which does not trigger the restart of the READY timer

- **DTM:** dual transfer mode, see 3GPP TS 44.018[84] and 3GPP TS ~~03.55~~43.055 [87]

********** Next Modified Section **********

4.2 Behaviour of the MS in MM Idle state, GMM-DEREGISTERED state and GMM-REGISTERED state

In this section, the detailed behaviour of the MS in the main states MM IDLE, GMM-DEREGISTERED and GMM-REGISTERED is described. Sections 4.2.1 to 4.2.3 refer to the state MM IDLE, whereas section 4.2.4 and section 4.2.5 refer to the states GMM-DEREGISTERED and GMM-REGISTERED, respectively.

The MM IDLE state is entered when none of the MM procedures are running and no RR connection exists. It is left when one of the MM procedures are triggered or a RR connection is established.

The specific behaviour in the MM IDLE state depends on the service state of the mobile station as described in section 4.1.2.1.2. The service state depends in particular on the update status which is defined in section 4.1.2.2.

How an appropriate service state is chosen after power on is described in section 4.2.1, and the specific behaviour of the mobile station in MM IDLE state is described in section 4.2.2. The service state chosen when the MM IDLE state is returned to from any state except NULL state is described in 4.2.3.

It should be noted that transitions between the various MM idle states are caused by (e.g.):

- results of procedures on RR connected mode (see section 4.2.3);
- insertion or removal of the SIM;
- cell selection/reselection (see also TS ~~03.22~~43.022 [82]);
- PLMN search;
- loss of coverage.

How various MM procedures affects the service state and the update status is described in the detailed descriptions of the procedures in sections 4.3 to 4.5.

********** Next Modified Section **********

4.2.1.1 Selection of the Service State after Power On.

When mobility management is activated after power-on, the service state is 19.7 PLMN SEARCH. The detailed processing in this state is described in detail in TS ~~03.22~~43.022 [82] and ~~05.08~~45.008 [34], where procedures for power on and selection of PLMN is described in detail. If the "Location update status" stored on the SIM is different from "updated", then the mobile shall act as if the "Location update status" stored on the SIM is "not updated".

The service state when the PLMN SEARCH state is left depends on the outcome of the search and on the presence of the SIM:

- if no cell has been found, the state is NO CELL AVAILABLE, until a cell is found;
- if no SIM is present the state is NO IMSI;
- if the mobile station has been continuously activated since loosing coverage and then returns to coverage, and if the selected cell is in the location area where the mobile station is registered and the timer T3212 has not expired, then the state is NORMAL SERVICE;
- if the selected cell is in the location area where the mobile station is registered and IMSI ATTACH is not required and timer T3212 has not expired, then the state is NORMAL SERVICE;
- if the mobile station is in automatic network selection mode and the selected cell is in a forbidden PLMN or a forbidden LA, then the mobile station enters the LIMITED SERVICE state;
- if the mobile station is in manual network selection mode and no cell of the selected PLMN has been found, then the mobile station enters the LIMITED SERVICE state;
- otherwise, the mobile station enters the LOCATION UPDATE NEEDED state.

********** Next Modified Section **********

4.2.2.4 Service State, NO IMSI

When in state MM IDLE and service state NO IMSI the mobile station shall (see section 3.2, 3GPP TS ~~03.22~~43.022 [82] and 3GPP TS ~~05.08~~45.008 [34]):

- not start any normal location updating attempt;
- not perform periodic updating;
- not perform IMSI detach if powered down;
- reject any request from CM entities for MM connections except for emergency calls;
- not respond to paging;
- only perform default cell selection.

In addition, mobile stations supporting VGCS listening or VBS listening shall:

- not indicate notifications to the GCC or BCC layer.

********** Next Modified Section **********

4.2.3 Service state when back to state MM IDLE from another state

When returning to MM IDLE, e.g., after a location updating procedure, the mobile station selects the cell as specified in TS ~~03.22~~43.022 [82]. With one exception, this is a normal cell selection.

If this return to idle state is not subsequent to a location updating procedure terminated with reception of cause "Roaming not allowed in this location area" the service state depends on the result of the cell selection procedure, on the update status of the mobile station, on the location data stored in the mobile station and on the presence of the SIM:

- if no cell has been found, the state is NO CELL AVAILABLE, until a cell is found;
- if no SIM is present, or if the inserted SIM is considered invalid by the MS, the state is NO IMSI;
- if the selected cell is in the location area where the MS is registered, then the state is NORMAL SERVICE; it shall be noted that this also includes an abnormal case described in paragraph 4.4.4.9;
- (Only applicable for mobile stations supporting VGCS listening or VBS listening.) if the mobile stations was in the service state RECEIVING GROUP CALL (NORMAL SERVICE) or RECEIVING GROUP CALL (LIMITED SERVICE) before the location updating procedure and the selected cell is in the location area where the mobile station is registered, then the state is RECEIVING GROUP CALL (NORMAL SERVICE);
- if the selected cell is in a location area where the mobile station is not registered but in which the MS is allowed to attempt a location update, then the state is LOCATION UPDATE NEEDED;
- if the selected cell is in a location area where the mobile station is not allowed to attempt a location update, then the state is LIMITED SERVICE;
- (Only applicable for MSs supporting VGCS listening or VBS listening.) if the MSs was in the service state RECEIVING GROUP CALL (NORMAL SERVICE) or RECEIVING GROUP CALL (LIMITED SERVICE) before the location updating procedure and the selected cell is in the location area where the MS is not allowed to attempt a location update, then the state is RECEIVING GROUP CALL (LIMITED SERVICE);
- after some abnormal cases occurring during an unsuccessful location updating procedure, as described in paragraph 4.4.4.9, the state is ATTEMPTING TO UPDATE.

In case of a return from a location updating procedure to which was answered "Roaming not allowed in this location area", the service state PLMN SEARCH is entered as specified in section 4.2.1.2.

4.2.4 Behaviour in state GMM-DEREGISTERED

The state GMM-DEREGISTERED is entered when:

- the MS is switched on;
- the GPRS capability has been enabled in the MS;
- a GPRS detach or combined GPRS detach procedure has been performed; or
- a GMM procedure has failed (except routing area updating, see 4.7.5).

The selection of the appropriate substate of GMM-DEREGISTERED after switching on is described in section 4.2.4.1. The specific behaviour of the MS in state GMM-DEREGISTERED is described in section 4.2.4.2. The substate chosen when the GMM-DEREGISTERED state is returned to from another state except state GMM-NULL is described in section 4.2.4.3.

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

- insertion or removal of the SIM;
- cell selection/reselection (see also 3GPP TS ~~03.22~~43.022 [82]);
- PLMN search;
- loss/regain of coverage; or
- change of RA.

How various GMM procedures affect the GMM-DEREGISTERED substates and the GPRS update status is described in the detailed description of the GMM procedures in section 4.7.

********** Next Modified Section **********

4.2.4.1.1 Selection of the substate after power on or enabling the MS's GPRS capability

When the MS is switched on, the substate shall be PLMN-SEARCH in case the SIM is inserted and valid. See 3GPP TS 23.122 [14] and 3GPP TS ~~05.08~~45.008 [34] for further details.

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

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

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

********** Next Modified Section **********

4.2.4.2.5 Substate, NO-CELL

The MS shall:

- perform cell selection according to TS ~~03.22~~43.022 [82] and shall choose an appropriate substate.

********** Next Modified Section **********

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

When returning to state GMM-DEREGISTERED, the MS shall select a cell as specified in TS ~~03.22~~43.022 [82].

The substate depends on the result of the cell selection procedure, the outcome of the previously performed GMM specific procedures , on the GPRS update status of the MS, on the location area data stored in the MS and on the presence of the SIM:

- if no cell has been found, the substate is NO-CELL-AVAILABLE, until a cell is found;
- if no SIM is present or if the inserted SIM is considered invalid by the MS, the substate shall be NO-IMSI;
- if the selected cell is in a location area where the MS is allowed to roam, the substate shall be NORMAL-SERVICE;
- if a GPRS attach shall be performed (e.g. network requested reattach), the substate shall be ATTEMPTING-TO-ATTACH
- if a PLMN reselection (according to 3GPP TS 23.122 [14]) is needed , the substate shall be PLMN SEARCH
- if the selected cell is in a location area where the MS is not allowed to roam, the state shall be LIMITED-SERVICE.

4.2.5 Behaviour in state GMM-REGISTERED

The state GMM-REGISTERED is entered when:

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

The specific behaviour of the MS in state GMM-REGISTERED is described in section 4.2.5.1. The primary substate when entering the state GMM-REGISTERED is always NORMAL-SERVICE.

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

- cell selection/reselection (see also TS ~~03.22~~43.022 [82]);
- change of RA;
- loss/regain of coverage.

How various GMM procedures affect the GMM-REGISTERED substates is described in the detailed description of the procedures in section 4.7.

********** Next Modified Section **********

4.2.5.1.1 Substate, NORMAL-SERVICE

The MS shall:

- perform cell selection/reselection according to TS ~~03.22~~43.022 [82];
- perform normal and periodic routing area updating; and
- receive and transmit user data and signalling information.

GPRS MSs in operation modes C or A shall answer to paging requests.

GPRS MS in operation mode B may answer to paging requests.

********** Next Modified Section **********

4.2.5.1.3 Substate, UPDATE-NEEDED

The MS shall:

- not send any user data;
- not send any signalling information;
- perform cell selection/reselection according to TS ~~03.22~~43.022 [82]; and
- chose the appropriate new substate depending on the GPRS update status as soon as the access class allows network contact in the selected cell.

********** Next Modified Section **********

4.2.5.1.5 Substate, NO-CELL-AVAILABLE

The MS shall perform cell selection/reselection according to TS ~~03.22~~43.022 [82].

4.2.5.1.6 Substate, LIMITED-SERVICE

The MS shall perform cell selection/reselection according to TS ~~03.22~~43.022 [82];

4.2.5.1.7 Substate, ATTEMPTING-TO-UPDATE-MM

The MS shall:

- perform cell selection/reselection according to TS ~~03.22~~43.022 [82];
- receive and transmit user data and signalling information.
- perform routing area update indicating "combined RA/LA updating with IMSI attach" on the expiry of timers T3311 or T3302;
- perform routing area update indicating "combined RA/LA updating with IMSI attach" when the routing area of the serving cell has changed and the location area this cell is belonging to is not in the list of forbidden LAs;

GPRS MSs in operation modes C or A shall answer to paging requests.

GPRS MS in operation mode B may answer to paging requests.

********** Next Modified Section **********

4.3.1 TMSI reallocation procedure

The purpose of the TMSI reallocation procedure is to provide identity confidentiality , i.e. to protect a user against being identified and located by an intruder (see 3GPP TS ~~02.09~~42.009 [5], ~~03.20~~43.020[13] and TS 33.102).

If the identity confidentiality service is applied for an IMSI, a Temporary Mobile Subscriber Identity (TMSI) is used for identification within the radio interface signalling procedures.

The structure of the TMSI is specified in 3GPP TS 23.003. The TMSI has significance only within a location area. Outside the location area it has to be combined with the Location Area Identifier (LAI) to provide for an unambiguous identity.

Usually the TMSI reallocation is performed at least at each change of a location area. (Such choices are left to the network operator).

The reallocation of a TMSI can be performed either by a unique procedure defined in this section or implicitly by a location updating procedure using the TMSI. The implicit reallocation of a TMSI is described together with that procedure.

If a TMSI provided by a mobile station is unknown in the network e.g. due to a data base failure, the network may require the mobile station to provide its International Mobile Subscriber Identity (IMSI). In this case the identification procedure (see section 4.3.3) should be used before the TMSI reallocation procedure may be initiated.

The TMSI reallocation can be initiated by the network at any time whilst a RR connection exists between the network and the mobile station.

NOTE 1: Usually the TMSI reallocation is performed in ciphered mode.

NOTE 2: Normally the TMSI reallocation will take place in conjunction with another procedure, e.g. at location updating or at call setup (see 3GPP TS 29.002).

4.3.1.1 TMSI reallocation initiation by the network

The network initiates the TMSI reallocation procedure by sending a TMSI REALLOCATION COMMAND message to the mobile station and starts the timer T3250.

The TMSI REALLOCATION COMMAND message contains a new combination of TMSI and LAI allocated by the network or a LAI and the IMSI if the used TMSI shall be deleted. Usually the TMSI-REALLOCATION COMMAND message is sent to the mobile station using a RR connection in ciphered mode (see 3GPP TS ~~03.20~~43.020 [13] and 3GPP TS 33.102).

********** Next Modified Section **********

4.3.2b Authentication Procedure used for a GSM authentication challenge

The purpose of the authentication procedure is twofold (see 3GPP TS ~~03.20~~43.020 [13]):

First to permit the network to check whether the identity provided by the mobile station is acceptable or not;

Second to provide parameters enabling the mobile station to calculate a new GSM ciphering key.

The cases where the authentication procedure should be used are defined in 3GPP TS ~~02.09~~42.009 [5].

The authentication procedure is always initiated and controlled by the network. GSM authentication challenge shall be supported by a ME supporting GSM or UMTS radio access.

A GSM security context is established in the MS and the network when a GSM authentication challenge is performed in GSM or in UMTS. However, in UMTS an MS which supports the UMTS authentication algorithm shall not accept a GSM authentication challenge. After a successful GSM authentication, the GSM ciphering key and the ciphering key sequence number, are stored both in the network and the MS.

4.3.2.1 Authentication request by the network

The network initiates the authentication procedure by transferring an AUTHENTICATION REQUEST message across the radio interface and starts the timer T3260. The AUTHENTICATION REQUEST message contains the parameters necessary to calculate the response parameters (see 3GPP TS ~~03.20~~43.020 [13] (in case of GSM authentication challenge) and TS 33.102 (in case of an UMTS authentication challenge)). In a GSM authentication challenge, the AUTHENTICATION REQUEST message also contains the GSM ciphering key sequence number allocated to the key which may be computed from the given parameters. In a UMTS authentication challenge, the AUTHENTICATION REQUEST message also contains the ciphering key sequence number allocated to the key set of UMTS ciphering key, UMTS integrity key and GSM ciphering key which may be computed from the given parameters.

********** Next Modified Section **********

4.3.2.3 Authentication processing in the network

Upon receipt of the AUTHENTICATION RESPONSE message, the network stops the timer T3260 and checks the validity of the response (see 3GPP TS ~~03.20~~43.020 [13] in case of a GSM authentication challenge respective TS 33.102 in case of an UMTS authentication challenge).

Upon receipt of the AUTHENTICATION FAILURE message, the network stops the timer T3260. In Synch failure case, the core network may renegotiate with the HLR/AuC and provide the MS with new authentication parameters.

4.3.2.4 Ciphering key sequence number

The security parameters for authentication and ciphering are tied together in sets.In a GSM authentication challenge, from a challenge parameter RAND both the authentication response parameter SRES and the GSM ciphering key can be computed given the secret key associated to the IMSI. In a UMTS authentication challenge, from a challenge parameter RAND, the authentication response parameter RES and the UMTS ciphering key and the UMTS integrity key can be computed given the secret key associated to the IMSI. In addition, a GSM ciphering key can be computed from the UMTS ciphering key and the UMTS integrity key by means of an unkeyed conversion function.

In order to allow start of ciphering on a RR connection without authentication, the ciphering key sequence numbers are introduced. The ciphering key sequence number is managed by the network in the way that the AUTHENTICATION REQUEST message contains the ciphering key sequence number allocated to the GSM ciphering key (in case of a GSM authentication challenge) or the UMTS ciphering key and the UMTS integrity key (in case of a UMTS authentication challenge) which may be computed from the RAND parameter carried in that message.

The mobile station stores the ciphering key sequence number with the GSM ciphering key (in case of a GSM authentication challenge) and the UMTS ciphering key and the UMTS integrity key (in case of a UMTS authentication challenge) and indicates to the network in the first message (LOCATION UPDATING REQUEST, CM SERVICE REQUEST, PAGING RESPONSE, CM RE-ESTABLISHMENT REQUEST) which ciphering key sequence number the stored GSM ciphering key (in case of a GSM authentication challenge) or set of UMTS ciphering, UMTS integrity and derived GSM ciphering keys (in case of a UMTS authentication challenge) has.

When the deletion of the ciphering key sequence number is described this also means that the associated GSM ciphering key, the UMTS ciphering key and the UMTS integrity key shall be considered as invalid (i.e. the established GSM security context or the UMTS security context is no longer valid).

In GSM, the network may choose to start ciphering with the stored GSM ciphering key (under the restrictions given in 3GPP TS ~~02.09~~42.009 [5]) if the stored ciphering key sequence number and the one given from the mobile station are equal.

In UMTS, the network may choose to start ciphering and integrity with the stored UMTS ciphering key and UMTS integrity key (under the restrictions given in 3GPP TS ~~02.09~~42.009 [5] and TS 33.102) if the stored ciphering key sequence number and the one given from the mobile station are equal.

NOTE: In some specifications the term KSI (Key Set Identifier) might be used instead of the term ciphering key sequence number.

********** Next Modified Section **********

4.3.3 Identification procedure

The identification procedure is used by the network to request a mobile station to provide specific identification parameters to the network e.g. International Mobile Subscriber Identity, International Mobile Equipment Identity (cf. 3GPP TS 23.003). For the presentation of the IMEI, the requirements of 3GPP TS ~~02.09~~42.009 [5] apply.

********** Next Modified Section **********

4.3.4 IMSI detach procedure

The IMSI detach procedure may be invoked by a mobile station if the mobile station is deactivated or if the Subscriber Identity Module (see 3GPP TS ~~02.17~~42.017 [7] and 31.102) is detached from the mobile station.

In GSM, a flag (ATT) broadcast in the L3-RR SYSTEM INFORMATION TYPE 3 message on the BCCH is used by the network to indicate whether the detach procedure is required. The value of the ATT flag to be taken into account shall be the one broadcast when the mobile station was in MM idle.

In UMTS, a flag (ATT) broadcast in the L3-RRC SYSTEM INFORMATION BLOCK 1 message on the BCCH is used by the network to indicate whether the detach procedure is required. The value of the ATT flag to be taken into account shall be the one broadcast when the mobile station was in MM idle.

The procedure causes the mobile station to be indicated as inactive in the network.

********** Next Modified Section **********

4.4.1 Location updating procedure

The location updating procedure is a general procedure which is used for the following purposes:

- normal location updating (described in this section);
- periodic updating (see section 4.4.2);
- IMSI attach (see section 4.4.3).

The normal location updating procedure is used to update the registration of the actual Location Area of a mobile station in the network. The location updating type information element in the LOCATION UPDATING REQUEST message shall indicate normal location updating. The conditions under which the normal location updating procedure is used by a mobile station in the MM IDLE state are defined for each service state in section 4.2.2.

Only applicable for mobile stations supporting VGCS listening or VBS listening: A mobile station in RR group receive mode is in the MM IDLE state, substate RECEIVING GROUP CALL (NORMAL SERVICE) or RECEIVING GROUP CALL (LIMITED SERVICE). To perform a location updating, the MS in RR group receive mode shall leave the group receive mode, establish an independent dedicated RR connection to perform the location updating as described above and return to the RR group receive mode afterwards.

The normal location updating procedure shall also be started if the network indicates that the mobile station is unknown in the VLR as a response to MM connection establishment request.

To limit the number of location updating attempts made, where location updating is unsuccessful, an attempt counter is used. The attempt counter is reset when a mobile station is switched on or a SIM card is inserted.

Upon successful location updating the mobile station sets the update status to UPDATED in the SIM, and stores the received Location Area Identification in the SIM. The attempt counter shall be reset.

The detailed handling of the attempt counter is described in 4.4.4.6 to 4.4.4.9.

The Mobile Equipment shall contain a list of "forbidden location areas for roaming", as well as a list of "forbidden location areas for regional provision of service". These lists shall be erased when the MS is switched off or when the SIM is removed, and periodically (with period in the range 12 to 24 hours). The location area identification received on the BCCH that triggered the location updating request shall be added to the suitable list whenever a location update reject message is received with the cause "Roaming not allowed in this location area" or with the cause "Location Area not allowed". The lists shall accommodate each 10 or more location area identifications. When the list is full and a new entry has to be inserted, the oldest entry shall be deleted.

The Mobile Equipment shall store a list of "equivalent PLMNs". This list is replaced or deleted at the end of each location update procedure, routing area update procedure and GPRS attach procedure. The stored list consists of a list of equivalent PLMNs as downloaded by the network plus the PLMN code of the network that downloaded the list. The stored list shall not be deleted when the MS is switched off. The stored list shall be deleted if the SIM is removed. The maximum number of possible entries in the stored list is six.

The cell selection processes in the different states are described in TS ~~03.22~~43.022 [82] and 3GPP TS ~~05.08~~45.008 [34].

The location updating procedure is always initiated by the mobile station.

********** Next Modified Section **********

4.4.4.3 Authentication by the network

The authentication procedure (see section 4.3.2) may be initiated by the network upon receipt of the LOCATION UPDATING REQUEST message from the mobile station. (See the cases defined in 3GPP TS ~~02.09~~42.009 [5]).

********** Next Modified Section **********

4.4.4.9 Abnormal cases on the mobile station side

The different abnormal cases that can be identified are the following:

a) Access barred because of access class control

The location updating procedure is not started. The mobile station stays in the current serving cell and applies normal cell reselection process. The procedure is started as soon as possible and if still necessary (when the barred state is ended or because of a cell change)

b) The answer to random access is an IMMEDIATE ASSIGNMENT REJECT message (A/Gb mode only)

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

c) Random access failure (A/Gb mode only)

Timer T3213 is started. When it expires the procedure is attempted again if still necessary.

NOTE: As specified in 3GPP TS ~~05.08~~45.008 [34], a cell reselection then takes place, with return to the cell inhibited for 5 seconds if there is at least one other suitable cell. Typically the selection process will take the mobile station back to the cell where the random access failed after 5 seconds.

If at the expiry of timer T3213 a new cell has not been selected due to the lack of valid information (see 3GPP TS ~~05.08~~45.008 [34]), the mobile station may as an option delay the repeated attempt for up to 8 seconds to allow cell re-selection to take place. In this case the procedure is attempted as soon as a new cell has been selected or the mobile station has concluded that no other cell can be selected.

If random access failure occurs for two successive random access attempts for location updating the mobile station proceeds as specified below.

d) RR connection failure

The procedure is aborted and the mobile station proceeds as specified below.

e) T3210 timeout

The procedure is aborted, the RR connection is aborted and the MS proceeds as specified below.

f) RR release before the normal end of procedure

The procedure is aborted and the mobile station proceeds as specified below.

g) Location updating reject, other causes than those treated in section 4.4.4.7

The MS waits for release of the RR connection as specified in section 4.4.4.8, and then proceeds as specified below.

h) RR connection establishment failure (Iu mode only)

The procedure is aborted and the mobile station proceeds as specified below.

NOTE: Case h) covers all cases when the signalling connection cannot be established, including random access failure and access reject. As the RRC protocol has error specific retransmission mechanisms (see 3GPP TS 25.331), there is no need to distinguish between the different error cases within MM.

In cases d) to h) above and for repeated failures as defined in c) above the mobile station proceeds as follows. Timer T3210 is stopped if still running. The RR Connection is aborted in case of timer T3210 timeout. The attempt counter is incremented. The next actions depend on the Location Area Identities (stored and received from the BCCH of the current serving cell) and the value of the attempt counter.

– the update status is UPDATED, and the stored LAI is equal to the one received on the BCCH from the current serving cell and the attempt counter is smaller than 4:

The mobile station shall keep the update status to UPDATED, the MM IDLE sub-state after the RR connection release is NORMAL SERVICE. The mobile station shall memorize the location updating type used in the location updating procedure. It shall start timer T3211 when the RR connection is released. When timer T3211 expires the location updating procedure is triggered again with the memorized location updating type;

– either the update status is different from UPDATED, or the stored LAI is different from the one received on the BCCH from the current serving cell, or the attempt counter is greater or equal to 4:

The mobile station shall delete any LAI, TMSI, ciphering key sequence number stored in the SIM, and list of equivalent PLMNs, set the update status to NOT UPDATED and enter the MM IDLE sub-state ATTEMPTING TO UPDATE when the RR connection is released (See section 4.2.2.2 for the subsequent actions). If the attempt counter is smaller than 4, the mobile station shall memorize that timer T3211 is to be started when the RR connection is released, otherwise it shall memorize that timer T3212 is to be started when the RR connection is released.

********** Next Modified Section **********

4.5.1.5 MM connection establishment for emergency calls

A MM connection for an emergency call may be established in all states of the mobility management sublayer which allow MM connection establishment for a normal originating call. In addition, establishment may be attempted in all service states where a cell is selected (see 4.2.2) but not in the MM CONNECTION ACTIVE state (GROUP TRANSMIT MODE) state. However, as a network dependent option, a MM connection establishment for emergency call may be rejected in some of the states.

NOTE: In GSM, if a mobile station is camping in a network where voice services are not available (CELL_BAR_QUALIFY_2 parameter indicates no voice service) and requests an emergency call service, the mobile station shall immediately go to "Any Cell Selection" state as defined in 3GPP TS ~~03.22~~43.022 [82], prior to establishing the emergency call.

When a user requests an emergency call establishment the mobile station will send a CM SERVICE REQUEST message to the network with a CM service type information element indicating emergency call establishment. If the network does not accept the emergency call request, e.g., because IMEI was used as identification and this capability is not supported by the network, the network will reject the request by returning a CM SERVICE REJECT message to the mobile station.

The reject cause information element indicates the reason for rejection. The following cause values may apply:

#3 "Illegal MS"

#4 "IMSI unknown in VLR"

#5 "IMEI not accepted"

#6 "Illegal ME"

#17 "Network failure"

#22 "Congestion"

#32 "Service option not supported"

#34 "Service option temporarily out of order"

With the above defined exceptions, the procedures described for MM connection establishment in 4.5.1.1 and 4.5.1.2 shall be followed.

NOTE: Normally, the mobile station will be identified by an IMSI or a TMSI. However, if none of these identifiers is available in the mobile station, then the mobile station shall use the IMEI for identification purposes. The network may in that case reject the request by returning a CM SERVICE REJECT message with reject cause:

#5 "IMEI not accepted".

4.5.1.6 Call re-establishment

The re-establishment procedure allows a MS to resume a connection in progress after a radio link failure, possibly in a new cell and possibly in a new location area. The conditions in which to attempt call re-establishment or not depend on the call control state, see section 5.5.4 and, whether or not a cell allowing call re-establishment has been found (as described in 3GPP TS ~~05.08~~45.008 [34]). MM connections are identified by their protocol discriminators and transaction identifiers: these shall not be changed during call re-establishment.

The re-establishment takes place when a lower layer failure occurs and at least one MM connection is active (i.e.. the mobile station's MM sublayer is either in state 6 "MM CONNECTION ACTIVE" or state 20 "WAIT FOR ADDITIONAL OUTGOING MM CONNECTION").

NOTE: During a re-establishment attempt the mobile station does not return to the MM IDLE state; thus no location updating is performed even if the mobile is not updated in the location area of the selected cell.

No call re-establishment shall be performed for voice group and broadcast calls.

********** Next Modified Section **********

4.7.2.1.1 READY timer behaviour (GSM only)

The READY timer, T3314 is used in the MS and in the network per each assigned P-TMSI to control the cell updating procedure.

When the READY timer is running or has been deactivated the MS shall perform cell update each time a new cell is selected (see TS ~~03.22~~43.022 [82]). If a routing area border is crossed, a routing area updating procedure shall be performed instead of a cell update.

When the READY timer has expired the MS shall:

- perform the routing area updating procedure when a routing area border is crossed;
- not perform a cell update when a new cell is selected.

All other GMM procedures are not affected by the READY timer.

The READY timer is started:

- in the MS when the GMM entity receives an indication from lower layers that an LLC frame other than LLC NULL frame has been transmitted on the radio interface; and
- in the network when the GMM entity receives an indication from lower layers that an LLC frame other than LLC NULL frame has been successfully received by the network.

Within GMM signalling procedures the network includes a 'force to standby' information element, in order to indicate whether or not the READY timer shall be stopped when returning to the GMM-REGISTERED state. If the 'force to standby' information element is received within more than one message during a ongoing GMM specific procedure, the last one received shall apply. If the READY timer is deactivated and the network indicates 'force to standby' with the 'force to standby' information element, this shall not cause a modification of the READY timer.

The READY timer is not affected by state transitions to and from the GMM-REGISTERED.SUSPENDED sub-state.

The value of the READY timer may be negotiated between the MS and the network using the GPRS attach or GPRS routing area updating procedure.

- If the MS wishes to indicate its preference for a READY timer value it shall include the preferred values into the ATTACH REQUEST and/or ROUTING AREA UPDATE REQUEST messages. The preferred values may be smaller, equal to or greater than the default values or may be equal to the value requesting the READY Timer function to be deactivated.
- Regardless of whether or not a timer value has been received by the network in the ATTACH REQUEST or ROUTING AREA UPDATE REQUEST messages, the network may include a timer value for the READY timer (different or not from the default value) into the ATTACH ACCEPT or ROUTING AREA UPDATE ACCEPT messages, respectively. If the READY Timer value was included, it shall be applied for the GMM context by the network and by the MS.
- When the MS proposes a READY Timer value and the Network does not include any READY Timer Value in its answer, then the value proposed by the MS shall be applied for the GMM context by the Network and by the MS.
- When neither the MS nor the Network proposes a READY Timer value into the ATTACH ACCEPT or ROUTING AREA UPDATE ACCEPT message, then the default value shall be used.

If the negotiated READY timer value indicates that the ready timer function is deactivated, the READY timer shall always run without expiry. If the negotiated READY timer value indicates that the ready timer function is deactivated, and within the same procedure the network indicates 'force to standby' with the 'force to standby' information element, the READY timer shall always run without expiry. If the negotiated READY timer value is set to zero, READY timer shall be stopped immediately.

To account for the LLC frame uplink transmission delay, the READY timer value should be slightly shorter in the network than in the MS. This is a network implementation issue.

If a new READY timer value is negotiated, the MS shall upon the reception of the ATTACH ACCEPT or ROUTING AREA UPDATE ACCEPT message perform a initial cell update (either by transmitting a LLC frame or, if required, a ATTACH COMPLETE or ROUTING AREA UPDATE COMPLETE message), in order to apply the new READY timer value immediately. If both the network and the MS supports the Cell Notification, the initial cell update shall use any LLC frame except the LLC NULL frame. If the new READY timer value is set to zero or if the network indicates 'force to standby' with the 'force to standby' IE, the initial cell update should not be done.

********** Next Modified Section **********

4.7.3.1.1 GPRS attach procedure initiation

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

The MS capable both UMTS and GSM or only GSM system shall include a valid P-TMSI, if any is available, the P-TMSI signature associated with the P-TMSI and the routing area identity associated with the P-TMSI in the ATTACH REQUEST message. If there is no valid P-TMSI available, the IMSI shall be included instead of the P-TMSI and P-TMSI signature.

The MS shall also indicate within the DRX parameters whether it supports the split pg cycle option on CCCH. The optional support of the split pg cycle on CCCH by the network is indicated in SI13 or PSI1. Split pg cycle on CCCH is applied by both the network and the MS when the split pg cycle option is supported by both (see 3GPP TS ~~05.02~~45.002 [32]).

In UMTS, if the MS wishes to prolong the established PS signalling connection after the GPRS attach procedure, it may set a follow-on request pending indicator on.

********** Next Modified Section **********

4.7.6 P-TMSI reallocation procedure

A temporary mobile station identity for GPRS services, the Packet-TMSI (P-TMSI), is used for identification within the radio interface signalling procedures. The structure of the P-TMSI is specified in 3GPP TS 23.003 [10]. The P-TMSI has significance only within a routing area. Outside the routing area it has to be combined with the routing area identification (RAI) to provide for an unambiguous identity.

The purpose of the P-TMSI reallocation procedure is to provide identity confidentiality, i.e. to protect a user against being identified and located by an intruder (see 3GPP TS ~~02.09~~42.009 [5] and ~~03.20~~43.020 [13] ~~[34]~~).

Usually, P-TMSI reallocation is performed at least at each change of a routing area. (Such choices are left to the network operator).

The reallocation of a P-TMSI is performed by the unique procedure defined in this section. This procedure can only be initiated by the network in state GMM-REGISTERED.

P-TMSI can also be implicitly reallocated in the attach or routing area updating procedures. The implicit reallocation of a P-TMSI is described in the corresponding sections.

NOTE: Normally, the P-TMSI reallocation will take place in conjunction with another GMM procedure, e.g. at routing area updating (see 3GPP TS 29.002 [37]).

********** Next Modified Section **********

4.7.7a Authentication and ciphering procedure used for UMTS authentication challenge.

The purpose of the authentication and ciphering procedure is fourfold (see TS 33.102):

- to permit the network to check whether the identity provided by the MS is acceptable or not;
- to provide parameters enabling the MS to calculate a new GPRS UMTS ciphering key and a new GPRS UMTS integrity key.
- to let the network set the GSM ciphering mode (ciphering /no ciphering) and GSM ciphering algorithm; and
- to permit the mobile station to authenticate the network.

In UMTS, and in the case of a UMTS authentication challenge, the authentication and ciphering procedure can be used for authentication only.

The cases in which the authentication and ciphering procedure shall be used are defined in TS 33.102 and 3GPP TS ~~02.09~~42.009 [5].

The authentication and ciphering procedure is always initiated and controlled by the network. However, in the case of a UMTS authentication challenge, there is the possibility for the MS to reject the network.

UMTS authentication challenge shall be supported by a MS supporting the UMTS authentication algorithm.

Note: According to 3GPP TS 33.102, a ME supporting only A/Gb mode need not support the USIM interface and in consequence need not support the UMTS authentication challenge.

The authentication and ciphering procedure can be used for either:

- authentication only;
- setting of the GSM ciphering mode and the GSM ciphering algorithm only; or
- authentication and the setting of the GSM ciphering mode and the GSM ciphering algorithm.

In GSM, the network should not send any user data during the authentication and ciphering procedure.

A UMTS security context is established in the MS and the network when a UMTS authentication challenge is performed in GSM or in UMTS. After a successful UMTS authentication, the GPRS UMTS ciphering key, the GPRS UMTS integrity key, the GPRS GSM ciphering key and the GPRS ciphering key sequence number, are stored both in the network and the MS.

4.7.7b Authentication and ciphering procedure used for GSM authentication challenge

The purpose of the authentication and ciphering procedure is threefold (see 3GPP TS ~~03.20~~43.020 [13]):

- to permit the network to check whether the identity provided by the MS is acceptable or not;
- to provide parameters enabling the MS to calculate a new GPRS GSM ciphering key; and
- to let the network set the GSM ciphering mode (ciphering/no ciphering) and GSM ciphering algorithm.

The authentication and ciphering procedure can be used for either:

- authentication only;
- setting of the GSM ciphering mode and the GSM ciphering algorithm only; or
- authentication and the setting of the GSM ciphering mode and the GSM ciphering algorithm.

The cases in which the authentication and ciphering procedure shall be used are defined in 3GPP TS ~~02.09~~42.009 [5].

In GSM, the authentication and ciphering procedure is always initiated and controlled by the network. It shall be performed in a non ciphered mode because of the following reasons:

- the network cannot decipher a ciphered AUTHENTICATION AND CIPHERING RESPONSE from an unauthorised MS and put it on the black list; and

- to be able to define a specific point in time from which on a new GPRS GSM ciphering key should be used instead of the old one.

GSM authentication challenge shall be supported by a ME supporting GSM or UMTS radio access.

In GSM, the network should not send any user data during the authentication and ciphering procedure.

A GSM security context is established in the MS and the network when a GSM authentication challenge is performed in GSM or in UMTS. However, in UMTS an MS which supports the UMTS authentication algorithm shall not accept a GSM authentication challenge. After a successful GSM authentication challenge, the GPRS GSM ciphering key and the GPRS ciphering key sequence number, are stored both in the network and the MS.

4.7.7.1 Authentication and ciphering initiation by the network

The network initiates the authentication and ciphering procedure by transferring an AUTHENTICATION AND CIPHERING REQUEST message across the radio interface and starts timer T3360. The AUTHENTICATION AND CIPHERING REQUEST message shall contain all parameters necessary to calculate the response parameters when authentication is performed (see 3GPP TS ~~03.20~~43.020 [13] and TS 33.102).

If authentication is requested, then the AUTHENTICATION AND CIPHERING REQUEST message shall contain either:

- In a GSM authentication challenge, the GPRS ciphering key sequence number, allocated to the GPRS GSM ciphering key and the RAND, or

- In a UMTS authentication challenge, the GPRS ciphering key sequence number, allocated to the GPRS UMTS ciphering and GPRS UMTS integrity keys, the RAND and the AUTN.

In GSM, if authentication is not requested, then the AUTHENTICATION AND CIPHERING REQUEST message shall not contain neither the GPRS ciphering key sequence number, the RAND nor the AUTN.

In GSM, if ciphering is requested, in a GSM authentication challenge or in a UMTS authentication challenge, then the AUTHENTICATION AND CIPHERING REQUEST message shall indicate the GPRS GSM ciphering algorithm.

The network includes the A&C reference number information element in the AUTHENTICATION AND CIPHERING REQUEST message. Its value is chosen in order to link an AUTHENTICATION AND CIPHERING REQUEST in a RA with its RESPONSE. The A&C reference number value might be based on the RA Colour Code value.

Additionally, the network may request the MS to include its IMEISV in the AUTHENTICATION AND CIPHERING RESPONSE message.

********** Next Modified Section **********

4.7.7.3 Authentication and ciphering completion by the network

Upon receipt of the AUTHENTICATION AND CIPHERING RESPONSE message, the network stops the timer T3360 and checks the validity of the response (see 3GPP TS ~~03.20~~43.020 [13] and TS 33.102). For this, it may use the A&C reference number information element within the AUTHENTICATION AND CIPHERING RESPONSE message to determine whether the response is correlating to the last request that was sent.

In GSM, the GMM layer shall notify the LLC sublayer if ciphering shall be used or not and if yes which algorithm and GPRS GSM ciphering key that shall be used (see 3GPP TS 04.64 [76]).

Upon receipt of the AUTHENTICATION AND CIPHERING FAILURE message, the network stops the timer T3360. In Synch failure case, the core network may renegotiate with the HLR/AuC and provide the MS with new authentication parameters.

4.7.7.4 GPRS ciphering key sequence number

The security parameters for authentication and ciphering are tied together in sets. In a GSM authentication challenge, from a challenge parameter RAND both the authentication response parameter SRES and the GPRS GSM ciphering key

can be computed given the secret key associated to the IMSI. In a UMTS authentication challenge, from a challenge parameter RAND, the authentication response parameter RES and the GPRS UMTS ciphering key and the GPRS UMTS integrity key can be computed given the secret key associated to the IMSI.

In order to allow start of ciphering on a logical link without authentication, GPRS ciphering key sequence numbers are introduced.

The GPRS ciphering key sequence number is managed by the network such that the AUTHENTICATION AND CIPHERING REQUEST message contains the GPRS ciphering key sequence number allocated to the GPRS GSM ciphering key (in case of a GSM authentication challenge) or the GPRS UMTS ciphering key and the GPRS UMTS integrity key (in case of a UMTS authentication challenge) which may be computed from the RAND parameter carried in that message.

The MS stores the GPRS ciphering key sequence number with the GPRS GSM ciphering key (in case of a GSM authentication challenge) and the GPRS UMTS ciphering key and the GPRS UMTS integrity key (in case of a UMTS authentication challenge),and includes the corresponding GPRS ciphering key sequence number in the ROUTING AREA UPDATE REQUEST , SERVICE REQUEST and ATTACH REQUEST messages.

If the GPRS ciphering key sequence number is deleted, the associated GPRS GSM ciphering key , GPRS UMTS ciphering key and GPRS UMTS integrity key shall be deleted (i.e. the established GSM security context or the UMTS security context is no longer valid).

In UMTS, the network may choose to start ciphering and integrity checking with the stored GPRS UMTS ciphering key and the stored GPRS UMTS integrity key (under the restrictions given in 3GPP TS ~~02.09~~42.009 [5] and 3GPP TS 33.102) if the stored GPRS ciphering key sequence number and the one given from the MS are equal.

In GSM, the network may choose to start ciphering with the stored GPRS GSM ciphering key (under the restrictions given in 3GPP TS ~~02.09~~42.009 [5]) if the stored GPRS ciphering key sequence number and the one given from the MS are equal and the previously negotiated ciphering algorithm is known and supported in the network. When ciphering is requested at GPRS attach, the authentication and ciphering procedure shall be performed since the MS does not store the ciphering algorithm at detach.

Upon GPRS attach, if ciphering is to be used, an AUTHENTICATION AND CIPHERING REQUEST message shall be sent to the MS to start ciphering.

If the GPRS ciphering key sequence number stored in the network does not match the GPRS ciphering key sequence number received from the MS in the ATTACH REQUEST message, then the network should authenticate the MS.

In GSM, the MS starts ciphering after sending the AUTHENTICATION AND CIPHERING RESPONSE message. The network starts ciphering when a valid AUTHENTICATION AND CIPHERING RESPONSE is received from the MS.

In UMTS, the MS starts ciphering and integrity checking according to the conditions specified in specification 3GPP TS 25.331.

In GSM, as an option, the network may decide to continue ciphering without sending an AUTHENTICATION AND CIPHERING REQUEST message after receiving a ROUTING AREA UPDATE REQUEST message with a valid GPRS ciphering key sequence number. Both the MS and the network shall use the latest ciphering parameters. The network starts ciphering when sending the ciphered ROUTING AREA UPDATE ACCEPT message to the MS. The MS starts ciphering after receiving a valid ciphered ROUTING AREA UPDATE ACCEPT message from the network.

NOTE: In some specifications the term KSI (Key Set Identifier) is used instead of the term GPRS ciphering key sequence number.

********** Next Modified Section **********

4.7.8 Identification procedure

The identification procedure is used by the network to request an MS to provide specific identification parameters to the network e.g. International Mobile Subscriber Identity, International Mobile Equipment Identity (see 3GPP TS 23.003). For the presentation of the IMEI, the requirements of 3GPP TS 42.009 [5] apply.

********** Next Modified Section **********

10.5.1.6 Mobile Station Classmark 2

The purpose of the *Mobile Station Classmark 2* information element is to provide the network with information concerning aspects of both high and low priority of the mobile station equipment. This affects the manner in which the network handles the operation of the mobile station. The Mobile Station Classmark information indicates general mobile station characteristics and it shall therefore, except for fields explicitly indicated, be independent of the frequency band of the channel it is sent on.

The *Mobile Station Classmark 2* information element is coded as shown in figure 10.5.6/3GPP TS 24.008, table 10.5.6a/3GPP TS 24.008 and table 10.5.6b/3GPP TS 24.008.

The *Mobile Station Classmark 2* is a type 4 information element with 5 octets length.

8	7	6	5	4	3	2	1	
	Mobile station classmark 2 IEI							octet 1
Length of mobile station classmark 2 contents								octet 2
0 spare	Revision level		ES IND	A5/1	RF power capability			octet 3
0 spare	PS capa.	SS Screen. Indicator		SM ca pabi.	VBS	VGCS	FC	octet 4
CM3	0 spare	LCSVA CAP	UCS2	SoLSA	CMSP	A5/3	A5/2	octet 5

NOTE: Owing to backward compatibility problems, bit 8 of octet 4 should not be used unless it is also checked that the bits 8, 7 and 6 of octet 3 are not "0 0 0".

Figure 10.5.6/3GPP TS 24.008 *Mobile Station Classmark 2* information element

Table 10.5.6a/3GPP TS 24.008: *Mobile Station Classmark 2* information element

Revision level (octet 3)
Bits

7	**6**	
0	0	Reserved for GSM phase 1
0	1	Used by GSM phase 2 mobile stations
1	0	Used by mobile stations supporting R99 or later versions of the protocol
1	1	Reserved for future use

ES IND (octet 3, bit 5) "Controlled Early Classmark Sending" option implementation
AN MS not supporting GSM shall set this bit to '0'.
An MS supporting GSM shall indicate the associated GSM capability (see table):

0	"Controlled Early Classmark Sending" option is not implemented in the MS
1	"Controlled Early Classmark Sending" option is implemented in the MS

NOTE: The value of the ES IND gives the implementation in the MS. It's value is **not** dependent on the broadcast SI 3 Rest Octet <Early Classmark Sending Control> value

Table 10.5.6a/3GPP TS 24.008: *Mobile Station Classmark 2* information element

A5/1 algorithm supported (octet 3, bit 4)
An MS not supporting GSM shall set this bit to '1'.
An MS supporting GSM shall indicate the associated GSM capability (see table)

0 encryption algorithm A5/1 available
1 encryption algorithm A5/1 not available

RF Power Capability (Octet 3)
When GSM 450, GSM 480, GSM 700, GSM 850, GSM 900 P, E [or R] band is used (for exceptions see 3GPP TS 44.018), the MS shall indicate the RF power capability of the band used (see table).
When UMTS is used, a single band GSM 450, GSM 480, GSM 700, GSM 850, GSM 900 P, E [or R] MS shall indicate the RF power capability corresponding to the (GSM) band it supports (see table). In this case, information on which single band is supported is found in classmark 3.
Bits
3 2 1
0 0 0 class 1
0 0 1 class 2
0 1 0 class 3
0 1 1 class 4
1 0 0 class 5
All other values are reserved.

When the DCS 1800 or PCS 1900 band is used (for exceptions see 3GPP TS 44.018) The MS shall indicate the RF power capability of the band used (see table).
When UMTS is used, a single band DCS 1800 or PCS 1900 MS shall indicate the RF power capability corresponding to the (GSM) band it supports (see table). In this case, information on which single band is supported is found in classmark 3
Bits
3 2 1
0 0 0 class 1
0 0 1 class 2
0 1 0 class 3
All other values are reserved.

When UMTS is used, an MS not supporting any GSM band or a multiband GSM MS shall code this field as follows (see table):
Bits
3 2 1
1 1 1 RF Power capability is irrelevant in this information element
All other values are reserved.

PS capability (pseudo-synchronization capability) (octet 4)
An MS not supporting GSM shall set this bit to '0'.
An MS supporting GSM shall indicate the associated GSM capability (see table):
Bit **7**
0 PS capability not present
1 PS capability present

SS Screening Indicator (octet 4)
Bits
6 5
0 0 defined in 3GPP TS 24.080
0 1 defined in 3GPP TS 24.080
1 0 defined in 3GPP TS 24.080
1 1 defined in 3GPP TS 24.080

SM capability (MT SMS pt to pt capability) (octet 4)
Bit **4**
0 Mobile station does not support mobile terminated point to point SMS
1 Mobile station supports mobile terminated point to point SMS

Table 10.5.6a/3GPP TS 24.008: *Mobile Station Classmark 2* information element

VBS notification reception (octet 4)
An MS not supporting GSM shall set this bit to '0'.
An MS supporting GSM shall indicate the associated GSM capability (see table):
Bit **3**
0 no VBS capability or no notifications wanted
1 VBS capability and notifications wanted

VGCS notification reception (octet 4)
An MS not supporting GSM shall set this bit to '0'.
An MS supporting GSM shall indicate the associated GSM capability (see table):
Bit **2**
0 no VGCS capability or no notifications wanted
1 VGCS capability and notifications wanted

FC Frequency Capability (octet 4)
When the GSM 400, or GSM 700, or GSM 850, or DCS 1800, or PCS 1900 band or UMTS is used (for exceptions see 3GPP TS 44.018) , for definitions of frequency band see 3GPP TS 45.005), this bit shall be sent with the value '0'.

Note: This bit conveys no information about support or non support of the E-GSM or R-GSM bands when GSM 400, GSM 700, GSM 850, DCS 1800, PCS 1900 band or UMTS is used.

When a GSM 900 band is used (for exceptions see 3GPP TS 44.018):
Bit **1**
0 The MS does not support the E-GSM or R-GSM band (For definition of frequency bands see 3GPP TS ~~05.05~~45.005 [33])
1 The MS does support the E-GSM or R-GSM (For definition of frequency bands see 3GPP TS ~~05.05~~45.005 [33])
Note: For mobile station supporting the R-GSM band further information can be found in MS Classmark 3.

CM3 (octet 5, bit 8)

0 The MS does not support any options that are indicated in CM3
1 The MS supports options that are indicated in classmark 3 IE

LCS VA capability (LCS value added location request notification capability) (octet 5,bit 6)

0 LCS value added location request notification capability not supported
1 LCS value added location request notification capability supported

UCS2 treatment (octet 5, bit 5)

This information field indicates the likely treatment by the mobile station of UCS2 encoded character strings. For backward compatibility reasons, if this field is not included, the value 0 shall be assumed by the receiver.
0 the ME has a preference for the default alphabet (defined in 3GPP TS 03.38) over UCS2.
1 the ME has no preference between the use of the default alphabet and the use of UCS2.

Table 10.5.6a/3GPP TS 24.008: *Mobile Station Classmark 2* information element

SoLSA (octet 5, bit 4)
An MS not supporting GSM shall set this bit to '0'.
An MS supporting GSM shall indicate the associated GSM capability (see table):
0 The ME does not support SoLSA.
1 The ME supports SoLSA.

CMSP: CM Service Prompt (octet 5, bit 3) $(CCBS)$

0 "Network initiated MO CM connection request" not supported.
1 "Network initiated MO CM connection request" supported for at least one CM protocol.

A5/3 algorithm supported (octet 5, bit 2)
An MS not supporting GSM shall set this bit to '0'.
An MS supporting GSM shall indicate the associated GSM capability (see table):
0 encryption algorithm A5/3 not available
1 encryption algorithm A5/3 available

A5/2 algorithm supported (octet 5, bit 1)
An MS not supporting GSM shall set this bit to '0'.
An MS supporting GSM shall indicate the associated GSM capability (see table):
0 encryption algorithm A5/2 not available
1 encryption algorithm A5/2 available

NOTE: Additional mobile station capability information might be obtained by invoking the classmark interrogation procedure when GSM is used.

10.5.1.7 Mobile Station Classmark 3

The purpose of the *Mobile Station Classmark 3* information element is to provide the network with information concerning aspects of the mobile station. The contents might affect the manner in which the network handles the operation of the mobile station. The Mobile Station Classmark information indicates general mobile station characteristics and it shall therefore, except for fields explicitly indicated, be independent of the frequency band of the channel it is sent on.

The *MS Classmark 3* is a type 4 information element with a maximum of 14 octets length.

The value part of a *MS Classmark 3* information element is coded as shown in figure 10.5.7/3GPP TS 24.008 and table 10.5.7/3GPP TS 24.008.

NOTE: The 14 octet limit is so that the CLASSMARK CHANGE message will fit in one layer 2 frame.

SEMANTIC RULE : a multiband mobile station shall provide information about all frequency bands it can support. A single band mobile station shall not indicate the band it supports in the *Multiband Supported, GSM 400 Bands Supported, GSM 700 Associated Radio Capability, GSM 850 Associated Radio Capability* or PCS *1900 Associated Radio Capability* fields in the MS Classmark 3. Due to shared radio frequency channel numbers between DCS 1800 and PCS 1900, the mobile should indicate support for either DCS 1800 band OR PCS 1900 band.

SEMANTIC RULE : a mobile station shall include the MS Measurement Capability field if the *Multi Slot Class* field contains a value of 19 or greater (see 3GPP TS ~~05.02~~45.002 [32]).

Typically, the number of spare bits at the end is the minimum to reach an octet boundary. The receiver may add any number of bits set to "0" at the end of the received string if needed for correct decoding.

```
<Classmark 3 Value part> ::=
    < spare bit >
    {    < Multiband supported : { 000 } >
             < A5 bits >
    |    < Multiband supported : { 101 | 110 } >
             < A5 bits >
             < Associated Radio Capability 2 : bit(4) >
             < Associated Radio Capability 1 : bit(4) >
    |    < Multiband supported : { 001 | 010 | 100 } >
             < A5 bits >
             < spare bit >(4)
             < Associated Radio Capability 1 : bit(4) > }
    { 0 | 1 < R Support > }
    { 0 | 1 < Multi Slot Capability > }
    < UCS2 treatment: bit >
    < Extended Measurement Capability : bit >
    { 0 | 1 < MS measurement capability > }
    { 0 | 1 < MS Positioning Method Capability > }
    { 0 | 1 < EDGE Multi Slot Capability > }
    { 0 | 1 < EDGE Struct > }
    { 0 | 1 < GSM 400 Bands Supported : { 01 | 10 | 11 } >
             < GSM 400 Associated Radio Capability: bit(4) > }

    { 0 | 1 <GSM 850 Associated Radio Capability : bit(4) > }
    { 0 | 1 <PCS 1900 Associated Radio Capability : bit(4) > }
    < UMTS FDD Radio Access Technology Capability : bit >
    < UMTS 3.84 Mcps TDD Radio Access Technology Capability : bit >
    < CDMA 2000 Radio Access Technology Capability : bit >

    { 0 | 1  < DTM GPRS Multi Slot Class : bit(2) >
             < MAC Mode Support : bit >
             {0 | 1< DTM EGPRS Multi Slot Class : bit(2) > } }
    { 0 | 1 < Single Band Support > } -- Release 4 starts here:
    { 0 | 1 <GSM 700 Associated Radio Capability : bit(4)>}

    < UMTS 1.28 Mcps TDD Radio Access Technology Capability : bit >
    < MS_EXT_UTBF : bit >

    { 0 | 1 < Extended DTM GPRS Multi Slot Class : bit(2) >
             < Extended DTM EGPRS Multi Slot Class : bit(2) > }

    < spare bit > ;

< A5 bits > ::=
    < A5/7 : bit > < A5/6 : bit > < A5/5 : bit > < A5/4 : bit >  ;

<R Support>::=
    < R-GSM band Associated Radio Capability : bit(3) > ;

< Multi Slot Capability > ::=
    < Multi Slot Class : bit(5) >  ;

< MS Measurement capability > ::=
    < SMS_VALUE : bit (4) >
    < SM_VALUE : bit (4) > ;

< MS Positioning Method Capability > ::=
    < MS Positioning Method : bit(5) > ;

< EDGE Multi Slot Capability > ::=
    < EDGE Multi Slot Class : bit(5) > ;

 <EDGE Struct> : :=
    < Modulation Capability : bit >
    { 0 | 1 < EDGE RF Power Capability 1: bit(2) > }
    { 0 | 1 < EDGE RF Power Capability 2: bit(2) > }

< Single Band Support > ::=
```

< GSM Band : bit (4) > ;

Figure 10.5.7/3GPP TS 24.008 *Mobile Station Classmark 3* information element

Table 10.5.7/3GPP TS 24.008: *Mobile Station Classmark 3* information element

Multiband Supported (3 bit field)

Band 1 supported (third bit of the field)
Bit 3
0 P-GSM not supported
1 P-GSM supported

Band 2 supported (second bit of the field)
BIT 2
0 E-GSM or R-GSM not supported
1 E-GSM or R-GSM supported

Band 3 supported (first bit of the field)
Bit 1
0 DCS 1800 not supported
1 DCS 1800 supported

The indication of support of P-GSM band or E-GSM or R-GSM band is mutually exclusive.

When the 'Band 2 supported' bit indicates support of E-GSM or R-GSM, the presence of the <R Support> field, see below, indicates if the E-GSM or R-GSM band is supported.

In this version of the protocol, the sender indicates in this field either none, one or two of these 3 bands supported.

For single band mobile station or a mobile station supporting none of the GSM 900 bands(P-GSM, E-GSM and R-GSM) and DCS 1800 bands, all bits are set to 0.

A5/4
Bit 1
0 Encryption algorithm A5/4 not available
1 Encryption algorithm A5/4 available

A5/5
Bit 1
0 Encryption algorithm A5/5 not available
1 Encryption algorithm A5/5 available

A5/6
Bit 1
0 Encryption algorithm A5/6 not available
1 Encryption algorithm A5/6 available

A5/7
0 Encryption algorithm A5/7 not available
1 Encryption algorithm A5/7 available

Associated Radio capability 1 and 2 (4 bit fields)

If either of P-GSM or E-GSM or R-GSM is supported, the radio capability 1 field indicates the radio capability for P-GSM, E-GSM or R-GSM, and the radio capability 2 field indicates the radio capability for DCS1800 if supported, and is spare otherwise.

If none of P-GSM or E-GSM or R-GSM are supported, the radio capability 1 field indicates the radio capability for DCS1800, and the radio capability 2 field is spare.

The radio capability contains the binary coding of the power class associated with the band indicated in multiband support bits (see GSM~~ß 05.05~~45.005 [13]).

(continued...)

Table 10.5.1.7/3GPP TS 24.008 (continued): *MS Classmark 3* information element

R Support

In case where the R-GSM band is supported the R-GSM band associated radio capability field contains the binary coding of the power class associated (see GSM 45.005) (regardless of the number of GSM bands supported). A mobile station supporting the R-GSM band shall also when appropriate, (see 10.5.1.6) indicate its support in the 'FC' bit in the Mobile Station Classmark 2 information element.

Note: the coding of the power class for P-GSM, E-GSM, R-GSM and DCS 1800 in radio capability 1 and/or 2 is different to that used in the Mobile Station Classmark 1 and Mobile Station Classmark 2 information elements.

Multi Slot Class (5 bit field)

In case the MS supports the use of multiple timeslots then the Multi Slot Class field is coded as the binary representation of the multislot class defined in TS GSM ~~05.02~~45.002 [32].

UCS2 treatment (1 bit field)

This information field indicates the likely treatment by the mobile station of UCS2 encoded character strings. If not included, the value 0 shall be assumed by the receiver.
Bit 1
0 the ME has a preference for the default alphabet (defined in 3GPP TS 03.38) over UCS2.
1 the ME has no preference between the use of the default alphabet and the use of UCS2.

Extended Measurement Capability (1 bit field)

This bit indicates whether the mobile station supports 'Extended Measurements' or not
Bit 1
0 the MS does not support Extended Measurements
1 the MS supports Extended Measurements

SMS_VALUE (Switch-Measure-Switch) (4 bit field)
The SMS field indicates the time needed for the mobile station to switch from one radio channel to another, perform a neighbour cell power measurement, and the switch from that radio channel to another radio channel.
Bits
4 3 2 1
0 0 0 0 1/4 timeslot (~144 microseconds)
0 0 0 1 2/4 timeslot (~288 microseconds)
0 0 1 0 3/4 timeslot (~433 microseconds)
. . .
1 1 1 1 16/4 timeslot (~2307 microseconds)

SM_VALUE (Switch-Measure) (4 bit field)
The SM field indicates the time needed for the mobile station to switch from one radio channel to another and perform a neighbour cell power measurement.
Bits
4 3 2 1
0 0 0 0 1/4 timeslot (~144 microseconds)
0 0 0 1 2/4 timeslot (~288 microseconds)
0 0 1 0 3/4 timeslot (~433 microseconds)
. . .
1 1 1 1 16/4 timeslot (~2307 microseconds)

MS Positioning Method Capability (1 bit field)
This bit indicates whether the MS supports Positioning Method or not for the provision of Location Services.

MS Positioning Method (5 bit field)
This field indicates the Positioning Method(s) supported by the mobile station.
MS assisted E-OTD
Bit 5
0 MS assisted E-OTD not supported
1 MS assisted E-OTD supported

Table 10.5.1.7/3GPP TS 24.008 (continued): *MS Classmark 3* information element

MS based E-OTD
Bit 4
0 MS based E-OTD not supported
1 MS based E-OTD supported

MS assisted GPS
Bit 3
0 MS assisted GPS not supported
1 MS assisted GPS supported

MS based GPS
Bit 2
0 MS based GPS not supported
1 MS based GPS supported

MS conventional GPS
Bit 1
0 conventional GPS not supported
1 conventional GPS supported

EDGE Multi Slot class (5 bit field)

In case the EDGE MS supports the use of multiple timeslots and the number of supported time slots is different from number of time slots supported for GMSK then the EDGE Multi Slot class field is included and is coded as the binary representation of the multislot class defined in 3GPP TS ~~05.02~~45.002 [32].

Modulation Capability

Modulation Capability field indicates the supported modulation scheme by MS in addition to GMSK
Bit 1
0 8-PSK supported for downlink reception only
1 8-PSK supported for uplink transmission and downlink reception

EDGE RF Power Capability 1 (2 bit field)
If 8-PSK modulation is supported for both uplink and downlink, the **EDGE RF Power Capability 1** field indicates the radio capability for8-PSK modulation in GSM 400, GSM700, GSM850 or GSM900.

EDGE RF Power Capability 2 (2 bit field)
If 8-PSK modulation is supported for both uplink and downlink, the **EDGE RF Power Capability 2** field indicates the radio capability for 8-PSK modulation in DCS1800 or PCS1900 if supported, and is not included otherwise.

The respective **EDGE RF Power Capability 1** and **EDGE RF Power Capability 2** fields contain the following coding of the 8-PSK modulation power class (see 3GPP TS ~~05.05~~45.005 [33]):
Bits 2 1
0 0 Reserved
0 1 Power class E1
1 0 Power class E2
1 1 Power class E3

Table 10.5.1.7/3GPP TS 24.008 (continued): *MS Classmark 3* information element

GSM 400 Bands Supported (2 bit field)
See the semantic rule for the sending of this field.
Bits
2 1
0 1 GSM 480 supported, GSM 450 not supported
1 0 GSM 450 supported, GSM 480 not supported
1 1 GSM 450 supported, GSM 480 supported

GSM 400 Associated Radio Capability (4 bit field)
If either GSM 450 or GSM 480 or both is supported, the GSM 400 Associated Radio Capability field indicates the radio capability for GSM 450 and/or GSM 480.

The radio capability contains the binary coding of the power class associated with the band indicated in GSM 400 Bands Supported bits (see 3GPP TS ~~05.05~~45.005 [33]).

Note: the coding of the power class for GSM 450 and GSM 480 in GSM 400 Associated Radio Capability is different to that used in the Mobile Station Classmark 1 and Mobile Station Classmark 2 information elements.

GSM 850 Associated Radio Capability (4 bit field)
See the semantic rule for the sending of this field.
This field indicates whether GSM 850 band is supported and its associated radio capability.

The radio capability contains the binary coding of the power class associated with the GSM 850 band (see 3GPP TS ~~05.05~~45.005 [33]).

Note: the coding of the power class for GSM 850 in GSM 850 Associated Radio Capability is different to that used in the Mobile Station Classmark 1 and Mobile Station Classmark 2 information elements.

PCS 1900 Associated Radio Capability (4 bit field)
See the semantic rule for the sending of this field.
This field indicates whether PCS 1900 band is supported and its associated radio capability.

The radio capability contains the binary coding of the power class associated with the PCS 1900 band (see 3GPP TS ~~05.05~~45.005 [33]).

Note: the coding of the power class for PCS 1900 in PCS 1900 Associated Radio Capability is different to that used in the Mobile Station Classmark 1 and Mobile Station Classmark 2 information elements.

Table 10.5.1.7/3GPP TS 24.008 (continued): *MS Classmark 3* information element

UMTS FDD Radio Access Technology Capability (1 bit field)
Bit 1
0 UMTS FDD not supported
1 UMTS FDD supported

UMTS 3.84 Mcps TDD Radio Access Technology Capability (1 bit field)
Bit 1
0 UMTS 3.84 Mcps TDD not supported
1 UMTS 3.84 Mcps TDD supported

CDMA 2000 Radio Access Technology Capability (1 bit field)
Bit 1
0 CDMA2000 not supported
1 CDMA2000 supported

DTM GPRS Multi Slot Class (2 bit field)
This field indicates the GPRS DTM multislot capabilities of the MS. It is coded as follows:

Bit 2 1
0 0 Multislot class 1 supported
0 1 Multislot class 5 supported
1 0 Multislot class 9 supported
1 1 Reserved for future extension. If received, the network shall interpret this as '00'

MAC Mode Support (1 bit field)
This field indicates whether the MS supports Dynamic and Fixed Allocation or only supports Exclusive Allocation. It is coded as follows:

Bit 1
0 Dynamic and Fixed Allocation not supported
1 Dynamic and Fixed allocation supported

EGPRS DTM Multislot Class (2 bit field)
This field indicates the EGPRS DTM multislot capabilities of the MS. This field shall be included only if the mobile station supports EGPRS DTM. This field is coded as the DTM GPRS Multi Slot Class field.

Single Band Support
This field shall be sent if the mobile station supports UMTS and one and only one GSM band with the exception of R-GSM; this field shall not be sent otherwise

GSM Band (4 bit field)
Bits
4 3 2 1
0 0 0 0 E-GSM is supported
0 0 0 1 P-GSM is supported
0 0 1 0 DCS 1800 is supported
0 0 1 1 GSM 450 is supported
0 1 0 0 GSM 480 is supported
0 1 0 1 GSM 850 is supported
0 1 1 0 PCS 1900 is supported
0 1 1 1 GSM 700 is supported
All other values are reserved for future use.

NOTE: When this field is received, the associated RF power capability is found in Classmark 1 or 2.

GSM 700 Associated Radio Capability (4 bit field)

See the semantic rule for the sending of this field.
This field indicates whether GSM 700 band is supported and its associated radio capability.

The radio capability contains the binary coding of the power class associated with the GSM 700 band (see 3GPP TS ~~05.05~~45.005 [33]).

Note: the coding of the power class for GSM 700 in GSM 700 Associated Radio Capability is different to that used in the Mobile Station Classmark 1 and Mobile Station Classmark 2 information elements.

UMTS 1.28 Mcps TDD Radio Access Technology Capability (1 bit field)

Bit 1
0 UMTS 1.28 Mcps TDD not supported
1 UMTS 1.28 Mcps TDD supported

MS_EXT_UTBF (1 bit field)

Bit
0 Extended uplink TBF not supported
1 Extended uplink TBF supported

Extended GPRS DTM Multi Slot Class (2 bit field)

This field indicates the extended GPRS DTM multislot capabilities of the MS and shall be interpreted in conjunction with the GPRS DTM Multi Slot Class field. It is coded as follows, where 'DGMSC' denotes the DTM GPRS Multi Slot Class field:

********** Next Modified Section **********

10.5.1.9 Descriptive group or broadcast call reference

The purpose of the *Descriptive Group or Broadcast Call Reference* is to provide information describing a voice group or broadcast call. The IE of the *Descriptive Group or Broadcast Call Reference* is composed of the group or broadcast call reference together with a service flag, an acknowledgement flag, the call priority and the group cipher key number.

The *Descriptive Group or Broadcast Call Reference* information element is coded as shown in figure 10.5.8/3GPP TS 24.008 and Table10.5.8/3GPP TS 24.008

The *Descriptive Group or Broadcast Call Reference* is a type 3 information element with 6 octets length.

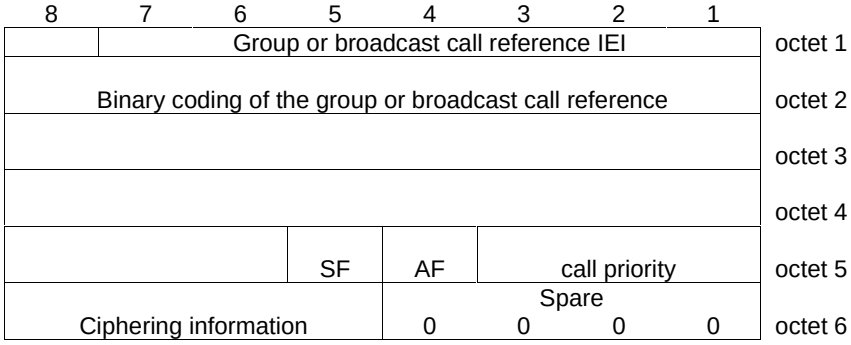

Figure 10.5.8/3GPP TS 24.008 Descriptive Group or Broadcast Call Reference

Table 10.5.8/3GPP TS 24.008 Descriptive Group or Broadcast Call Reference

Binary code of the group or broadcast call reference
The length of the binary code has 27 bits which is encoded in the octet 2, 3, 4 and Bits 8,7,6 (octet 5).
The highest bit of the BC is the bit 8 in the octet 2 and the lowest bit is allocated in the bit 6 in the octet 5. (see also GSM ~~03.03~~23.003 [10])

SF Service flag (octet 5)

Bit **5**	
0	VBS (broadcast call reference)
1	VGCS (group call reference)

AF Acknowledgement flag (octet 5), network to MS direction:

Bit **4**	
0	acknowledgement is not required
1	acknowledgement is required

Call priority (octet 5)

Bit **3**	**2**	**1**	
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

Ciphering information (octet 6)

Bit **8**	**7**	**6**	**5**	
0	0	0	0	no ciphering
0	0	0	1	ciphering with cipher key number 1
0	0	1	0	ciphering with cipher key number 2
0	0	1	1	ciphering with cipher key number 3
0	1	0	0	ciphering with cipher key number 4
0	1	0	1	ciphering with cipher key number 5
0	1	1	0	ciphering with cipher key number 6
0	1	1	1	ciphering with cipher key number 7
1	0	0	0	ciphering with cipher key number 8
1	0	0	1	ciphering with cipher key number 9
1	0	1	0	ciphering with cipher key number A
1	0	1	1	ciphering with cipher key number B
1	1	0	0	ciphering with cipher key number C
1	1	0	1	ciphering with cipher key number D
1	1	1	0	ciphering with cipher key number E
1	1	1	1	ciphering with cipher key number F

AF Acknowledgement flag (octet 5), MS to network direction:
Bit 4 is spare and shall be set to "0".

Call priority (octet 5)
Bits 1 to 3 are spare and shall be set to "0".

Ciphering information (octet 6)
Bits 5 to 8 are spare and shall be set to "0".

********** Next Modified Section **********

10.5.3.8 Time Zone

The purpose of this information element is to encode the offset between universal time and local timein steps of 15 minutes.

The *Time Zone* information element is coded as shown in figure 10.5.83/3GPP TS 24.008 and table 10.5.96/3GPP TS 24.008.

The *Time Zone* is a type 3 information element with a length of 2 octets.

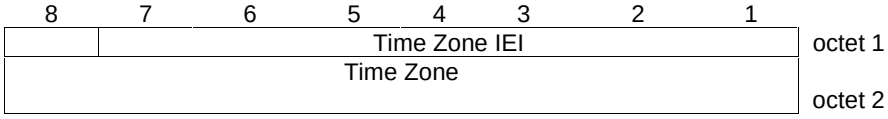

Figure 10.5.83/3GPP TS 24.008 *Time Zone* information element

Table 10.5.96/3GPP TS 24.008 *Time Zone* information element

Time Zone (octet 2, bits 1-8) This field uses the same format as the Timezone field used in the TP-Service-Centre-Time-Stamp, which is defined in 3GPP TS ~~03.40~~23.040 [92], and its value shall be set as defined in 3GPP TS ~~02.42~~22.042 [91]

10.5.3.9 Time Zone and Time

The purpose of the timezone part of this information element is to encode the offset between universal time and local time in steps of 15 minutes.

The purpose of the time part of this information element is to encode the universal time at which this information element may have been sent by the network.

The *Time Zone and Time* information element is coded as shown in figure 10.5.84/3GPP TS 24.008 and table 10.5.97/3GPP TS 24.008.

The *Time Zone and Time* is a type 3 information element with a length of 8 octets.

Figure 10.5.84/3GPP TS 24.008 *Time Zone and Time* information element

Table 10.5.97/3GPP TS 24.008 *Timezone and Time* information element

Year (octet 2, bits 1-8)

This field uses the same format as the Year field used in the TP-Service-Centre-Time-Stamp, which is defined in 3GPP TS ~~03.40~~23.040 [92], and its value shall be set as defined in 3GPP TS ~~02.42~~22.042 [91]

Month (octet 3, bits 1-8)
This field uses the same format as the Month field used in the TP-Service-Centre-Time-Stamp, which is defined in 3GPP TS ~~03.40~~23.040 [92], and its value shall be set as defined in 3GPP TS ~~02.42~~22.042 [91].
Day (octet 4, bits 1-8)
This field uses the same format as the Day field used in the TP-Service-Centre-Time-Stamp, which is defined in 3GPP TS ~~03.40~~23.040 [92], and its value shall be set as defined in 3GPP TS ~~02.42~~22.042 [91].

Hour (octet 5, bits 1-8)
This field uses the same format as the Hour field used in the TP-Service-Centre-Time-Stamp, which is defined in 3GPP TS ~~03.40~~23.040 [92], and its value shall be set as defined in 3GPP TS ~~02.42~~22.042 [91].

Minute (octet 6, bits 1-8)
This field uses the same format as the Minute field used in the TP-Service-Centre-Time-Stamp, which is defined in 3GPP TS ~~03.40~~23.040 [92], and its value shall be set as defined in 3GPP TS ~~02.42~~22.042 [91].

Second (octet 7, bits 1-8)
This field uses the same format as the Second field used in the TP-Service-Centre-Time-Stamp, which is defined in 3GPP TS ~~03.40~~23.040 [92], and its value shall be set as defined in 3GPP TS ~~02.42~~22.042 [91].

Time Zone (octet 8, bits 1-8)
This field uses the same format as the Time Zone field used in the TP-Service-Centre-Time-Stamp, which is defined in 3GPP TS ~~03.40~~23.040 [92], and its value shall be set as defined in 3GPP TS ~~02.42~~22.042 [91]

NOTE: Due to ambiguities in earlier versions of the protocol specifications, some mobile stations may interpret the received NITZ time as local time. This may result in incorrect time settings in the mobile.

********** Next Modified Section **********

10.5.4.4 Auxiliary states

The purpose of the auxiliary states information element is to describe the current status of the auxiliary states of a call in the call control states "active" and "mobile originating modify". (See TSs 3GPP TS 24.083 and ~~04.84~~24.084 [28])

The auxiliary states information element is coded as shown in figure 10.5.87/3GPP TS 24.008, table 10.5.100/3GPP TS 24.008 and table 10.5.101/3GPP TS 24.008.

The auxiliary states is a type 4 information element with 3 octets length.

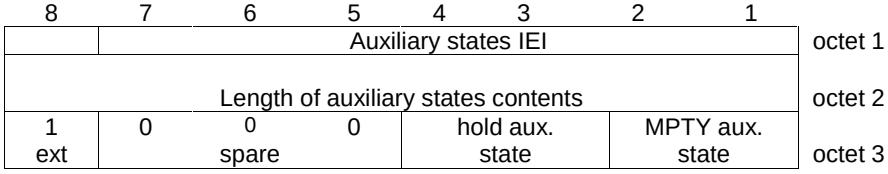

Figure 10.5.87/3GPP TS 24.008 Auxiliary states information element

Table 10.5.100/3GPP TS 24.008: Auxiliary states information element

Hold auxiliary state (octet 3)			
Bits			
4	**3**		
0	0	idle	Note 1
0	1	hold request	Note 1
1	0	call held	Note 1
1	1	retrieve request	Note 1
Note 1: These states are defined in Rec 3GPP TS ~~04.83~~24.083 [27].			

Table 10.5.101/3GPP TS 24.008: Auxiliary states information element

Multi party auxiliary state (octet 3)			
Bits			
2	**1**		
0	0	idle	Note 2
0	1	MPTY request	Note 2
1	0	call in MPTY	Note 2
1	1	split request	Note 2
Note 2: These states are defined in Rec 3GPP TS ~~04.84~~24.084 [28].			

********** Next Modified Section **********

10.5.4.7 Called party BCD number

The purpose of the called party BCD number information element is to identify the called party.

The called party BCD number information element is coded as shown in figure 10.5.91/3GPP TS 24.008 and table 10.5.118/3GPP TS 24.008.

The called party BCD number is a type 4 information element with a minimum length of 3 octets and a maximum length of 43 octets. For PCS 1900 the maximum length is 19 octets.

8	7	6	5	4	3	2	1	
	Called party BCD number IEI							octet 1
Length of called party BCD number contents								octet 2
1 ext	type of number			Numbering plan identification				octet 3
Number digit 2				Number digit 1				octet 4*
Number digit 4				Number digit 3				octet 5*
								:
2)								:

Figure 10.5.91/3GPP TS 24.008 Called party BCD number information element

NOTE 1: The number digit(s) in octet 4 precedes the digit(s) in octet 5 etc. The number digit which would be entered first is located in octet 4, bits 1 to 4.

NOTE 2: If the called party BCD number contains an odd number of digits, bits 5 to 8 of the last octet shall be filled with an end mark coded as "1111".

Since the information element must contain the complete called party BCD number there is no need for an additional complete indication.

Table 10.5.118/3GPP TS 24.008: Called party BCD number

Type of number (octet 3) (Note 1)

Bits 7	6	5	
0	0	0	unknown (Note 2)
0	0	1	international number (Note 3, Note 5)
0	1	0	national number (Note 3)
0	1	1	network specific number (Note 4)
1	0	0	dedicated access, short code
1	0	1	Reserved
1	1	0	Reserved
1	1	1	reserved for extension

NOTE 1: For the definition of "number" see ITU-T Recommendation I.330 and 3GPP TS 23.003.

NOTE 2: The type of number "unknown" is used when the user or the network has no knowledge of the type of number, e.g. international number, national number, etc. In this case the number digits field is organized according to the network dialling plan, e.g. prefix or escape digits might be present.

NOTE 3: Prefix or escape digits shall not be included.

NOTE 4: The type of number "network specific number" is used to indicate administration/service number specific to the serving network, e.g. used to access an operator.

NOTE 5: The international format shall be accepted by the MSC when the call is destined to a destination in the same country as the MSC.

Table 10.5.118/3GPP TS 24.008: Called party BCD number (continued)

Numbering plan identification (octet 3)

Number plan (applies for type of number = 000, 001, 010 and 100)

Bits 4	3	2	1	
0	0	0	0	Unknown
0	0	0	1	ISDN/telephony numbering plan (Rec. E.164/E.163)
0	0	1	1	data numbering plan (Recommendation X.121)
0	1	0	0	telex numbering plan (Recommendation F.69)
1	0	0	0	national numbering plan
1	0	0	1	private numbering plan
1	0	1	1	reserved for CTS (see 3GPP TS ~~04.56~~44.056 [93])
1	1	1	1	reserved for extension

All other values are reserved.

When an MS is the recipient of number information from the network, any incompatibility between the number digits and the number plan identification shall be ignored and a STATUS message shall not be sent to the network.

In the case of numbering plan "unknown", the number digits field is organized according to the network dialling plan; e.g. prefix or escape digits might be present.

Table 10.5.118/3GPP TS 24.008: Called party BCD number (continued)

Number digits (octets 4, etc.)					
Bits					Number digit value
4	**3**	**2**	**1**	or	
8	**7**	**6**	**5**		
0	0	0	0		0
0	0	0	1		1
0	0	1	0		2
0	0	1	1		3
0	1	0	0		4
0	1	0	1		5
0	1	1	0		6
0	1	1	1		7
1	0	0	0		8
1	0	0	1		9
1	0	1	0		*
1	0	1	1		#
1	1	0	0		A
1	1	0	1		B
1	1	1	0		C
1	1	1	1		used as an endmark in the case of an odd number of number digits

********** Next Modified Section **********

10.5.5.4 TMSI status

The purpose of the *TMSI status* information element is to indicate whether a valid TMSI is available in the MS or not.

The *TMSI status* is a type 1 information element.

The *TMSI status* information element is coded as shown in figure 10.5.120/3GPP TS ~~04.08~~24.008 and table 10.5.137/3GPP TS ~~04.08~~24.008.

8	7	6	5	4	3	2	1	
TMSI status IEI				0	0 spare	0	TMSI flag	octet 1

Figure 10.5.120/3GPP TS ~~04.08~~24.008: *TMSI status* information element

Table 10.5.137/3GPP TS ~~04.08~~24.008: *TMSI status* information element

TMSI flag (octet 1)	
Bit	
1	
0	no valid TMSI available
1	valid TMSI available

********** Next Modified Section **********

10.5.5.12a MS Radio Access capability

The purpose of the *MS RA capability* information element is to provide the radio part of the network with information concerning radio aspects of the mobile station. The contents might affect the manner in which the network handles the operation of the mobile station.

The *MS RA capability* is a type 4 information element, , with a maximum length of 52 octets.

The value part of a *MS RA capability* information element is coded a shown table 10.5.146/3GPP TS 24.008.

– SEMANTIC RULE : Among the three Access Type Technologies GSM 900-P, GSM 900-E and GSM 900-R only one shall be present.

– The MS shall indicate supported Access Technology Types. e.g. [450, 480, 900, 1800, UMTS] or [700, 850, 1900] MHz bands during a single MM procedure.

– Error handling : If a received Access Technology Type is unknown to the receiver, it shall ignore all the corresponding fields;

– If within a known Access Technology Type a receiver recognizes an unknown field it shall ignore it.

– See more details about error handling of MS radio access capability in 3GPP TS 48.018.

- Due to shared radio frequency channel numbers between 1800 and 1900, the mobile should provide the relevant MS Radio Access capability for either 1800 band OR 1900 band, not both.

Table 10.5.146/3GPP TS 24.008 : *Mobile Station Radio Access Capability* Information Element

< MS Radio Access capability IE > ::=
<**MS Radio Access capability IEI** : 00100100 >
<**Length of MS RA capability**: <octet>> -- *length in octets of MS RA capability value part and spare bits*
<**MS RA capability value part** : < MS RA capability value part struct >>
<spare bits>**; -- *may be used for future enhancements*

<MS RA capability value part struct >::= *--recursive structure allows any number of Access technologies*
< **Access Technology Type**: bit (4) >
< **Access capabilities** : <Access capabilities struct> >
{ 0 | 1 <MS RA capability value part struct> } ;

< Access capabilities struct > ::=
< **Length** : bit (7) > -- length in bits of Content and spare bits
<Access capabilities : <Content>>
<spare bits>** ; -- expands to the indicated length
-- may be used for future enhancements

< Content > ::=
< **RF Power Capability** : bit (3) >
{ 0 | 1 <**A5 bits** : <A5 bits> > } -- *zero means that the same values apply for parameters as in the immediately preceeding Access capabilities field within this IE*
-- *The presence of the A5 bits is mandatory in the 1st Access capabilities struct within this IE.*
< **ES IND** : bit >
< **PS** : bit >
< **VGCS** : bit >
< **VBS** : bit >
{ 0 | 1 < **Multislot capability** : Multislot capability struct > } -- *zero means that the same values for multislot parameters as given in an earlier Access capabilities field within this IE apply also here*
-- Additions in release 99
{ 0 | 1 < **8PSK Power Capability** : bit(2) >} -- *'1' also means 8PSK modulation capability in uplink.*
< **COMPACT Interference Measurement Capability : bit >**
< **Revision Level Indicator** : bit >
< **UMTS FDD Radio Access Technology Capability** : bit > -- *3G RAT*
< **UMTS 3.84 Mcps TDD Radio Access Technology Capability** : bit > -- *3G RAT*
< **CDMA 2000 Radio Access Technology Capability** : bit > -- *3G RAT*
< **UMTS 1.28 Mcps TDD Radio Access Technology Capability**: bit > -- *3G RAT*
< **MS_EXT_UTBF** : bit >
{ 0 | 1 < **Extended DTM GPRS Multi Slot Class** : bit(2) >
< **Extended DTM EGPRS Multi Slot Class** : bit(2) > };
-- error: struct too short, assume features do not exist
-- error: struct too long, ignore data and jump to next Access technology

Table 10.5.146/3GPP TS 24.008 (continued): *Mobile Station Radio Access Capability* IE

< Multislot capability struct > ::=
{ 0 | 1 < **HSCSD multislot class** : bit (5) > }
{ 0 | 1 < **GPRS multislot class** : bit (5) > < **GPRS Extended Dynamic Allocation Capability** : bit > }
{ 0 | 1 < **SMS_VALUE** : bit (4) > < **SM_VALUE** : bit (4) > }
-- Additions in release 99
{ 0 | 1 < **ECSD multislot class** : bit (5) > }
{ 0 | 1 < **EGPRS multislot class** : bit (5) > < **EGPRS Extended Dynamic Allocation Capability** : bit > }
{0 | 1 < **DTM GPRS Multi Slot Class**: bit(2)>
<MAC Mode Support : bit>
{0 | 1 <**EGPRS DTM Multi Slot Class** : bit(2)> } } ;
-- error: struct too short, assume features do not exist

<A5 bits> ::= < A5/1 : bit> <A5/2 : bit> <A5/3 : bit> <A5/4 : bit> <A5/5 : bit> <A5/6 : bit> <A5/7 : bit>; -- bits for circuit mode ciphering algorithms

Access Technology Type
This field indicates the access technology type to be associated with the following access capabilities.
Bits
4 3 2 1
0 0 0 0 GSM P
0 0 0 1 GSM E *--note that GSM E covers GSM P*
0 0 1 0 GSM R *--note that GSM R covers GSM E and GSM P*
0 0 1 1 GSM 1800
0 1 0 0 GSM 1900
0 1 0 1 GSM 450
0 1 1 0 GSM 480
0 1 1 1 GSM 850
1 0 0 0 GSM 700
All other values are treated as unknown by the receiver.

RF Power Capability
This field is coded as radio capability in Classmark 3 for the indicated band: it contains the binary coding of he power class associated (see 3GPP TS ~~05.05~~45.005 [33] paragraph 4.1 output power and paragraph 4.1.1 Mobile Station).

8PSK Power Capability
If 8-PSK modulation is supported for uplink, this field indicates the radio capability for 8-PSK modulation. The following coding is used (see 3GPP TS ~~05.05~~45.005 [33]):
Bits 2 1
0 0 Reserved
0 1 Power class E1
1 0 Power class E2
1 1 Power class E3

A5/1
0 encryption algorithm A5/1 not available
1 encryption algorithm A5/1 available
A5/2
0 encryption algorithm A5/2 not available
1 encryption algorithm A5/2 available
A5/3
0 encryption algorithm A5/3 not available
1 encryption algorithm A5/3 available
A5/4
0 encryption algorithm A5/4 not available
1 encryption algorithm A5/4 available
A5/5
0 encryption algorithm A5/5 not available
1 encryption algorithm A5/5 available
A5/6
0 encryption algorithm A5/6 not available
1 encryption algorithm A5/6 available
A5/7
0 encryption algorithm A5/7 not available
1 encryption algorithm A5/7 available

ES IND – (Controlled early Classmark Sending)
0 "controlled early Classmark Sending" option is not implemented
1 "controlled early Classmark Sending" option is implemented

Table 10.5.146/3GPP TS 24.008 (concluded): *Mobile Station Radio Access Capability* Information Element

PS – (Pseudo Synchronisation)
0 PS capability not present
1 PS capability present

VGCS – (Voice Group Call Service)
0 no VGCS capability or no notifications wanted
1 VGCS capability and notifications wanted.

VBS – (Voice Broadcast Service)
0 no VBS capability or no notifications wanted
1 VBS capability and notifications wanted

HSCSD Multi Slot Class
The Multi Slot Class field is coded as the binary representation of the multislot class defined in 3GPP TS ~~05.02~~45.002 [32].
Range 1 to 18, all other values are reserved.

GPRS Multi Slot Class
The GPRS Multi Slot Class field is coded as the binary representation of the multislot class defined in 3GPP TS ~~05.02~~45.002 [32].

-- Additions in release 99

ECSD Multi Slot Class
The presence of this field indicates ECSD capability. Whether the MS is capable of 8-PSK modulation in uplink is indicated by the presence of 8-PSK Power Capability field. The Multi Slot Class field is coded as the binary representation of the multislot class defined in 3GPP TS ~~05.02~~45.002 [32].
Range 1 to 18, all other values are reserved.

EGPRS Multi Slot Class
The presence of this field indicates EGPRS capability. Whether the MS is capable of 8-PSK modulation in uplink is indicated by the presence of 8-PSK Power Capability field. The EGPRS Multi Slot Class field is coded as the binary representation of the multislot class defined in 3GPP TS ~~05.02~~45.002 [32].

GPRS Extended Dynamic Allocation Capability
0 Extended Dynamic Allocation Capability for GPRS is not implemented
1 Extended Dynamic Allocation Capability for GPRS is implemented
EGPRS Extended Dynamic Allocation Capability
0 Extended Dynamic Allocation Capability for EGPRS is not implemented
1 Extended Dynamic Allocation Capability for EGPRS is implemented

SMS_VALUE (Switch-Measure-Switch) (4 bit field)
The SMS field indicates the time needed for the mobile station to switch from one radio channel to another, perform a neighbor cell power measurement, and the switch from that radio channel to another radio channel.
Bits
4 3 2 1
0 0 0 0 1/4 timeslot (~144 microseconds)
0 0 0 1 2/4 timeslot (~288 microseconds)
0 0 1 0 3/4 timeslot (~433 microseconds)
. . .
1 1 1 1 16/4 timeslot (~2307 microseconds)
(SM_VALUE) Switch-Measure (4 bit field)
The SM field indicates the time needed for the mobile station to switch from one radio channel to another and perform a neighbour cell power measurement.
Bits
4 3 2 1
0 0 0 0 1/4 timeslot (~144 microseconds)
0 0 0 1 2/4 timeslot (~288 microseconds)
0 0 1 0 3/4 timeslot (~433 microseconds)
. . .
1 1 1 1 16/4 timeslot (~2307 microseconds)

DTM GPRS Multi Slot Class (2 bit field)
This field indicates the GPRS DTM multislot capabilities of the MS. It is coded as follows:
Bits
2 1
0 0 Multislot class 1 supported
0 1 Multislot class 5 supported
1 0 Multislot class 9 supported
1 1 Reserved for future extension. If received, the network shall interpret this as '00'

MAC Mode Support (1 bit field)
This field indicates whether the MS supports Dynamic and Fixed Allocation or only supports Exclusive Allocation
Bits
1
0 Dynamic and Fixed Allocation not supported
1 Dynamic and Fixed allocation supported

EGPRS DTM Multi Slot Class (2 bit field)
This field indicates the EGPRS DTM multislot capabilities of the MS. This field shall be included only if the mobile station supports EGPRS DTM. This field is coded as the DTM GPRS multislot Class field.

COMPACT Interference Measurement Capability
0 COMPACT Interference Measurement Capability is not implemented
1 COMPACT Interference Measurement Capability is implemented

Revision Level Indicator(1 bit field)
Bit
0 The ME is Release '98 or older
1 The ME is Release '99 onwards

UMTS FDD Radio Access Technology Capability (1 bit field)
Bit
0 UMTS FDD not supported
1 UMTS FDD supported

UMTS 3.84 Mcps TDD Radio Access Technology Capability (1 bit field)
Bit
0 UMTS 3.84 Mcps TDD not supported
1 UMTS 3.84 Mcps TDD supported

CDMA 2000 Radio Access Technology Capability (1 bit field)
Bit
0 CDMA2000 not supported
1 CDMA2000 supported

UMTS 1.28 Mcps TDD Radio Access Technology Capability (1 bit field)
Bit
0 UMTS 1.28 Mcps TDD not supported
1 UMTS 1.28 Mcps TDD supported

MS_EXT_UTBF (1 bit field)
Bit
0 Extended uplink TBF not supported
1 Extended uplink TBF supported

Extended GPRS DTM Multi Slot Class (2 bit field)
This field indicates the extended GPRS DTM capabilities of the MS and shall be interpreted in conjunction with the GPRS DTM Multi Slot Class field. It is coded as follows, where 'DGMSC' denotes the DTM GPRS multislot class field:

1 0	**0 1**	Multislot class 10 supported

********** Next Modified Section **********

10.5.6.1 Access Point Name

The purpose of the *access point name* information element is to identify the packet data network to which the GPRS user wishes to connect and to notify the access point of the packet data network that wishes to connect to the MS.

The Access Point Name is a label or a full qualified domain name according to DNS naming conventions (see 3GPP TS 23.003 [10]).

The *access point name* is a type 4 information element with a minimum length of 3 octets and a maximum length of 102 octets.

The *access point name* information element is coded as shown in figure 10.5.134/3GPP TS 24.008 and table 10.5.152/3GPP TS 24.008.

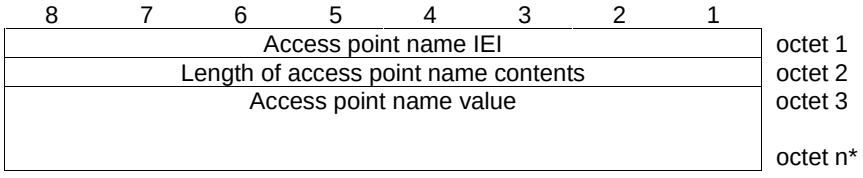

Figure 10.5.134/3GPP TS 24.008: A*ccess point name* information element

The value part is defined in ~~03.03~~23.003 [10].

********** Next Modified Section **********

10.5.6.10 Tear down indicator

The purpose of the *tear down indicator* information element is to indicate whether only the PDP context associated with this specific TI or all active PDP contexts sharing the same PDP address as the PDP context associated with this specific TI shall be deactivated.

The *tear down indicator* is a type 1 information element.

The *tear down indicator* information element is coded as shown in figure 10.5.142/3GPP TS 24.008 and table 10.5.160/3GPP TS 24.008.

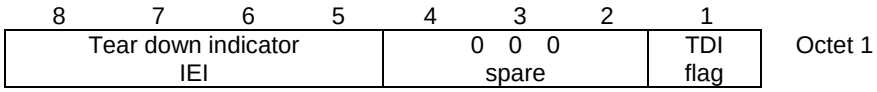

Figure 10.5.142/3GPP TS 24.008: *Tear down indicator* information element

Table 10.5.160/3GPP TS ~~04.08~~24.008: *Tear down indicator* information element

Tear down indicator(TDI) flag (octet 1) Bit **1** 0 tear down not requested 1 tear down requested