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Technical Specification

**Digital cellular telecommunications system (Phase 2+);
Release independent frequency bands;
Implementation guidelines
(3GPP TS 05.14 version 7.2.0 Release 1998)**

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Foreword

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Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

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

Version x.y.z

where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
  - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

The present document deals with implementation guidelines. SMG has accepted that Band of Operation may be independent of Release. This approach provides the flexibility that is needed when new frequency bands are being standardised. However in a case where frequency band is considered release independent it is seen necessary to give instructions for implementation. The release independence of frequncy band may be applied to any band of operation. As an example GSM 400 system is specified in Release 99. When operating GSM 400 is using Information Elements that are based on Release 99 while the other bands of operation e.g. DCS 1800 or GSM 900 may use Information Elements that are based on earlier Releases. For compatibility point of view it is necessary to instruct in implementation issues.

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 24.008: "3rd Generation Partnership Project; Technical Specification Group Core Network; Mobile radio interface layer 3 specification; Core Network Protocols – Stage 3, Release 1999".

[2] 3GPP TS 04.18: "Digital cellular telecommunications system (Phase 2+); Mobile radio interface layer 3 specification, Radio Resource Control Protocol, Release 1999".

[3] 3GPP TS 05.10: "Digital cellular telecommunications system (Phase2+); Radio Subsystem Synchronization, Release 1999".

[4] 3GPP TS 04.04: "Digital cellular telecommunications system (Phase2+); Layer 1; General requirements, Release 1999".

[5] 3GPP TS 05.05: "Digital cellular telecommunications system (Phase2+); Radio transmission and reception, Release 1999".

[6] 3GPP TS 03.22: "Digital cellular telecommunications system (Phase2+); Functions related to Mobile Station (MS) in idle mode and group receive mode, Release 1999".

[7] 3GPP TS 05.08: "Digital cellular telecommunications system (Phase2+); Radio subsystem link control, Release 1999".

[8] 3GPP TS 04.60: "General Packet Radio Service (GPRS);Mobile Station (MS) - Base Station System (BSS) interface; Radio Link Control/ Medium Access Control (RLC/MAC) protocol (Release 1999)

3 Definitions, symbols and abbreviations

Unless listed below, all definitions, symbols and abbreviations used in the present document are listed in documents referenced in clause 2.

4 GSM400 MS Independent of Release

GSM400 system is defined as release independent frequency band. This approach aligns GSM400 band with other frequency bands when considering features that have to be supported in different releases. However there exists requirements that have to be implemented independent of release MS states to support.

A mobile station supporting GSM400 shall implement following requirements:

- support of Extended Timing Advance as specified in 3GPP TS 04.04 [4], 3GPP TS 05.10 [3] and as stated in clause 4.1.4 of the present document;
- comply with the RF-requirements specified in 3GPP TS 05.05 [5] for GSM400;
- comply with the requirements for PLMN and cell searching specified in 3GPP TS 03.22 [6] and 3GPP TS 05.08 [7];
- indicate the Classmark 1, Classmark 2 and Classmark3 as specified in clauses 4.1.1, 4.1.2 and 4.1.3;
- indicate the MS Radio Access Capability as specified in clause 4.1.5;
- support Band Indicator bit as specified in clauses 4.1.6, 4.1.7 and 4.1.8.

4.1 R'98 GSM400 MS

This clause presents the contents of appropriate information elements as they shall be used in a case where GSM400 MS states conformancy with Release 1998. It should be noted that information elements presented are of Release 1999. This is due to fact that GSM 400 is standardised in Release 1999 or later.

4.1.1 Mobile Station Classmark 1 IE

Followed information is from 3GPP TS 24.008 [1] specification. It shows the contents of Information Element for Release 99.

The *Mobile Station Classmark 1* information element is coded as shown in figure 10.5.5/3GPP TS 24.008 and table 10.5.5/3GPP TS 24.008.

The *Mobile Station Classmark 1* is a type 3 information element with 2 octets length.

8	7	6	5	4	3	2	1	
	Mobile Station Classmark 1 IEI							octet 1
0 spare	Revision level		ES IND	A5/1	RF power capability			octet 2

Figure 10.5.5/3GPP TS 24.008: *Mobile Station Classmark 1* information element

The field of interest is *Revision level.* R'98 GSM 400 MS shall indicate phase 2 support with the bit pattern '01'.

4.1.2 Mobile Station Classmark 2 IE

Followed information is from 3GPP TS 24.008 [1] specification. It shows the contents of Information Element for Release 99.

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

R'98 GSM 400 MS requirements:

For R'98 GSM 400 MS a field of interest is *Revision level*. The coding of that field shall indicate phase 2 support with bit pattern '01'. In a case that MS claims to support *LCSVA* or *SoLSA* then those fields shall be set to '1's , according to the definitions of those parameters. Field *UCS2* shall indicate '0' since it is defined as spare in R'98.

4.1.3 Mobile Station Classmark 3 IE

Followed information is from 3GPP TS 24.008 [1] specification. It shows the contents of Information Element for Release 99.

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 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 (3GPP TS 05.02).

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 TDD Radio Access Technology Capability : bit >
    < CDMA 2000 Radio Access Technology Capability : bit >

    { 0 | 1  < DTM GPRS Multi Slot Sub-Class : bit(2) >
             < MAC Mode Support : bit >
             { 0 | 1< DTM EGPRS Multi Slot Sub-Class : bit(2) > } }
    { 0 | 1 < Single Band Support > }
    < 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 > ::=
    < GSMBand : bit(4) > ;
```

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

R'98 GSM 400 MS requirements:

From R'98 GSM400 MS point of view the relevant field is *GSM 400 Bands Supported.* Bit pattern '01' indicates GSM 480 support, '10' indicates GSM450 support and '11' indicates support for both bands.

If GSM400 MS states to support MS Positioning it shall indicate it with '1' in the field *MS Positioning Method Capability* and also indicate the supported method in the *MS Positioning Method* field.

Fields *EDGE Multislot Capability* and *EDGE Struct* shall be indicated not to included to the Classmark 3 IE since they are not defined in Release '98. This is done by setting the indication bit to '0' for each of those mentioned bit structure.

Parameters *UMTS FDD Radio Access Technology Capability, UMTS TDD Radio Access Technology Capability, CDMA 2000 Radio Access Technology Capability, DTM GPRS Multi Slot Sub-Class, MAC Mode Support, DTM EGPRS Support* and *Single Band Support* shall be indicated as not supported. This is done either by not including these fields at all in the Classmark 3 IE or by setting the bit value '0' for each of these parameters.

Support of other frequency bands shall be indicated as defined in Release ’98, including the options defined in 3GPP TS 05.14.

4.1.4 Timing Advance IE

The *Timing Advance* information element is coded as shown in Figure 10.5.2.40.1/3GPP TS 04.18 and Table 10.5.2.40.1/3GPP TS 04.18

The *Timing Advance* is a type 3 information element with 2 octets length.

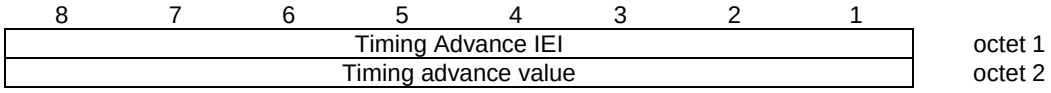

Figure 10.5.2.40.1/3GPP TS 04.18: *Timing Advance* information element

R'98 GSM 400 MS requirements:

In case of MS supporting Release 1998 GSM400 MS uses bits from 1 to 8 in the field *Timing advance value* to indicate timing advance values from 0 to 219. For other bands values from 0 to 63 are used, which means that bits 7 and 8 are set to spare.

4.1.5 MS Radio Access capability

Followed information is from 3GPP TS 24.008 [1] specification. It shows the contents of Information Element for Release 99.

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

For the indication of the Access Technology Types the following conditions shall apply:

- Among the three Access Technology Types GSM 900-P, GSM 900-E and GSM 900-R only one shall be present.
- Due to shared radio frequency channel numbers between GSM 1800 and GSM 1900, the mobile station should provide the relevant radio access capability for either GSM 1800 band OR GSM 1900 band, not both.
- The MS shall indicate its supported Access Technology Types during a single MM procedure.
- If the alternative coding by using the Additional access technologies struct is chosen by the mobile station, the mobile station shall indicate its radio access capability for the serving BCCH frequency band in the first includedAccess capabilities struct.
- The first Access Technology Type shall not be set to "1111".

For error handling the following shall apply:

- 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.
- For more details about error handling of MS radio access capability see 3GPP TS 08.18.

NOTE: The MS should not add spare bits following the <Content> field for the Access capabilities of an Access Technology Type, i.e. the MS should encode the <Length> field of the < Access capabilities struct > as the length in bits of <Content> only.

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) exclude 1111 >
< **Access capabilities** : <Access capabilities struct> > }

| { < **Access Technology Type**: bit (4) == 1111 > -- *structure adding Access technologies with same capabilities*
< **Length** : bit (7) > -- *length in bits of list of Additional access technologies and spare bits*
{ 1 < **Additional access technologies**: < Additional access technologies struct > > } ** 0
<spare bits>** } }

{ 0 | 1 <MS RA capability value part struct> } ;

< Additional access technologies struct > ::=
< **Access Technology Type** : bit (4) >
< **GMSK Power Class** : bit (3) >
< **8PSK Power Class** : bit (2) > ;

< 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 preceding Access capabilities field 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*
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 Sub-Class**: bit(2)>
<MAC Mode Support : bit>
{0 | 1 <**DTM EGPRS Multi Slot Sub-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. These fields are not used by the network and may be excluded by the MS.

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 1 1 1 Indicates the presence of a list of Additional access technologies
All other values are treated as unknown by the receiver.

RF Power Capability, GMSK Power Class (3 bit field)
This field contains the binary coding of the power class used for GMSK associated with the indicated Access Technology Type (see 3GPP TS 05.05).

8PSK Power Capability (2 bit field)
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):
Bits 2 1
0 0 Reserved
0 1 Power class E1
1 0 Power class E2
1 1 Power class E3

8PSK Power Class (2 bit field)
This field indicates the radio capability for 8-PSK modulation. The following coding is used (see 3GPP TS 05.05):
Bits 2 1
0 0 8PSK modulation not supported for uplink
0 1 Power class E1
1 0 Power class E2
1 1 Power class E3

Additional access technologies struct
This structure contains the GMSK Power Class and 8PSK Power Class for an additional Access Technology. All other capabilities for this indicated Access Technology are the same as the capabilities indicated by the preceding Access capabilities struct.

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 GSM 05.02. This field is not used by the network and may be excluded by the MS.
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 GSM 05.02.

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 GSM 05.02. This field is not used by the network and may be excluded by the MS.
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 GSM 05.02.

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 neighbour cell power measurement, and the switch from that radio channel to another radio channel. This field is not used by the network and may be excluded by the MS.
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. This field is not used by the network and may be excluded by the MS.
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 Sub-Class (2 bit field)
This field indicates the GPRS DTM capabilities of the MS. The GPRS DTM Multi Slot Sub-Class is independent from the Multi Slot Capabilities field.
Bits
2 1
0 0 Sub-Class 1 supported
0 1 Sub-Class 5 supported
1 0 Sub-Class 9 supported
1 1 Reserved for future extension. If received, the network shall interpret this as '00'.

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

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

COMPACT Interference Measurement Capability (1 bit field)
Bit
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

R'98 GSM 400 MS requirements:

From R'98 GSM400 MS point of view the relevant field is *Access Technology Type.* Bit pattern '0101' indicates GSM 450 support and bit pattern '0110' indicates GSM 480 support.

The access capabilities struct for any access technology type may be encoded either according to Release'98 or Release '99 specification. In case coding specified for Release '99 is used, the following requirements apply:

In case the Multislot capability struct is present in the access capabilities struct, the fields *ECSD multislot class, EGPRS multislot class, DTM GPRS Multi Slot Sub-Class and DTM EGPRS Multi Slot Sub-Class* shall be indicated as not supported since they are not defined in Release '98. This is done by setting the field indication bit to '0'.

The field 8PSK Power Capability shall be indicated as not present by setting the field indication bit to '0'. Parameters *COMPACT Interference Measurement Capability, Revision Level Indicator, UMTS FDD Radio Access Technology Capability, UMTS TDD Radio Access Technology Capability, CDMA 2000 Radio Access Technology Capability* and *MAC Mode Support* shall be indicated as not supported. This is done by the bit value '0' for each of these parameters.

The MS shall not use the Additional access technologies struct.

4.1.6 System Information Type 1 Rest Octets

Followed information is from 3GPP TS 04.18 [2] Release 1999 specification. It shows the contents of Information Element for Release 99.

The *SI 1 Rest Octets* information element is shown in Table 10.5.2.32.1a and Table 10.5.2.32.1b/3GPP TS 04.18.

The *SI 1 Rest Octets* information element is a type 5 information element with 1 octet length.

```
<SI1 Rest Octets> ::=
                {L |H  <NCH Position : bit (5)> }
                < Band indicator >
                <spare padding> ;

< Band indicator > ::=
      < BAND_INDICATOR : bit == L >          -- ARFCN indicates 1800 band
    | < BAND_INDICATOR : bit == H > ;        -- ARFCN indicates 1900 band
```

Table 10.5.2.32.1a/3GPP TS 04.18: *SI1 Rest Octets* information element details

BAND_INDICATOR (1 bit)

The band indicator for 1800 and 1900 associates the ARFCN channel numbers to the DCS 1800 respectively to the PCS 1900 band, see 3GPP TS 05.05. The most recently received band indicator value is valid for the whole PLMN.

Table 10.5.2.32.1b/3GPP TS 04.18: *SI 1 Rest Octets* information element

```
NCH Position on the CCCH

The values in the NCH Position field indicates the block
Number of the CCCH block which is used for the
First NCH block and the number of blocks used
for the NCH. (The block numbering corresponds
to table 5 in clause 7 of 3GPP TS 05.02)

The absence of the NCH position field indicates that
there is no NCH in the cell/on the carrying CCCH slot

The following coding applies if 1 or more basic
physical channels are used for CCCH, not combined with
 SDCCHs.
        Value     No of blocks Number of first block
      0 0 0 0 0   1             0
      0 0 0 0 1   1             1
      0 0 0 1 0   1             2
      0 0 0 1 1   1             3
      0 0 1 0 0   1             4
      0 0 1 0 1   1             5
      0 0 1 1 0   1             6
      0 0 1 1 1   2             0
      0 1 0 0 0   2             1
      0 1 0 0 1   2             2
      0 1 0 1 0   2             3
      0 1 0 1 1   2             4
      0 1 1 0 0   2             5
      0 1 1 0 1   3             0
      0 1 1 1 0   3             1
      0 1 1 1 1   3             2
      1 0 0 0 0   3             3
      1 0 0 0 1   3             4
      1 0 0 1 0   4             0
      1 0 0 1 1   4             1
      1 0 1 0 0   4             2
      1 0 1 0 1   4             3
      1 0 1 1 0   5             0
      1 0 1 1 1   5             1
      1 1 0 0 0   5             2
      1 1 0 0 1   6             0
      1 1 0 1 0   6             1
      1 1 0 1 1   7             0

 Other values are reserved for future use. A mobile
 station receiving a reserved value shall behave as if
 the NCH position was not present
```

In the case the CCCH configuration is not compatible with the NCH position (e.g., CCCH with combined SDCCH and the value different from 00000, 00001 or 00111), the mobile station shall behave as if the NCH Position field was not present.

R'98 GSM400 requirements:

From R'98 GSM400 MS point of view the relevant field is *Band Indicator.* A Band Indicator value ‘L’ indicates DCS 1800 band and bit value ‘H’ indicates PCS 1900 band.

4.1.7 SI6 Rest Octets

The following information is from 3GPP TS 04.18 Release 1999 specification. It shows the contents of Information Element for Release 99.

The *SI 6 Rest Octet* information element may contain information concerning the paging, notification channels, VBS and VGCS services of the cell.

The *SI 6 Rest Octets* information element is a type 5 information element with 7 octets length.

The value part is as shown below:

Table 10.5.2.35a.1/3GPP TS 04.18: *SI 6 Rest Octets* information element content

```
<SI6 rest octets> ::=
        {L I H <PCH and NCH info>}
        {L I H <VBS/VGCS options : bit(2)>}
    { < DTM_support : bit == L >
    I < DTM_support : bit == H >
        < RAC : bit (8) >
        < MAX_LAPDm : bit (3) > }
        < Band indicator >
    <implicit spare >;

<PCH and NCH info> ::=
    <Paging channel restructuring>
    <NLN(SACCH) : bit(2)>
    {0 I 1 <Call priority : bit (3)>}
    <NLN status : bit >;

<paging channel restructuring> ::=
    1|      -- paging channel is restructured
    0       -- paging channel is not restructured

<VBS/VGCS options> ::=
    <inband notifications>
    <inband pagings>;

<inband notifications>::=
    0|  --  the network does not provide notification on FACCH so that the mobile should
            inspect the NCH for notifications
    1   --  the mobile shall be notified on incoming high priority VBS/VGCS calls through
            NOTIFICATION/FACCH, the mobile need not to inspect the NCH

<inband pagings>::=
    0|      --  the network does not provide paging information on FACCH so that the mobile
               should inspect the PCH for pagings
    1       --  the mobile shall be notified on incoming high priority point-to-point calls
               through NOTIFICATION/FACCH, the mobile need not to inspect the PCH

< Band indicator > ::=
      < BAND_INDICATOR : bit == L >          -- ARFCN indicates 1800 band
    | < BAND_INDICATOR : bit == H > ;        -- ARFCN indicates 1900 band
```

Table 10.5.2.35a.2/3GPP TS 04.18: *SI 6 Rest Octets* information element details

Attributes, field contents:

1. For <NLN(SACCH): bit(2)>: see 10.5.2.23.

2. For <call priority>: see 10.5.2.23. Indication of the highest priority associated with VBS/VGCS calls in a cell.

DTM_support (1 bit field)
This field indicates whether DTM is supported in the serving cell (i.e. whether the MS is allowed to initiate the packet request procedure while in dedicated mode). It is coded as follows:

Bit 0
L DTM is not supported in the serving cell
H DTM is supported in the serving cell

RAC (8 bit field)
This field codes the Routeing Area Code of the RA to which the serving cell belongs (see 3GPP TS 03.03).

MAX_LAPDm (3 bit field)
This field indicates the maximum number of LAPDm frames on which a layer 3 can be segmented into and be sent on the main DCCH. It is coded as follows:

Bit 2 1 0	
0 0 0	Any message segmented in up to 5 LAPDm frames.
0 0 1	Any message segmented in up to 6 LAPDm frames.
0 1 0	Any message segmented in up to 7 LAPDm frames.
0 1 1	Any message segmented in up to 8 LAPDm frames.
1 0 0	Any message segmented in up to 9 LAPDm frames.
1 0 1	Any message segmented in up to 10 LAPDm frames.
1 1 0	Any message segmented in up to 11 LAPDm frames.
1 1 1	Any message segmented in up to 12 LAPDm frames.

BAND_INDICATOR (1 bit field)

The band indicator for 1800 and 1900 associates the ARFCN channel numbers to the DCS 1800 respectively to the PCS 1900 band, see 3GPP TS 05.05.

R'98 GSM 400 requirements:

From R'98 GSM400 MS point of view the relevant field is *Band Indicator*. A Band Indicator value 'L' indicates DCS 1800 band and a value 'H' indicates PCS 1900 band.

4.1.8 Packet System Information Type 1

The following information is from 3GPP TS 04.60 Release 1999 specification. It shows the contents of Information Element for Release 99.

Table 11.2.18.1: PSI1 information elements

```
< PSI1 message content > ::=
    < PAGE_MODE : bit (2) >
    < PBCCH_CHANGE_MARK : bit (3) >
    < PSI_CHANGE_FIELD : bit (4) >
    < PSI1_REPEAT_PERIOD : bit (4) >
    < PSI_COUNT_LR : bit (6) >
    { 0 | 1 < PSI_COUNT_HR : bit (4) > }
    < MEASUREMENT_ORDER: bit (1) >
    < GPRS Cell Options : < GPRS Cell Options IE > >
    < PRACH Control Parameters : < PRACH Control Parameters IE > >
    < PCCCH Organization Parameters : < PCCCH Organization Parameters IE > >
    < Global Power Control Parameters : < Global Power Control Parameters IE > >
    < PSI_STATUS_IND : bit >
    { null | 0          -- Receiver backward compatible with earlier release
     | 1                -- Additions in release 99 :
        < MSCR : bit >
        < SGSNR : bit >
        < BAND_INDICATOR : bit >
        < padding bits > }
     ! < Distribution part error : bit (*) = < no string > > ;
```

Table 11.2.18.2: PSI1 information element details

GPRS Cell Options
This information element is defined in subclause 12.24

Global Power Control Parameters
This information element is defined in subclause 12.9.

MEASUREMENT ORDER (1 bit field)
The MEASUREMENT ORDER field indicates if set = 0 that the mobile station is in control of the cell re-selection in both packet idle mode and packet transfer mode (= NC0 in 3GPP TS 05.08) and that the mobile station shall not send any measurement reports to the network (= NC0 and = EM0 in 3GPP TS 05.08). It also indicates that the Optional PSI5 message is not broadcast.
If set = 1 the mobile station shall send measurement reports for cell re-selection and/or for extended measurements to the network. Further cell re-selection and measurement details are included in the PSI5 message.

PAGE_MODE (2 bit field)
This field describes which type of page mode used, i.e. either normal paging, extended paging, paging reorganization or same as before from the previous page mode. The mobile station shall ignore this field if the message is received on the PACCH. Coding of this field is defined in 3GPP TS 04.18.

PBCCH_CHANGE_MARK (3 bit field)
The PBCCH_CHANGE_MARK field is a 3 bit counter incremented with one each time information has been changed in one or more of the broadcast PSI2-PSIn messages on PBCCH (n>2).

PSI_CHANGE_FIELD (4 bit field)
The PSI_CHANGE_FIELD is a 4 bit value reflecting which PSI message or group of instantiated PSI message was most recent updated when the PBCCH_CHANGE_MARK was last incremented. If more than one PSI message or group of instantiated PSI message were changed at the same time, the PSI_CHANGE_FIELD indicates unspecified updates. Range 0 to 15.

Bit 4 3 2 1	
0 0 0 0	Update of unspecified PSI message(s);
0 0 0 1	Unknown
0 0 1 0	PSI2 updated
0 0 1 1	PSI3/PSI3bis/PSI3ter/PSI3quater updated
0 1 0 0	PSI4 updated
0 1 0 1	PSI5 updated
0 1 1 0	PSI6 updated
0 1 1 1	PSI7 updated
1 0 0 0	PSI8 updated

All other values shall be interpreted as 'Update of unknown SI message type'.

PSI1_REPEAT_PERIOD (4 bit field)
This field is the binary representation of the PSI1_REPEAT_PERIOD parameter value minus one, see 3GPP TS 05.02. The field is coded according to the following table:

Bit 4 3 2 1	
0 0 0 0	PSI1_REPEAT_PERIOD = 1
0 0 0 1	PSI1_REPEAT_PERIOD = 2
. . .	
1 1 1 1	PSI1_REPEAT_PERIOD = 16

PSI_COUNT_LR (6 bit field)
This field is the binary representation of the PSI_COUNT_LR parameter, see 3GPP TS 05.02. The field is coded according to the following table:

Bit 6 5 4 3 2 1	
0 0 0 0 0 0	PSI_COUNT_LR = 0
0 0 0 0 0 1	PSI_COUNT_LR = 1
. . .	
1 1 1 1 1 1	PSI_COUNT_LR = 63

PSI_COUNT_HR (4 bit field)
This field is the binary representation of the PSI_COUNT_HR parameter value minus one, see 3GPP TS 05.02. If PSI_COUNT_HR is not included in PSI1 message, the default value PSI_COUNT_HR = 0 applies. The field is coded according to the following table:

Bit
4 3 2 1
0 0 0 0 PSI_COUNT_HR = 1
0 0 0 1 PSI_COUNT_HR = 2
. . .
1 1 1 1 PSI_COUNT_HR = 16

PCCCH Organization Parameters
This information element is defined in subclause 12.25

PRACH Control Parameters
This information element is defined in subclause 12.14.

PSI_STATUS_IND (1 bit field):
0 The network does not support the PACKET PSI STATUS message;
1 The network supports the PACKET PSI STATUS message.

MSCR, MSC Release (1 bit field):
0 The MSC is Release '98 or older
1 The MSC is Release '99 onwards

SGSNR, SGSN Release (1 bit field)
0 The SGSN is Release '98 or older
1 The SGSN is Release '99 onwards

BAND_INDICATOR (1 bit field)
See 3GPP TS 05.05 for definition of this field, which is coded as follows:
0 ARFCN indicates 1800 band
1 ARFCN indicates 1900 band

R'98 GSM 400 requirements:

From R'98 GSM400 MS point of view the relevant field is *Band Indicator*. Bit pattern '0' indicates band DCS 1800 band and bit '1' indicates PCS 1900 band.

4.2 R'98 GSM400 MS supporting GPRS

This clause presents the contents of appropriate information elements as they shall be used in a case where GSM400 MS states conformancy with Release 1998 and supports GPRS. It should be noted that information elements presented are of Release 1999. This is due to fact that GSM 400 is standardised in Release 1999 or later.

4.2.1 Packet Uplink Assignment IE

Followed information is from 3GPP TS 04.18 [2] Release 1999 specification. It shows the contents of Information Element for Release 99.

The *RR Packet Uplink Assignment* information element is coded as shown in tables 10.5.2.25c.1/3GPP TS 04.18 and 10.5.2.25c.2/3GPP TS 04.18.

The *RR Packet Uplink Assignment* is a type 4 information element.

Table 10.5.2.25c.1/3GPP TS 04.18: RR PACKET UPLINK ASSIGNMENT information element

```
< RR Packet Uplink Assignment IE > ::=
    < LENGTH_IN_OCTETS : bit (8) >
    < CHANNEL_CODING_COMMAND : bit (2) >
    < TLLI_BLOCK_CHANNEL_CODING : bit (1) >
    < Packet Timing Advance : Packet Timing Advance IE >
    { 01 < Dynamic Allocation : Dynamic Allocation struct >
    | 10 < Single Block Allocation : Single Block Allocation struct >
    | 11 < Fixed Allocation : Fixed Allocation struct >
    | 00 < Extension > }
    { null                              -- Receiver compatible with earlier release
    |                                   -- Additions for R99
        { 0 | 1  < EGPRS_MCS_MODE : bit (4) >
            < RESEGMENT : bit (1) >
            < EGPRS Window Size : < EGPRS Window Size IE >> }
        { 0 | 1  < Packet Extended Timing Advance : bit (2) > }
        < SPARE_BITS : bit ** > } ;
< Extension > ::=                       -- Future extension can be done by modifying this structure
        null ;
<Dynamic Allocation struct > ::=
        < Extended Dynamic Allocation : bit(1)>
        {0 | 1 < P0 : bit (4) >
            < PR_MODE : bit (1) > }
        < USF_GRANULARITY : bit (1) >
        { 0 | 1 < UPLINK_TFI_ASSIGNMENT : bit (5) > }
        { 0 | 1 < RLC_DATA_BLOCKS_GRANTED : bit (8) > }
            { 0                         -- Timeslot Allocation
                { 0 | 1 < USF_TN0 : bit (3) > }
                { 0 | 1 < USF_TN1 : bit (3) > }
                { 0 | 1 < USF_TN2 : bit (3) > }
                { 0 | 1 < USF_TN3 : bit (3) > }
                { 0 | 1 < USF_TN4 : bit (3) > }
                { 0 | 1 < USF_TN5 : bit (3) > }
                { 0 | 1 < USF_TN6 : bit (3) > }
                { 0 | 1 < USF_TN7 : bit (3) > }
            | 1                         -- Timeslot Allocation with Power Control Parameters
                < ALPHA : bit (4) >
                { 0 | 1 < USF_TN0 : bit (3) >
                    < GAMMA_TN0 : bit (5) > }
                { 0 | 1 < USF_TN1 : bit (3) >
                    < GAMMA_TN1 : bit (5) > }
                0 | 1 < USF_TN2 : bit (3) >
                    < GAMMA_TN2 : bit (5) > }
                { 0 | 1 < USF_TN3 : bit (3) >
                    < GAMMA_TN3 : bit (5) > }
                { 0 | 1 < USF_TN4 : bit (3) >
                    < GAMMA_TN4 : bit (5) > }
                { 0 | 1 < USF_TN5 : bit (3) >
                    < GAMMA_TN5 : bit (5) > }
                { 0 | 1 < USF_TN6 : bit (3) >
                    < GAMMA_TN6 : bit (5) > }
                { 0 | 1 < USF_TN7 : bit (3) >
                    < GAMMA_TN7 : bit (5) > } } ;
<Single Block Allocation struct > ::=
        < TIMESLOT_NUMBER : bit (3) >
        { 0 | 1 < ALPHA : bit (4) >
            < GAMMA_TN : bit (5) > }
        { 0 | 1 < P0 : bit (4) >
            < BTS_PWR_CTRL_MODE : bit (1) >
            < PR_MODE : bit (1) > } ;
```

```
<Fixed Allocation struct > ::=
        { 0 | 1 < UPLINK_TFI_ASSIGNMENT : bit (5) > }
        < FINAL_ALLOCATION : bit (1) >
        < DOWNLINK_CONTROL_TIMESLOT: bit(3) >
        { 0 | 1 < P0 : bit (4) >
            < BTS_PWR_CTRL_MODE : bit (1) >
            < PR_MODE : bit (1) > }
        { 0 < TIMESLOT_ALLOCATION : bit (8) >
        | 1 < Power Control Parameters : Power Control Parameters IE > }
        < HALF_DUPLEX_MODE : bit (1) >
        { 0 { 0       -- with length of allocation bitmap
            < BLOCKS_OR_BLOCK_PERIODS : bit (1) >
            < ALLOCATION_BITMAP_LENGTH : bit (7) >
            < ALLOCATION_BITMAP : bit (val(ALLOCATION_BITMAP_LENGTH)) >
            | 1       -- without length of Allocation Bitmap (fills remainder of this IE)
                < ALLOCATION_BITMAP : bit ** > }
            ! < Message escape : 1 bit (*) = <no string > > } ;
```

R'98 GSM 400 MS requirements:

From R'98 GSM400 point of view the relevant fields of interest are *EGPRS_MCS_MODE, RESEGMENT, EGPRS Window Size* and *Packet Extended Timing Advance*. These all are defined as spare in R'98 specification. However in case of GSM400 MS that states conformancy with Release 98 all other mentioned fields shall be left out from the Packet Uplink Assignment by indicating with '0' that the following structures are not included , but the *Packet Extended Timing Advance* field shall be indicated according to intended timing advance value.

4.2.2 RR Packet Downlink Assignment IE

The *RR Packet Downlink Assignment* information element is coded as shown in tables 10.5.2.25d.1/3GPP TS 04.18 and 10.5.2.25d.2/3GPP TS 04.18.

The *RR Packet Downlink Assignment* is a type 4 information element.

For a mobile station assigned to operate in the fixed allocation MAC mode, the network may assign regularly repeating intervals during which the mobile station shall measure neighbour cell power levels.

Table 10.5.2.25d.1/3GPP TS 04.18: RR PACKET DOWNLINK ASSIGNMENT information element

```
< RR Packet Downlink Assignment IE > ::=
    < LENGTH_IN_OCTETS : bit (8) >
    < MAC_MODE : bit (2) >
    < RLC_MODE : bit (1) >
    < TIMESLOT_ALLOCATION : bit (8) >
    < Packet Timing Advance : Packet Timing Advance IE >
    { 0 | 1  < P0 : bit (4) >
            < BTS_PWR_CTRL_MODE : bit(1) >
            < PR_MODE : bit (1) > }
    { 0 | 1  < Power Control Parameters : Power Control Parameters IE > }
    { 0 | 1  < DOWNLINK_TFI_ASSIGNMENT : bit (5) > }
    { 0 | 1  < MEASUREMENT_STARTING_TIME : bit (16) >
            < MEASUREMENT_INTERVAL : bit (5) >
            < MEASUREMENT_BITMAP : bit (8) > }
    { null                                  -- Receiver compatible with earlier release
    |
        { 0 | 1-- indicates EGPRS TBF mode, see 3GPP TS 04.60
                < EGPRS Window Size : < EGPRS Window Size IE >>
                < LINK_QUALITY_MEASUREMENT_MODE : bit (2) > }
        { 0 | 1  < Packet Extended Ttiming Advance : bit (2)> }
    < SPARE_BITS : bit ** > } ;
```

R'98 GSM 400 MS requirements:

In case of R'98 GSM400 MS the fields of interest are *Indication of the EGPRS TBF mode, EGPRS Window Size*, *LINK_QUALITY_MEASUREMENT_MODE* and *Packet Extended Timing Advance*. From these fields others shall not be included to the message, but the field *Packet Extended Timing Advance* shall be used according to intended timing advance value.

5 GSM850 MS Independent of Release

GSM850 system is defined as release independent frequency band. This approach aligns GSM850 band with other frequency bands when considering features that have to be supported in different releases. However there exists requirements that have to be implemented independent of release MS states to support.

A mobile station supporting GSM850 shall implement following requirements:

- comply with the RF-requirements specified in 3GPP TS 05.05 [5] for GSM850;
- comply with the requirements for PLMN and cell searching specified in 3GPP TS 03.22 [6] and 3GPP TS 05.08 [7];
- indicate the Classmark 1, Classmark 2 and Classmark3 as specified in clauses 5.1.1, 5.1.2 and 5.1.3;
- indicate the MS Radio Access Capability as specified in clause 5.1.4;
- support Band Indicator bit as specified in clauses 5.1.5, 5.1.6 and 5.1.7.

5.1 R'98 GSM850 MS

This clause presents the contents of appropriate information elements as they shall be used in a case where GSM850 MS states conformance with Release 1998. It should be noted that information elements presented are of Release 1999. This is due to fact that GSM 850 is standardised in Release 1999.

5.1.1 Mobile Station Classmark 1 IE

Followed information is from 3GPP TS 24.008 [1] specification. It shows the contents of Information Element for Release 99.

The *Mobile Station Classmark 1* information element is coded as shown in figure 10.5.5/3GPP TS 24.008 and table 10.5.5/3GPP TS 24.008.

The *Mobile Station Classmark 1* is a type 3 information element with 2 octets length.

8	7	6	5	4	3	2	1	
	Mobile Station Classmark 1 IEI							octet 1
0 spare	Revision level		ES IND	A5/1	RF power Capability			octet 2

Figure 10.5.5/3GPP TS 24.008 *Mobile Station Classmark 1* information element

The field of interest is *Revision level.* R'98 GSM 850 MS shall indicate phase 2 support with the bit pattern '01'.

5.1.2 Mobile Station Classmark 2 IE

Followed information is from 3GPP TS 24.008 [1] specification. It shows the contents of Information Element for Release 99. 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

R'98 GSM 850 MS requirements:

For R'98 GSM 850 MS a field of interest is *Revision level*. The coding of that field shall indicate phase 2 support with bit pattern '01'. In a case that MS claims to support *LCSVA* or *SoLSA* then those fields shall be set to '1's , according to the definitions of those parameters. Field *UCS2* shall indicate '0' since it is defined as spare in R'98.

5.1.3 Mobile Station Classmark 3 IE

Followed information is from 3GPP TS 24.008 [1] specification. It shows the contents of Information Element for Release 99.

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 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).

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 TDD Radio Access Technology Capability : bit >
    < CDMA 2000 Radio Access Technology Capability : bit >

    { 0 | 1  < DTM GPRS Multi Slot Sub-Class : bit(2) >
             < MAC Mode Support : bit >
             { 0 | 1< DTM EGPRS Multi Slot Sub-Class : bit(2) > } }
    { 0 | 1 < Single Band Support > }
    < 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 > ::=
    < GSMBand : bit(4) > ;
```

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

R'98 GSM 850 MS requirements:

From R'98 GSM850 MS point of view the relevant field is *GSM 850 Associated Radio Capability*. Bit pattern '1' indicates GSM 850 support.

If GSM850 MS states to support MS Positioning it shall indicate it with '1' in the field *MS Positioning Method Capability* and also indicate the supported method in the *MS Positioning Method* field.

Fields *EDGE Multi Slot Capability* and *EDGE Struc* shall be indicated not to be included in the Classmark 3 IE since they are not defined in Release '98. This is done by setting the indication bit of mentioned fields to '0'.

Parameters *UMTS FDD Radio Access Technology Capability*, *UMTS TDD Radio Access Technology Capability*, *CDMA 2000 Radio Access Technology Capability*, *DTM GPRS Multi Slot Sub-Class*, *MAC Mode Support*, *DTM EGPRS Support* and *Single Band Support* shall be indicated as not supported. This is done either by not including these fields at all in the Classmark 3 IE or by setting the bit value '0' for each of these parameters.

Support of other frequency bands shall be indicated as defined in Release ’98, including the options defined in 3GPP TS 05.14.

5.1.4 MS Radio Access capability

Followed information is from 3GPP TS 24.008 [1] specification. It shows the contents of Information Element for Release 99.

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

For the indication of the Access Technology Types the following conditions shall apply:

- Among the three Access Technology Types GSM 900-P, GSM 900-E and GSM 900-R only one shall be present.
- Due to shared radio frequency channel numbers between GSM 1800 and GSM 1900, the mobile station should provide the relevant radio access capability for either GSM 1800 band OR GSM 1900 band, not both.
- The MS shall indicate its supported Access Technology Types during a single MM procedure.
- If the alternative coding by using the Additional access technologies struct is chosen by the mobile station, the mobile station shall indicate its radio access capability for the serving BCCH frequency band in the first includedAccess capabilities struct.
- The first Access Technology Type shall not be set to "1111".

For error handling the following shall apply:

- 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.
- For more details about error handling of MS radio access capability see 3GPP TS 08.18.

NOTE: The MS should not add spare bits following the <Content> field for the Access capabilities of an Access Technology Type, i.e. the MS should encode the <Length> field of the < Access capabilities struct > as the length in bits of <Content> only.

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) exclude 1111 >
< **Access capabilities** : <Access capabilities struct> > }

| { < **Access Technology Type**: bit (4) == 1111 > -- *structure adding Access technologies with same capabilities*
< **Length** : bit (7) > -- *length in bits of list of Additional access technologies and spare bits*
{ 1 < **Additional access technologies**: < Additional access technologies struct > > } ** 0
<spare bits>** } }

{ 0 | 1 <MS RA capability value part struct> } ;

< Additional access technologies struct > ::=
< **Access Technology Type** : bit (4) >
< **GMSK Power Class** : bit (3) >
< **8PSK Power Class** : bit (2) > ;

< 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 preceding Access capabilities field 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*
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 Sub-Class**: bit(2)>
<MAC Mode Support : bit>
{0 | 1 <**DTM EGPRS Multi Slot Sub-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. These fields are not used by the network and may be excluded by the MS.

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 1 1 1 Indicates the presence of a list of Additional access technologies
All other values are treated as unknown by the receiver.

RF Power Capability, GMSK Power Class (3 bit field)
This field contains the binary coding of the power class used for GMSK associated with the indicated Access Technology Type (see 3GPP TS 05.05).

8PSK Power Capability (2 bit field)
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):
Bits 2 1
0 0 Reserved
0 1 Power class E1
1 0 Power class E2
1 1 Power class E3

8PSK Power Class (2 bit field)
This field indicates the radio capability for 8-PSK modulation. The following coding is used (see 3GPP TS 05.05):
Bits 2 1
0 0 8PSK modulation not supported for uplink
0 1 Power class E1
1 0 Power class E2
1 1 Power class E3

Additional access technologies struct
This structure contains the GMSK Power Class and 8PSK Power Class for an additional Access Technology. All other capabilities for this indicated Access Technology are the same as the capabilities indicated by the preceding Access capabilities struct.

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 GSM 05.02. This field is not used by the network and may be excluded by the MS.
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 GSM 05.02.

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 GSM 05.02. This field is not used by the network and may be excluded by the MS.
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 GSM 05.02.

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 neighbour cell power measurement, and the switch from that radio channel to another radio channel. This field is not used by the network and may be excluded by the MS.
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. This field is not used by the network and may be excluded by the MS.
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 Sub-Class (2 bit field)
This field indicates the GPRS DTM capabilities of the MS. The GPRS DTM Multi Slot Sub-Class is independent from the Multi Slot Capabilities field.
Bits
2 1
0 0 Sub-Class 1 supported
0 1 Sub-Class 5 supported
1 0 Sub-Class 9 supported
1 1 Reserved for future extension. If received, the network shall interpret this as '00'.

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

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

COMPACT Interference Measurement Capability (1 bit field)
Bit
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

R'98 GSM 850 MS requirements:

From R'98 GSM850 MS point of view the relevant field is *Access Technology Type.* Bit pattern '0111' indicates GSM 850 support.

The access capabilities struct for any access technology type may be encoded either according to Release'98 or Release '99 specification. In case coding specified for Release '99 is used, the following requirements apply:

In case the Multislot capability struct is present in the access capabilities struct, the fields *ECSD multislot class, EGPRS multislot class, DTM GPRS Multi Slot Sub-Class and DTM EGPRS Multi Slot Sub-Class* shall be indicated as not supported since they are not defined in Release '98. This is done by setting the indication bit of mentioned fields to '0'.

The field 8PSK Power Capability shall be indicated as not present by setting the field indication bit to '0'. Parameters *COMPACT Interference Measurement Capability, Revision Level Indicator, UMTS FDD Radio Access Technology Capability, UMTS TDD Radio Access Technology Capability, CDMA 2000 Radio Access Technology Capability* and *MAC Mode Support* shall be indicated as not supported. This is done by the bit value '0' for each of these parameters.

The MS shall not use the Additional access technologies struct.

5.1.5 System Information Type 1 Rest Octets

Followed information is from 3GPP TS 04.18 [2] Release 1999 specification. It shows the contents of Information Element for Release 99.

The *SI 1 Rest Octets* information element is shown in Table 10.5.2.32.1a and Table 10.5.2.32.1b/3GPP TS 04.18.

The *SI 1 Rest Octets* information element is a type 5 information element with 1 octet length.

```
<SI1 Rest Octets> ::=
                {L |H  <NCH Position : bit (5)> }
                < Band indicator >
                <spare padding> ;

< Band indicator > ::=
      < BAND_INDICATOR : bit == L >          -- ARFCN indicates 1800 band
    | < BAND_INDICATOR : bit == H > ;        -- ARFCN indicates 1900 band
```

Table 10.5.2.32.1a/3GPP TS 04.18: *SI1 Rest Octets* information element details

BAND_INDICATOR (1 bit)

The band indicator for 1800 and 1900 associates the ARFCN channel numbers to the DCS 1800 respectively to the PCS 1900 band, see 3GPP TS 05.05. The most recently received band indicator value is valid for the whole PLMN.

Table 10.5.2.32.1b/3GPP TS 04.18: *SI 1 Rest Octets* information element

NCH Position on the CCCH

The values in the NCH Position field indicates the block number of the CCCH block which is used for the first NCH block and the number of blocks used for the NCH. (The block numbering corresponds to table 5 in clause 7 of 3GPP TS 05.02)

The absence of the NCH position field indicates that there is no NCH in the cell/on the carrying CCCH slot

The following coding applies if 1 or more basic physical channels are used for CCCH, not combined with SDCCHs.

Value	No of blocks	Number of first block
0 0 0 0 0	1	0
0 0 0 0 1	1	1
0 0 0 1 0	1	2
0 0 0 1 1	1	3
0 0 1 0 0	1	4
0 0 1 0 1	1	5
0 0 1 1 0	1	6
0 0 1 1 1	2	0
0 1 0 0 0	2	1
0 1 0 0 1	2	2
0 1 0 1 0	2	3
0 1 0 1 1	2	4
0 1 1 0 0	2	5
0 1 1 0 1	3	0
0 1 1 1 0	3	1
0 1 1 1 1	3	2
1 0 0 0 0	3	3
1 0 0 0 1	3	4
1 0 0 1 0	4	0
1 0 0 1 1	4	1
1 0 1 0 0	4	2
1 0 1 0 1	4	3
1 0 1 1 0	5	0
1 0 1 1 1	5	1
1 1 0 0 0	5	2
1 1 0 0 1	6	0
1 1 0 1 0	6	1
1 1 0 1 1	7	0

Other values are reserved for future use. A mobile station receiving a reserved value shall behave as if the NCH position was not present

In the case the CCCH configuration is not compatible with the NCH position (e.g., CCCH with combined SDCCH and the value different from 00000, 00001 or 00111), the mobile station shall behave as if the NCH Position field was not present.

R'98 GSM 850 requirements:

From R'98 GSM850 MS point of view the relevant field is *Band Indicator.* A Band Indicator value ‘L’ indicates DCS 1800 band and a value ‘H’ indicates PCS 1900 band.

5.1.6 SI6 Rest Octets

The following information is from 3GPP TS 04.18 Release 1999 specification. It shows the contents of Information Element for Release 99.

The *SI 6 Rest Octet* information element may contain information concerning the paging, notification channels, VBS and VGCS services of the cell.

The *SI 6 Rest Octets* information element is a type 5 information element with 7 octets length.

The value part is as shown below:

Table 10.5.2.35a.1/3GPP TS 04.18: *SI 6 Rest Octets* information element content

```
<SI6 rest octets> ::=
        {L I H <PCH and NCH info>}
        {L I H <VBS/VGCS options : bit(2)>}
    { < DTM_support : bit == L >
    I < DTM_support : bit == H >
        < RAC : bit (8) >
        < MAX_LAPDm : bit (3) > }
        < Band indicator >
    <implicit spare >;

<PCH and NCH info> ::=
    <Paging channel restructuring>
    <NLN(SACCH) : bit(2)>
    {0 I 1 <Call priority : bit (3)>}
    <NLN status : bit >;

<paging channel restructuring> ::=
    1|      -- paging channel is restructured
    0       -- paging channel is not restructured

<VBS/VGCS options> ::=
    <inband notifications>
    <inband pagings>;

<inband notifications>::=
    0|  --  the network does not provide notification on FACCH so that the mobile should
            inspect the NCH for notifications
    1   --  the mobile shall be notified on incoming high priority VBS/VGCS calls through
            NOTIFICATION/FACCH, the mobile need not to inspect the NCH

<inband pagings>::=
    0|      --  the network does not provide paging information on FACCH so that the mobile
               should inspect the PCH for pagings
    1       --  the mobile shall be notified on incoming high priority point-to-point calls
               through NOTIFICATION/FACCH, the mobile need not to inspect the PCH

< Band indicator > ::=
     < BAND_INDICATOR : bit == L >          -- ARFCN indicates 1800 band
    | < BAND_INDICATOR : bit == H > ;       -- ARFCN indicates 1900 band
```

Table 10.5.2.35a.2/3GPP TS 04.18: *SI 6 Rest Octets* information element details

Attributes, field contents:

1. For <NLN(SACCH): bit(2)>: see 10.5.2.23.

2. For <call priority>: see 10.5.2.23. Indication of the highest priority associated with VBS/VGCS calls in a cell.

DTM_support (1 bit field)
This field indicates whether DTM is supported in the serving cell (i.e. whether the MS is allowed to initiate the packet request procedure while in dedicated mode). It is coded as follows:

Bit 0
L DTM is not supported in the serving cell
H DTM is supported in the serving cell

RAC (8 bit field)
This field codes the Routeing Area Code of the RA to which the serving cell belongs (see 3GPP TS 03.03).

MAX_LAPDm (3 bit field)
This field indicates the maximum number of LAPDm frames on which a layer 3 can be segmented into and be sent on the main DCCH. It is coded as follows:

Bit 2 1 0	
0 0 0	Any message segmented in up to 5 LAPDm frames.
0 0 1	Any message segmented in up to 6 LAPDm frames.
0 1 0	Any message segmented in up to 7 LAPDm frames.
0 1 1	Any message segmented in up to 8 LAPDm frames.
1 0 0	Any message segmented in up to 9 LAPDm frames.
1 0 1	Any message segmented in up to 10 LAPDm frames.
1 1 0	Any message segmented in up to 11 LAPDm frames.
1 1 1	Any message segmented in up to 12 LAPDm frames.

BAND_INDICATOR (1 bit field)

The band indicator for 1800 and 1900 associates the ARFCN channel numbers to the DCS 1800 respectively to the PCS 1900 band, see 3GPP TS 05.05.

R'98 GSM 850 requirements:

From R'98 GSM850 MS point of view the relevant field is *Band Indicator.* A Band Indicator value 'L' indicates DCS 1800 band and a value 'H' indicates PCS 1900 band.

5.1.7 Packet System Information Type 1

The following information is from 3GPP TS 04.60 Release 1999 specification. It shows the contents of Information Element for Release 99.

Table 11.2.18.1: PSI1 information elements

```
< PSI1 message content > ::=
    < PAGE_MODE : bit (2) >
    < PBCCH_CHANGE_MARK : bit (3) >
    < PSI_CHANGE_FIELD : bit (4) >
    < PSI1_REPEAT_PERIOD : bit (4) >
    < PSI_COUNT_LR : bit (6) >
    { 0 | 1 < PSI_COUNT_HR : bit (4) > }
    < MEASUREMENT_ORDER: bit (1) >
    < GPRS Cell Options : < GPRS Cell Options IE > >
    < PRACH Control Parameters : < PRACH Control Parameters IE > >
    < PCCCH Organization Parameters : < PCCCH Organization Parameters IE > >
    < Global Power Control Parameters : < Global Power Control Parameters IE > >
    < PSI_STATUS_IND : bit >
    { null | 0          -- Receiver backward compatible with earlier release
     | 1                -- Additions in release 99 :
        < MSCR : bit >
        < SGSNR : bit >
        < BAND_INDICATOR : bit >
        < padding bits > }
     ! < Distribution part error : bit (*) = < no string > > ;
```

Table 11.2.18.2: PSI1 information element details

GPRS Cell Options
This information element is defined in subclause 12.24

Global Power Control Parameters
This information element is defined in subclause 12.9.

MEASUREMENT ORDER (1 bit field)
The MEASUREMENT ORDER field indicates if set = 0 that the mobile station is in control of the cell re-selection in both packet idle mode and packet transfer mode (= NC0 in 3GPP TS 05.08) and that the mobile station shall not send any measurement reports to the network (= NC0 and = EM0 in 3GPP TS 05.08). It also indicates that the Optional PSI5 message is not broadcast.
If set = 1 the mobile station shall send measurement reports for cell re-selection and/or for extended measurements to the network. Further cell re-selection and measurement details are included in the PSI5 message.

PAGE_MODE (2 bit field)
This field describes which type of page mode used, i.e. either normal paging, extended paging, paging reorganization or same as before from the previous page mode. The mobile station shall ignore this field if the message is received on the PACCH. Coding of this field is defined in 3GPP TS 04.18.

PBCCH_CHANGE_MARK (3 bit field)
The PBCCH_CHANGE_MARK field is a 3 bit counter incremented with one each time information has been changed in one or more of the broadcast PSI2-PSIn messages on PBCCH (n>2).

PSI_CHANGE_FIELD (4 bit field)
The PSI_CHANGE_FIELD is a 4 bit value reflecting which PSI message or group of instantiated PSI message was most recent updated when the PBCCH_CHANGE_MARK was last incremented. If more than one PSI message or group of instantiated PSI message were changed at the same time, the PSI_CHANGE_FIELD indicates unspecified updates. Range 0 to 15.

Bit 4 3 2 1	
0 0 0 0	Update of unspecified PSI message(s);
0 0 0 1	Unknown
0 0 1 0	PSI2 updated
0 0 1 1	PSI3/PSI3bis/PSI3ter/PSI3quater updated
0 1 0 0	PSI4 updated
0 1 0 1	PSI5 updated
0 1 1 0	PSI6 updated
0 1 1 1	PSI7 updated
1 0 0 0	PSI8 updated

All other values shall be interpreted as 'Update of unknown SI message type'.

PSI1_REPEAT_PERIOD (4 bit field)
This field is the binary representation of the PSI1_REPEAT_PERIOD parameter value minus one, see 3GPP TS 05.02. The field is coded according to the following table:

Bit 4 3 2 1	
0 0 0 0	PSI1_REPEAT_PERIOD = 1
0 0 0 1	PSI1_REPEAT_PERIOD = 2
. . .	
1 1 1 1	PSI1_REPEAT_PERIOD = 16

PSI_COUNT_LR (6 bit field)
This field is the binary representation of the PSI_COUNT_LR parameter, see 3GPP TS 05.02. The field is coded according to the following table:

Bit 6 5 4 3 2 1	
0 0 0 0 0 0	PSI_COUNT_LR = 0
0 0 0 0 0 1	PSI_COUNT_LR = 1
. . .	
1 1 1 1 1 1	PSI_COUNT_LR = 63

PSI_COUNT_HR (4 bit field)
This field is the binary representation of the PSI_COUNT_HR parameter value minus one, see 3GPP TS 05.02. If PSI_COUNT_HR is not included in PSI1 message, the default value PSI_COUNT_HR = 0 applies. The field is coded according to the following table:

Bit 4 3 2 1	
0 0 0 0	PSI_COUNT_HR = 1
0 0 0 1	PSI_COUNT_HR = 2
. . .	
1 1 1 1	PSI_COUNT_HR = 16

PCCCH Organization Parameters
This information element is defined in subclause 12.25

PRACH Control Parameters
This information element is defined in subclause 12.14.

PSI_STATUS_IND (1 bit field):
0 The network does not support the PACKET PSI STATUS message;
1 The network supports the PACKET PSI STATUS message.

MSCR, MSC Release (1 bit field):
0 The MSC is Release '98 or older
1 The MSC is Release '99 onwards

SGSNR, SGSN Release (1 bit field)
0 The SGSN is Release '98 or older
1 The SGSN is Release '99 onwards

BAND_INDICATOR (1 bit field)
See 3GPP TS 05.05 for definition of this field, which is coded as follows:
0 ARFCN indicates 1800 band
1 ARFCN indicates 1900 band

R'98 GSM 850 requirements:

From R'98 GSM850 MS point of view the relevant field is *Band Indicator*. Bit pattern '0' indicates band DCS 1800 band and bit '1' indicates PCS 1900 band.

Annex A (informative): Change History

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
2000-11	G02	GP-000911			New specification approved by TSG-GERAN#2		7.0.0
2001-06	G05	GP-011331	A002	1	Corrections of GSM400 to release independent implementation guide for R98	7.0.0	7.1.0
2001-06	G05	GP-011425	A004	1	GSM850 addition to release independent implementation guide for R98	7.0.0	7.1.0
2002-06	G10	GP-022118	A008	3	Update of TS 05.14	7.1.0	7.2.0

History

Document history		
V7.0.0	November 2000	Publication
V7.1.0	June 2001	Publication
V7.2.0	June 2002	Publication