ETSI TS 145 014 V6.0.0 (2000-11)

Technical Specification

Digital cellular telecommunications system (Phase 2+);
Release independent frequency bands;
Implementation guidelines
(3GPP TS 05.14 version 6.0.0 Release 1997)

Reference
DTS/TSGG-010514Q6

Keywords
GSM

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (http://www.etsi.org/ipr).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Foreword

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

The present document may refer to technical specifications or reports using their 3GPP identities, UMTS identities or GSM identities. These should be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between GSM, UMTS, 3GPP and ETSI identities can be found under www.etsi.org/key .

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 6.x.y

where:

6 GSM Phase 2+ Release 1997;

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

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

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.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.
- For this Release 1997 document, references to GSM documents are for Release 1999, where latest specification version shall always apply.

[1] 3G 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] GSM 04.18: "Digital cellular telecommunications system (Phase 2+); Mobile radio interface layer 3 specification, Radio Resource Control Protocol, Release 1999".

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

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

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

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

[7] GSM 05.08: "Digital cellular telecommunications system (Phase2+); Radio subsystem link control, 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 GSM 04.04 [4], GSM 05.10 [3] and as stated in clause 5.4 of the present document;
- comply with the RF-requirements specified in GSM 05.05 [5] for GSM400;
- comply with the requirements for PLMN and cell searching specified in GSM 03.22 [6] and GSM 05.08 [7];
- indicate the Classmark 1, Classmark 2 and Classmark3 as specified in clauses 5.1, 5.2 and 5.3.

4.1 R'97 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 1997. 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 3G 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/TS 24.008 and table 10.5.5/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/TS 24.008: *Mobile Station Classmark 1* information element

The field of interest is *Revision level.* R'97 GSM 400 MS shall indicate phase 2 support with the bit pattern '01'.

Mobile Station Classmark 2 IEFollowed information is from 3G 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/TS 24.008, table 10.5.6a/TS 24.008 and table 10.5.6b/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/TS 24.008: *Mobile Station Classmark 2* information element

R'97 GSM 400 MS requirements:

For R'97 GSM 400 MS a field of interest is *Revision level*. The coding of that field shall indicate phase 2 support with bit pattern '01'. Fields *LCSVA CAP, UCS 2* and *SoLSA* shall be set to '0's , according to the definitions of those parameters.

4.1.2 Mobile Station Classmark 3 IE

Followed information is from 3G 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/TS 24.008 and table 10.5.7/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 GSM 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 Multi Slot Sub-Class : bit(2)>
          <MAC Mode Support : bit>
          <EGPRS Support : bit>} ;

                <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)>}
```

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

R'97 GSM 400 MS requirements:

From R'97 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.

Fields *MS Positioning Method*, *EDGE Multislot Capability*, *EDGE Struct*, *GSM 850 Associated Radio Capability*, *GSM 1900 Associated Radio Capability* and *DTM Multi Slot Sub-Class* shall be indicated not to included to the Classmark 3 IE since they are not defined in Release '97. 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* shall be indicated as not supported. This is done by the bit value '0' for each of these parameters.

4.1.3 Timing Advance IE

The *Timing Advance* information element is coded as shown in figure 10.5.67/GSM 04.18 and table 10.5.81/GSM 04.18 [2].

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

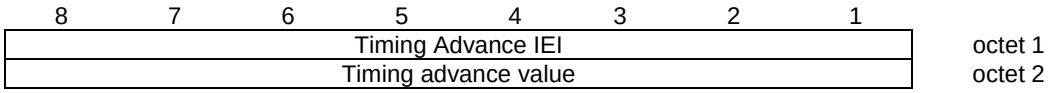

Figure 10.5.67/GSM 04.18: *Timing Advance* information element

R'97 GSM 400 MS requirements:

In case of MS supporting Release 1997 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.

4.2 R'97 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 1997 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 GSM 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 10.5.60/GSM 04.18 and 10.5.61/GSM 04.18.

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

Table 10.5.60: RR PACKET UPLINK ASSIGNMENT information element

< RR Packet Uplink Assignment IE > ::=
< **LENGTH_IN_OCTETS** : bit (8) >

< **CHANNEL_CODING_COMMAND** : bit (2) >

< **TLLI_BLOCK_CHANNEL_CODING** : bit (1) >

< **Packet Timing Advance** : Packet Timing Advance IE >

{01 <**Dynamic Allocation** : Dynamic Allocation struct>

| 10 <**Single Block Allocation** : Single Block Allocation struct>

| 11 <**Fixed Allocation : Fixed Allocation struct>**

| 00 <Exension>**}**

{0 | 1 < EGPRS_MCS_MODE : bit (4) >

< RESEGMENT : bit (1) >

< EGPRS Window Size : < EGPRS Window Size IE >>}

{ 0 | 1 < Packet Extended Timing Advance : bit (2) >}

< **SPARE_BITS** : bit** > ;

<Extension> : := -- Future extension can be done by modifying this structure

null ;

<Dynamic Allocation struct > ::=

< **Extended Dynamic Allocation** : bit(1)>

{0 | 1 < **P0** : bit (4) >

< **PR_MODE** : bit (1) > }

< **USF_GRANULARITY** : bit (1) >

{ 0 | 1 < **UPLINK_TFI_ASSIGNMENT** : bit (5) > }

{ 0 | 1 < **RLC_DATA_BLOCKS_GRANTED** : bit (8) > }

{ 0 -- Timeslot Allocation

{ 0 | 1 < **USF_TN0** : bit (3) >}

{ 0 | 1 < **USF_TN1** : bit (3) >}

{ 0 | 1 < **USF_TN2** : bit (3) >}

{ 0 | 1 < **USF_TN3** : bit (3) >}

{ 0 | 1 < **USF_TN4** : bit (3) >}

{ 0 | 1 < **USF_TN5** : bit (3) >}

{ 0 | 1 < **USF_TN6** : bit (3) >}

{ 0 | 1 < **USF_TN7** : bit (3) >}

| 1 -- Timeslot Allocation with Power Control Parameters

< **ALPHA** : bit (4) >

{ 0 | 1 < **USF_TN0** : bit (3) >

< **GAMMA_TN0** : bit (5) > }

{ 0 | 1 < **USF_TN1** : bit (3) >

< **GAMMA_TN1** : bit (5) > }

{ 0 | 1 < **USF_TN2** : bit (3) >

```
                < GAMMA_TN2 : bit (5) > }

                { 0 | 1 < USF_TN3 : bit (3) >

                < GAMMA_TN3 : bit (5) > }

                { 0 | 1 < USF_TN4 : bit (3) >

                < GAMMA_TN4 : bit (5) > }

                { 0 | 1 < USF_TN5 : bit (3) >

                < GAMMA_TN5 : bit (5) > }

                { 0 | 1 < USF_TN6 : bit (3) >

                < GAMMA_TN6 : bit (5) >

                { 0 | 1 < USF_TN7 : bit (3) >

                < GAMMA_TN7 : bit (5) > }};


<Single Block Allocation struct > ::=

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

Editors note: This IE has a number of differences to the contents of the PACKET UPLINK ASSIGNMENT message described in GSM 04.60:

- the PAGE_MODE is not included because this IE is sent on a DCCH, not on the PCH/AGCH;
- the Referenced Address is not included because this IE is sent in a dedicated mode message and hence has only one intended recipient;
- the CONTENTION_RESOLUTION_TLLI is not included because this IE is sent after dedicated mode contention resolution;
- the GSM 04.60 Frequency Parameters are not included because the dedicated mode message(s) carry this information in other information elements (eg Mobile Allocation);

- the TBF_STARTING_TIME is not included because it duplicates the information in the *Starting Time* IE;

- the ALLOCATION_REFERENCE is not included because this IE is in a message sent in dedicated mode using a reliable data link.

R'97 GSM 400 MS requirements:

From R'97 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'97 specification. However in case of GSM400 MS that states conformancy with Release 97 all other mentioned fields shall be left out from the Packet Uplink Assignement by indicating with '0' that the following structures are not included , but *Packet Extended Timing Advance* field shall be used 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 10.5.62/GSM 04.18 and 10.5.63/GSM 04.18.

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

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

Table 10.5.62: RR PACKET DOWNLINK ASSIGNMENT information element

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

Editors note: This IE has a number of differences to the contents of the PACKET DOWNLINK ASSIGNMENT message described in GSM 04.60:

- the PAGE_MODE is not included because this IE is sent on a DCCH not on the PCH/AGCH;
- Referenced Address is not included because this IE is sent in a dedicated mode message and hence has only one intended recipient.
- the GSM 04.60 Frequency Parameters are not included because the dedicated mode message(s) carry this information in other information elements (eg Mobile Allocation);
- the TBF_STARTING_TIME is not included because it duplicates the information in the *Starting Time* IE.

R'97 GSM 400 MS requirements:

In case of R'97 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.

Annex A (informative): Change History

Change history						
Meeting#	**Spec**	**Version**	**CR**	**<Phase>**	**New Version**	**Subject/Comment**
G02	05.14	6.0.0				New specification approved by TSG-GERAN

History

Document history		
V6.0.0	November 2000	Publication