

# ETSI TS 100 532 V7.0.1 (1999-07)

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*Technical Specification*

**Digital cellular telecommunications system (Phase 2+);  
Support of Dual Tone Multi-Frequency signalling (DTMF)  
via the GSM system  
(GSM 03.14 version 7.0.1 Release 1998)**

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**GSM**®

GLOBAL SYSTEM FOR  
MOBILE COMMUNICATIONS



Reference

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## Foreword

This Technical Specification (TS) has been produced by the Special Mobile Group (SMG).

The present document defines the Discontinuous Reception (DRX) in the GSM system within the digital cellular telecommunications system.

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

Version 7.x.y

where:

- 7 indicates Release 1998 of GSM Phase 2+
- x the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- y the third digit is incremented when editorial only changes have been incorporated in the specification.

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## 1 Scope

The present document describes how Dual Tone Multi Frequency (DTMF) signals are supported in the GSM system.

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## 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 1998 document, references to GSM documents are for Release 1998 versions (version 7.x.y).

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

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

[3] CEPT T/CS 34-08: "Automatic sender for push-button multifrequency signalling".

[4] CEPT T/CS 46-02: "Multifrequency signalling system to be used for push-button telephones".

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## 3 Abbreviations

Abbreviations used in the present document are listed in GSM 01.04.

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## 4 Requirement

Dual Tone Multi Frequency (DTMF) is an inband one out of four plus one out of four signalling system, primarily used from terminal instruments in telecommunication networks. The international recommendations which apply are CEPT recommendations T/CS 34-08 (sender) and T/CS 46-02 (receiver) as detailed in sections 6.2 and 6.3. For PCS 1900 for North America the Standards which apply are operator specific.

In the GSM system the MSC must support DTMF in the mobile to land direction.

The support of this facility in the land to mobile direction is for further study.

The use of DTMF is only permitted when the speech teleservice is being used or during the speech phase of alternate speech/data and alternate speech/facsimile teleservices. The responsibility for checking this lies in the MS.

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## 5 Cause of DTMF generation

A user may cause a DTMF tone to be generated by depression of a key in the Mobile Station (MS). Optionally (on a MS basis) manufacturers of mobile equipment may choose to allow DTMF to be controlled from a remote terminal.

The man-machine interface questions associated with this facility are not discussed further in this GTS.

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## 6 Support of DTMF across the air interface

### 6.1 General

A message based signalling system is used across the GSM air interface.

This requires that the relevant user action (e.g. a key depression) is interpreted by the MS as a requirement for a DTMF digit to be sent, this is converted by the MS into a message, the message is transmitted across the air interface, and is converted by the MSC into a DTMF tone which is applied towards the network, which should then respond with an acknowledgement. When the user completes the key depression, an message that the DTMF sending should cease is also passed to the MSC, which again will respond with an acknowledgement.

### 6.2 Specific

The messages to be sent across the air interface will use the frame stealing mode of transmission.

The messages when sent across the air interface should contain the following information:

- a) START DTMF : Containing the digit value (0-9,A,B,C,D,\*,#);
- b) START DTMF ACKNOWLEDGE: Containing the digit value (0-9,A,B,C,D,\*,#) corresponding to the DTMF tone that the network applies towards the remote user;
- c) STOP DTMF : No further info;
- d) STOP DTMF ACKNOWLEDGE: No further info.

Only a single digit will be passed in each START DTMF and START DTMF ACKNOWLEDGE message.

The messages will be passed transparently through the base station and interpreted at the MSC.

On receipt of a START DTMF message, the MSC will connect the correct dual-tone to line. This tone will remain connected until either the call is cleared or a STOP DTMF message is received.

As an operator option, the tone may be ceased after a pre-determined time whether or not a STOP DTMF message has a been received.

The tones that are to be generated by the MSC are specified as follows:

- Frequencies are defined in CEPT Recommendation T/CS 34-08 (for PCS 1900 for North America this is operator specific);
- Tone sending levels are defined nationally (for PCS 1900 for North America this is operator specific);
- Durations as specified below.

### 6.3 Tone durations

The minimum length of tone generated by the switch should be according to CEPT recommendation T/CS 46-02. For PCS 1900 for North America this is operator specific.

The minimum gap between two subsequent tones should be according to CEPT recommendation T/CS 46-02. For PCS 1900 for North America this is operator specific.

There is no defined maximum length to the tone, which will normally cease when a STOP DTMF message is received from the MS. However, the operator may choose to put a pre-defined time limit on the duration of tones sent to line as mentioned in 6.2.

Figures 1 to 3 show an overview of how the DTMF should operate.

NOTE: The transmission time of the messages over the air interface on FACCH/F or FACCH/H, see GSM 05.02, ensures that the minimum length of tones and minimum gap between tones according to T/CS 46-02 are fulfilled. This does not apply to PCS 1900 for North America.

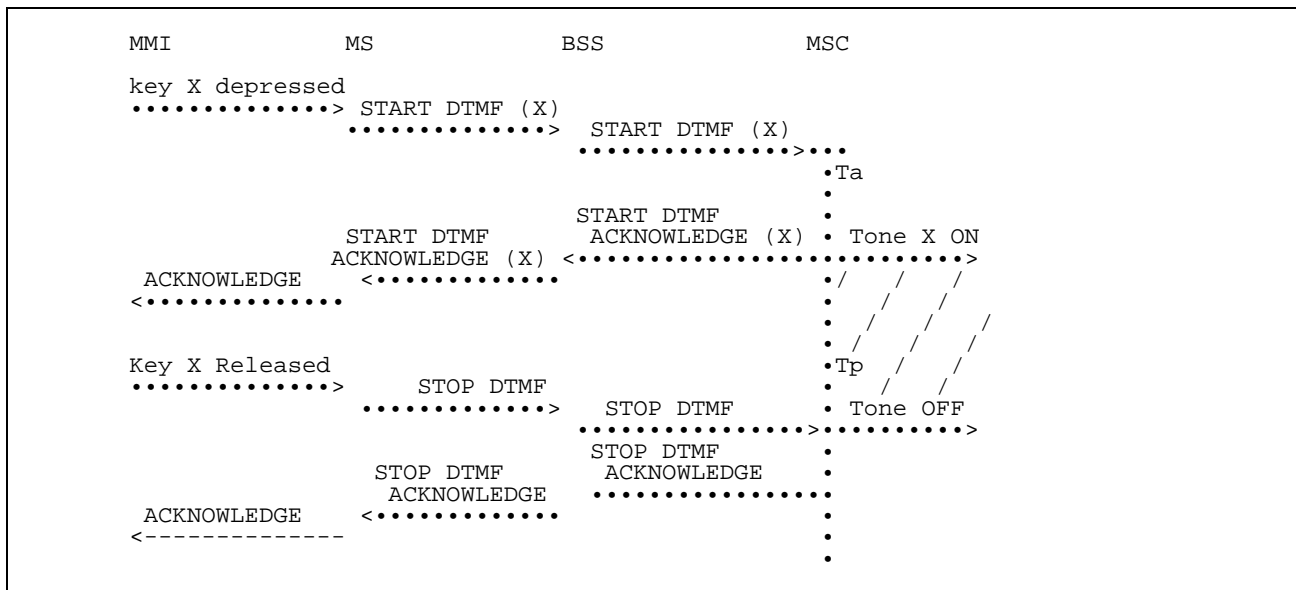


Figure 1: Single DTMF Transmission

Ta Association time for DTMF Generator in MSC, implementation dependent but low.

Tp Pre-determined maximum tone length, operator option.

NOTE: If the Network operator implements the time limit option (see section 6.2), then the tone ends if the timer expires before the 'Stop DTMF' is received.

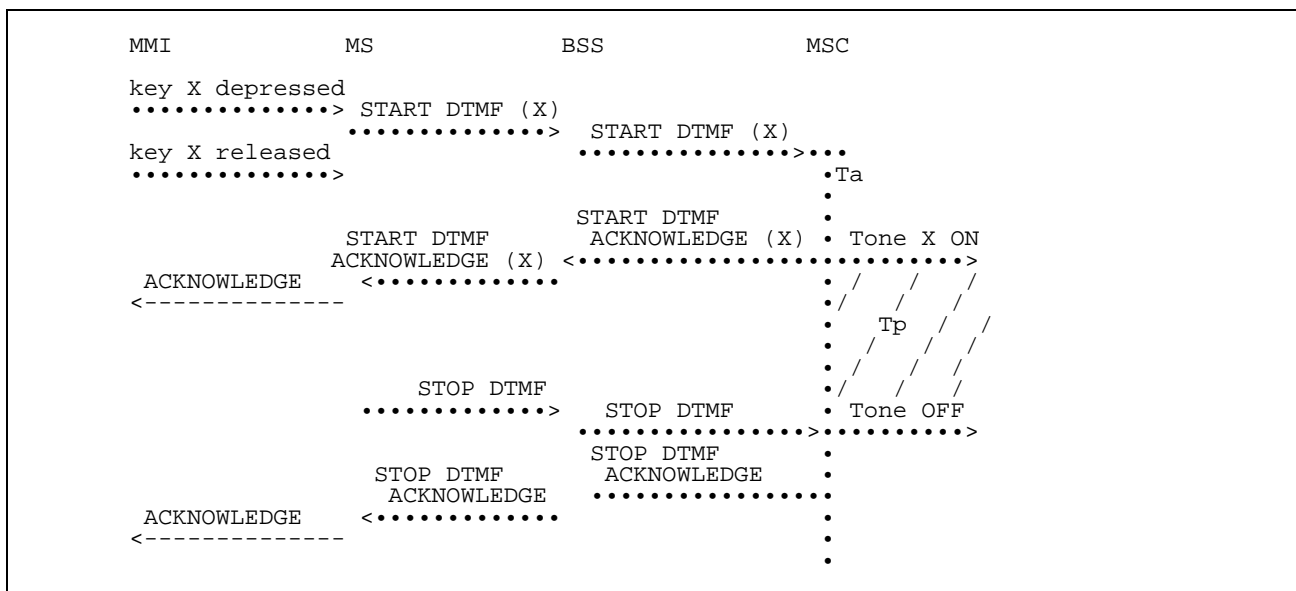


Figure 2: Single DTMF Transmission, short key depression

Ta Association time for DTMF Generator in MSC, implementation dependent but low.

Tp Pre-determined maximum tone length, operator option.

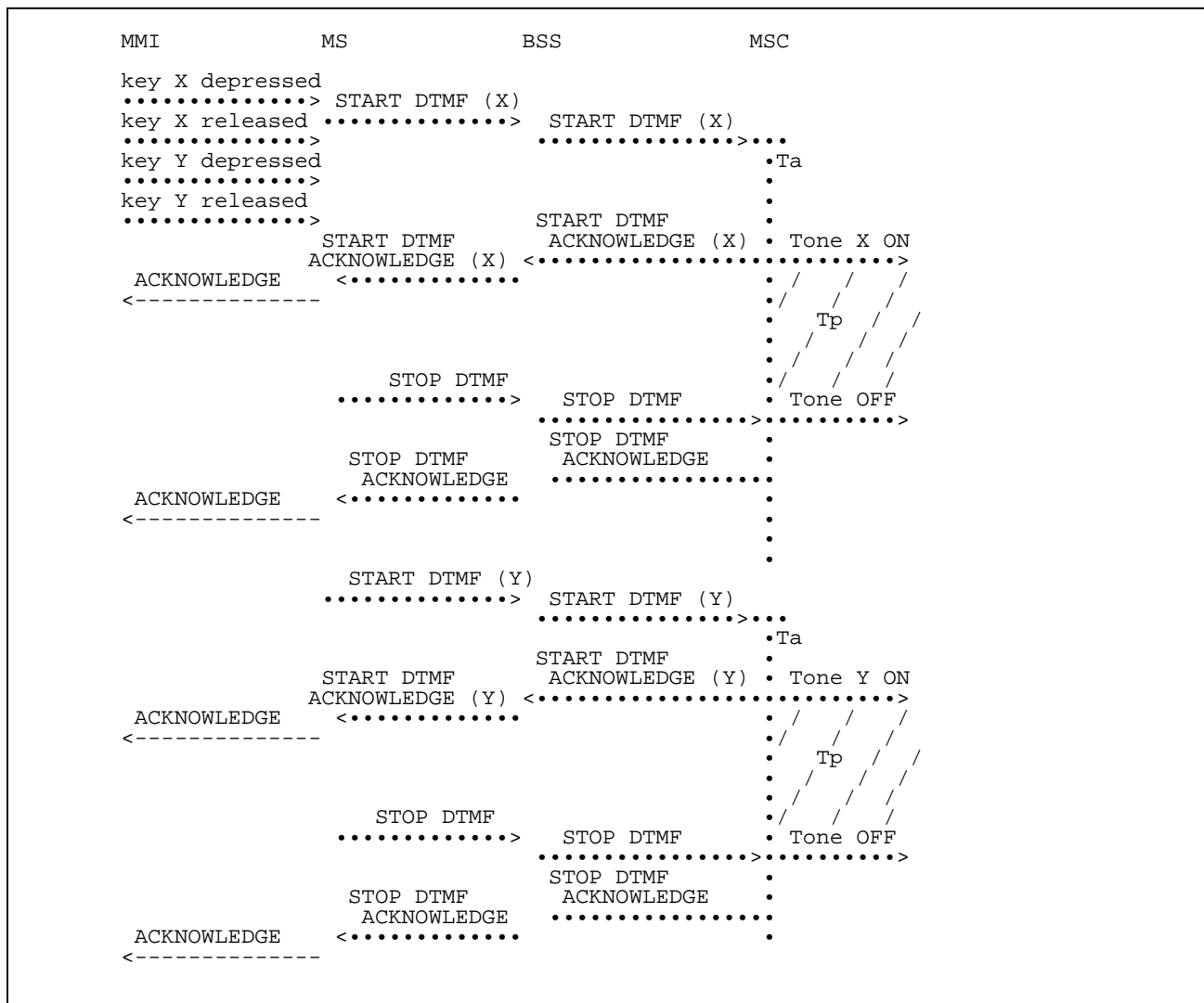


Figure 3: Two single DTMF Transmissions, short key depressions

Ta Association time for DTMF Generator in MSC, implementation dependent but low.

Tp Pre-determined maximum tone length, operator option.

## 7 Effect of Handover

### 7.1 Internal Handover

There is unlikely to be any impact on DTMF due to internal handover.

### 7.2 External Handover

Depending on the exact moment when handover occurs, there may be a slight possibility of cutting short a DTMF tone.

For protocol reasons, in the case of an MSC receiving a STOP DTMF message when no tone is being sent, it should respond with an acknowledgement as usual.

No other impact is seen due to external handover.



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## Annex A (informative): Change Request History

<b>Change history</b>					
<b>SMG No.</b>	<b>TDoc. No.</b>	<b>CR. No.</b>	<b>Section affected</b>	<b>New version</b>	<b>Subject/Comments</b>
SMG#10				4.1.1	ETSI Publication
SMG#20				5.0.0	Release 1996 version
SMG#27				6.0.0	Release 1997 version
SMG#28	P-99-308	A004		7.0.0	Support of Dual Tone Multi-Frequency signalling (DTMF) via the GSM system.(Harmonisation)
SMG#29				7.0.1	Publication of version 7.0.1

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# History

<b>Document history</b>		
V6.0.0	March 1999	Publication
V7.0.1	July 1999	Publication