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**European digital cellular telecommunications system (Phase 2);
Support of Dual Tone Multi-Frequency signalling (DTMF)
via the GSM system
(GSM 03.14)**

ETSI

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Contents

Foreword	5
1 Scope	7
2 Normative references	7
3 Definitions and abbreviations	7
4 Requirement	7
5 Cause of DTMF generation	7
6 Support of DTMF across the air interface.....	8
6.1 General	8
6.2 Specific	8
6.3 Tone durations	9
7 Effect of Handover	13
7.1 Internal Handover	13
7.2 External Handover	13
History	14

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Foreword

This European Telecommunication Standard (ETS) has been produced by the Special Mobile Group (SMG) Technical Committee (TC) of the European Telecommunications Standards Institute (ETSI).

This ETS defines the Discontinuous Reception (DRX) in the GSM system for the European digital cellular telecommunications system (Phase 2). This ETS corresponds to GSM Technical Specification (GSM-TS) GSM 03.14 version 4.1.1.

The specification from which this ETS has been derived was originally based on CEPT documentation, hence the presentation of this ETS may not be entirely in accordance with the ETSI/PNE rules.

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1 Scope

This Technical Specification describes how DTMF (Dual Tone Multi Frequency) signals are supported in the GSM system.

2 Normative references

This ETS incorporates by dated and undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

- [1] GSM 01.04 (ETR 100): "European digital cellular telecommunications system (Phase 2); Abbreviations and acronyms".
- [2] GSM 05.02 (prETS 300 574): "European 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".

3 Definitions and abbreviations

Abbreviations used in this specification are listed in GSM 01.04.

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.

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.

5 Cause of DTMF generation

A user may cause a DTMF tone to be generated by depression of a key in the MS. Optionally (on a mobile station 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 Technical Specification.

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 mobile station as a requirement for a DTMF digit to be sent, this is converted by the mobile station 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 Rec. T/CS 34-08;
- Tone sending levels are defined nationally;
- 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.

The minimum gap between two subsequent tones should be according to CEPT recommendation T/CS 46-02.

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 TS GSM 05.02, ensures that the minimum length of tones and minimum gap between tones according to T/CS 46-02 are fulfilled.

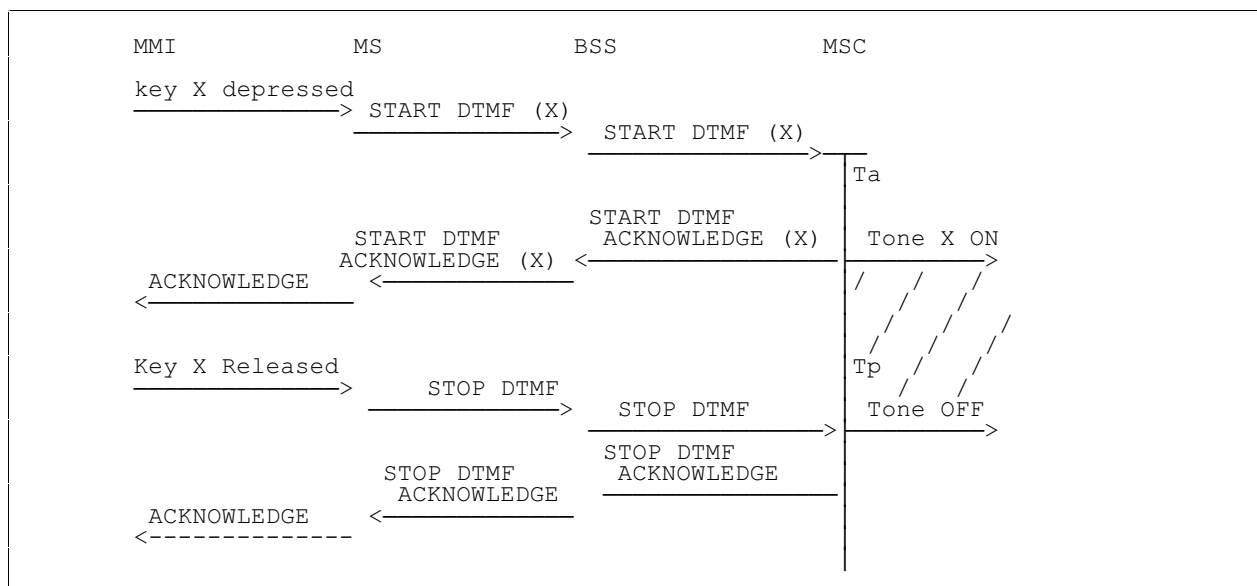


Figure 1: Single DTMF Transmission

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

T_p 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.

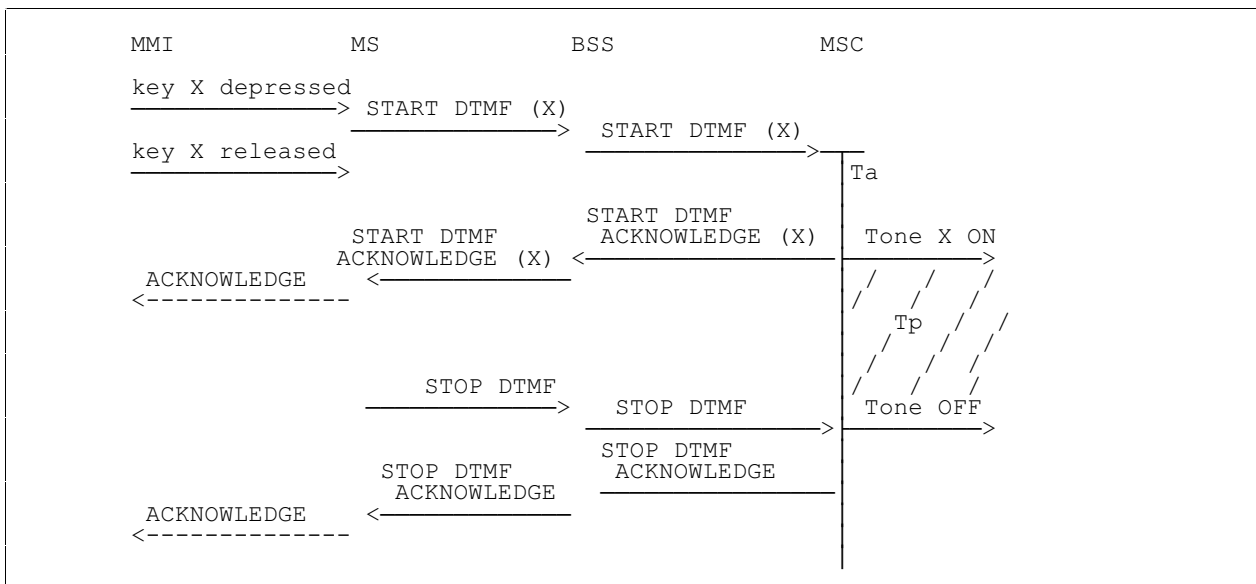


Figure 2: Single DTMF Transmission, short key depression

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

Tp Pre-determined maximum tone length, operator option.

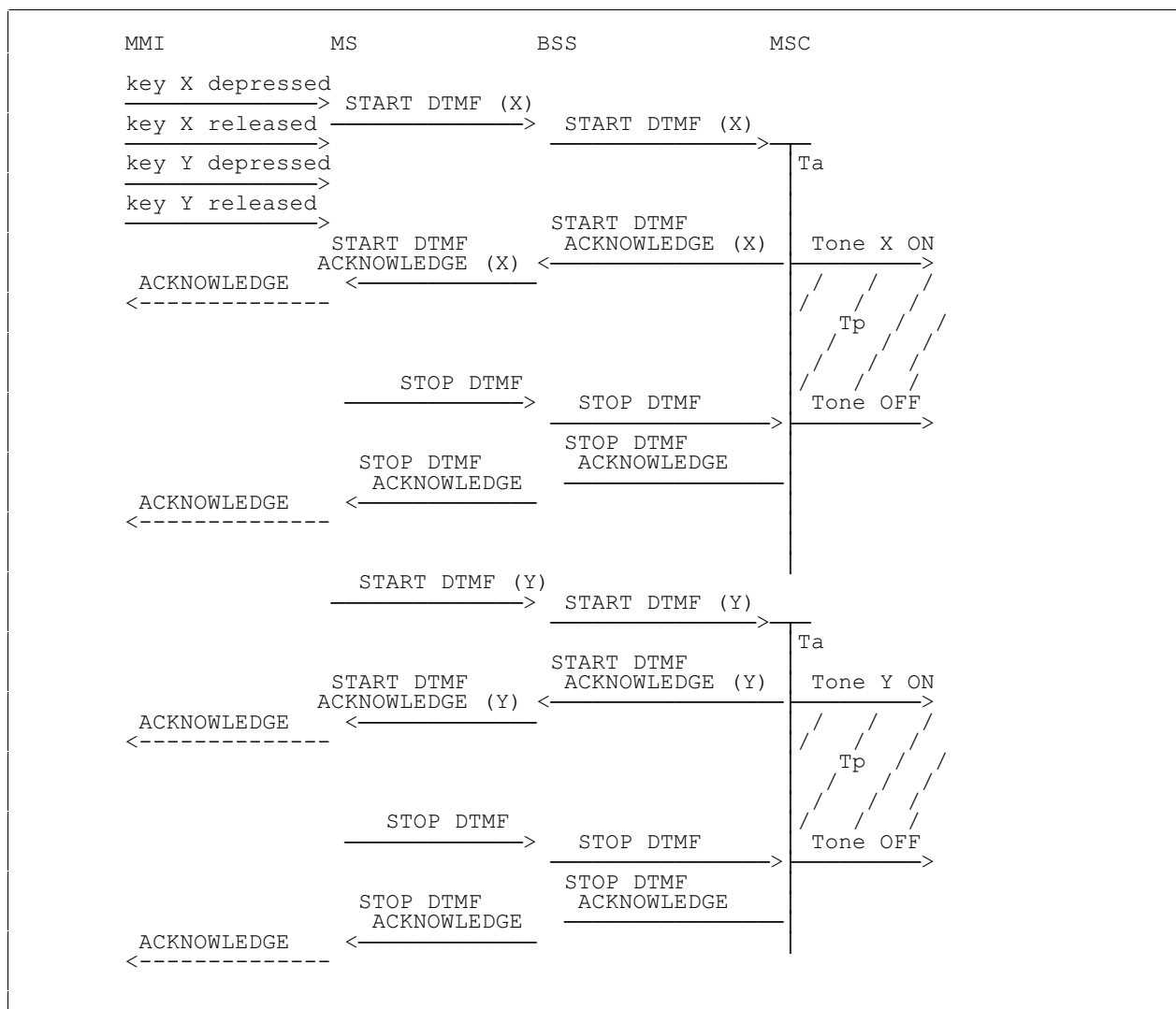


Figure 3: Two single DTMF Transmissions, short key depressions

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.

History

Document history	
September 1994	First Edition
November 1995	Converted into Adobe Acrobat Portable Document Format (PDF)