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RELEASE NOTE

Recommendation GSM 03.14

Support of DTMF via the GSM System

Previously distributed version : 3.0.2 (Release 1/90)
New Released version February 92 : 3.0.2 (Release 92, Phase 1)

1. Reason for changes

No changes since the previously distributed version.

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PREFATORY NOTE

ETSI has constituted stable and consistent documents which give specifications for the implementation of the European Cellular Telecommunications System. Historically, these documents have been identified as "GSM recommendations".

Some of these recommendations may subsequently become Interim European Telecommunications Standards (I-ETSs) or European Telecommunications Standards (ETSs), whilst some continue with the status of ETSI-GSM Technical Specifications. These ETSI-GSM Technical Specifications are for editorial reasons still referred to as GSM recommendations in some current GSM documents.

The numbering and version control system is the same for ETSI-GSM Technical Specifications as for "GSM recommendations".

0. SCOPE

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

1. 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 3.2 and 3.3.

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.

2. 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 recommendation.

3. SUPPORT OF DTMF ACROSS THE AIR INTERFACE

3.1. 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.

3.2. 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) Send DTMF Acknowledgement: No further info

c) Stop DTMF : No further info

d) Stop DTMF Acknowledgement: No further info

Only a single digit will be passed in each Digit Send message.

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

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

As an operator option, the tone may be ceased after a pre-determined time whether or not a Digit End 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

3.3. 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 Digit End 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 3.2.

The MS shall ensure that messages are not sent towards the network faster than the minimum times mentioned above will allow.

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

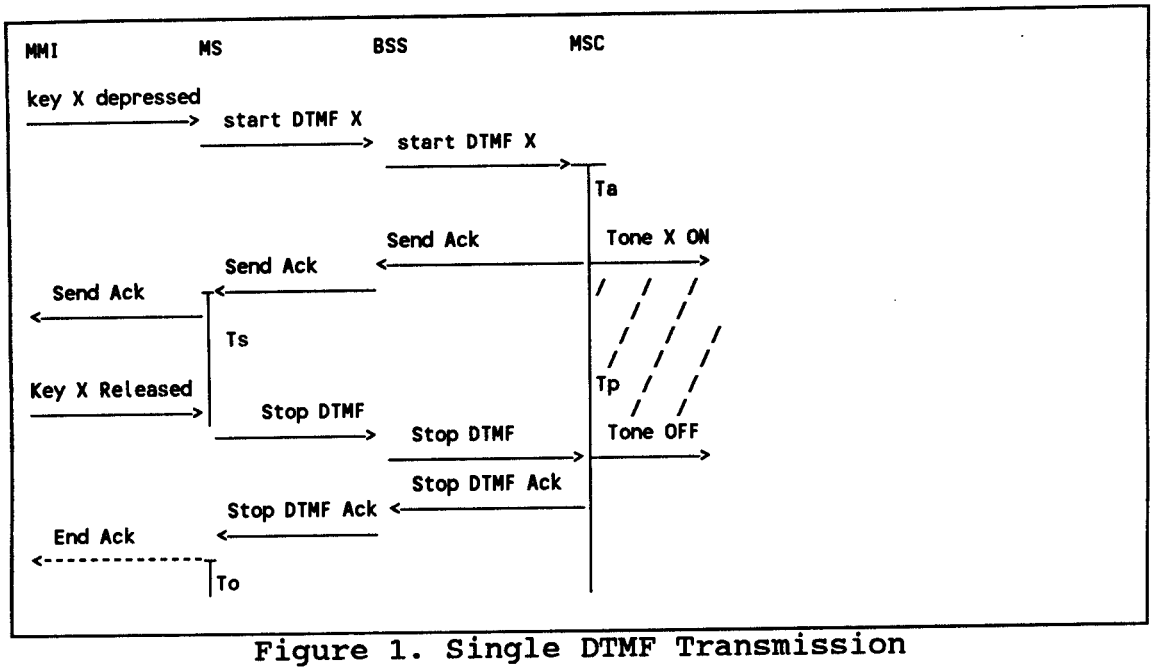

Figure 1. Single DTMF Transmission

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

Ts Minimum send duration, ref. CEPT T/CS 46-02

To Minimum off time between tones, ref. CEPT T/CS 46-02

Tp Pre-determined maximum tone length, operator option.

Note: If the Network operator implements the time limit option (see section 3.2), then the tone ends if the timer expires before the 'Stop DTMF' is received.

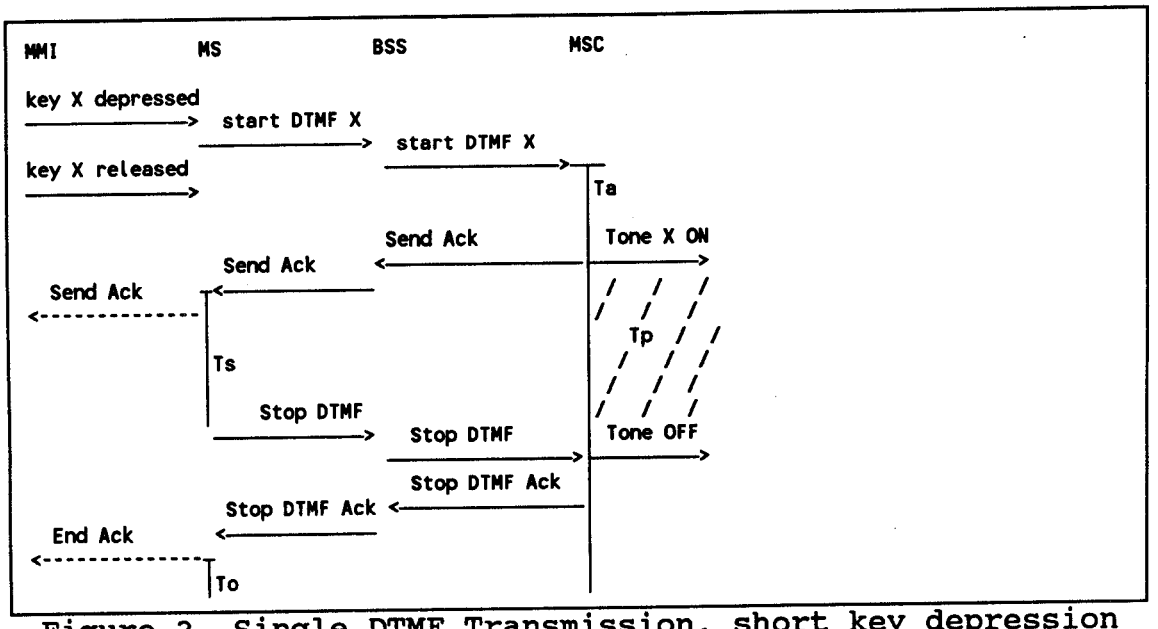

Figure 2. Single DTMF Transmission, short key depression

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

Ts Minimum send duration, ref. CEPT T/CS 46-02

To Minimum off time between tones, ref. CEPT T/CS 46-02

Tp Pre-determined maximum tone length, operator option.

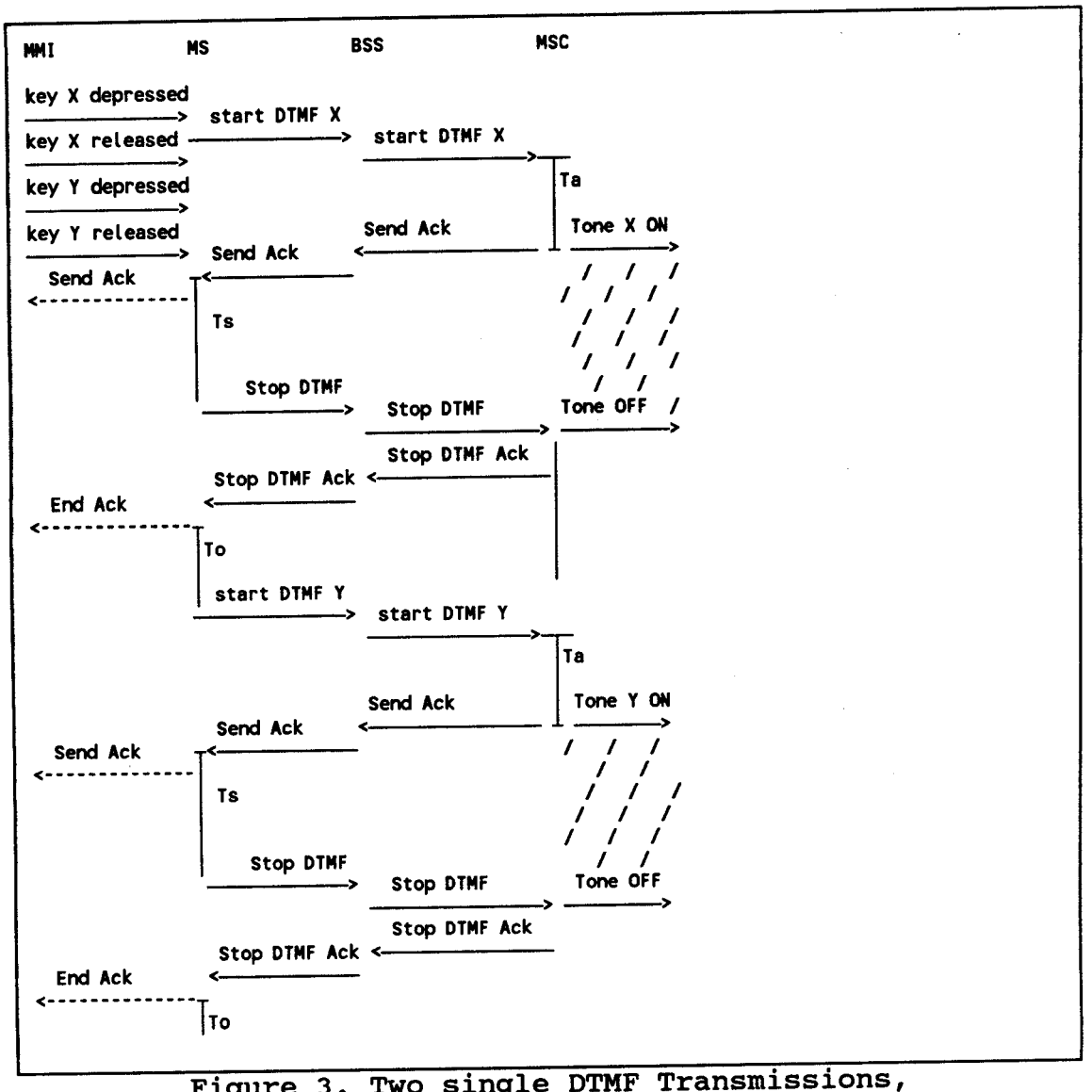

Figure 3. Two single DTMF Transmissions, short key depressions

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

Ts Minimum send duration, ref. CEPT T/CS 46-02

To Minimum off time between tones, ref. CEPT T/CS 46-02

Tp Pre-determined maximum tone length, operator option.

4. EFFECT OF HANDOVER

4.1 Internal Handover

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

4.2 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 DTMF Digit End message when no tone is being sent, it should respond with an acknowledgement as usual.

No other impact is seen due to external handover.