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# GUIDELINES FOR IMPLEMENTATION

# PUBLIC SWITCHED TELEPHONE NETWORK (PSTN); SUBSCRIBER LINE PROTOCOL OVER THE LOCAL LOOP FOR DISPLAY (AND RELATED) SERVICES

## FOREWORD

This **Guidelines for Implementation (GFI), Public Switched Telephone Network (PSTN); Subscriber line protocol over the local loop for display (and related) services,** contains clarifications and recommended option selections for ETSI standards (ETS) on protocols for display (and related) services over the PSTN local loop. This document defines the FSK protocol implementation which may be used for different type of display related services. This document also covers the implementation of Calling line identification presentation (CLIP) service using DTMF based subscriber line protocol.

This GFI has been prepared by the members of the national standardization groups for switching systems. The Steering Group for Telecommunications Standardization has considered this document and recommends it to be followed when implementing the services utilizing either FSK or DTMF based subsbriber line protocol over the PSTN local loop.

## REFERENCES

[1] ETS 300 659-1 (2/97)
Public Switched Telephone Network (PSTN); Subscriber line protocol over the local loop for display (and related) services; Part 1: On hook data transmission

[2] Draft Standard THK 9702 (7.3.1997)
Telecommunication network exchanges. Transmission characteristics.

[3] ETR 206 (9/95)
Public Switched Telephone Network (PSTN);
Multifrequency signalling system to be used for push-button telephones
[CEPT Recommendation T/CS 46-02 E (1985)]

[4] ETR 205 (9/95)
Public Switched Telephone Network (PSTN);
Multifrequency push-button receiver at subscriber's premises
[CEPT Recommendation T/CS 34-09 E (1983)]

[5] prETS 300 659-2 (6/97)
Public Switched Telephone Network (PSTN); Subscriber line protocol over the local loop for display (and related) services; Part 2: Off-hook data transmission

**Contents**

## 1 INTRODUCTION

This GFI consists of two parts:

**Part I** defines the subsciber line protocol for on hook data transmission to be used over PSTN local loop. For this two different operation modes are available: the FSK method is the targetted solution and the DTMF method is an interim solution. ***Note: It shall be possible to select on subscriber base which one of these methods is used.***

**Part II** defines the subsciber line protocol for off- hook data transmission to be used over PSTN local loop.

## PART I: SUBSCRIBER LINE PROTOCOL OVER THE LOCAL LOOP FOR DISPLAY (AND RELATED) SERVICES: ON HOOK DATA TRANSMISSION

The definions given in ETS 300659-1 [1] are applied with the following options selection or additional definitions.

(Note: The numbering of following clauses refers to relevant clauses in [1].)

### 5.2 Data link layer

Mark Signal: shall consist of block of 180 +/- 25 mark bits

### 5.3 Physical layer

The source impedance is according to standard ”Telecommunication network exchanges. Transmission characteristics [2].

## 6 DATA TRANSMISSION REQUIREMENTS; SIGNALLING, TIMING AND TOLERANCE

Interface Z shall support both of the following modes:
- transmission is associated with ringing
- transmission is not associated with ringing

7.4.16 Extension for network operator use parameter

Network operator codes are defined in the “Numbering plan for Network operator codes” maintained by Telecommunications Administration Centre.

## ANNEX B : TE CONNECTED TO LE VIA A PAIR GAIN SYSTEM

Not appplicable

## ANNEX C: DTMF BASED SUBSCRIBER LINE PROTOCOL

The text in Annex C of [1] is totally replaced with the following text.

### C1 INTRODUCTION

This annex C describes in which format the calling subscriber number information is transmitted to the destination user over the analog PSTN local loop whwn using the DTMF method. This description only covers the calling line identification service. Other services which might possibly use the same type of DTMF signalling over the analog line are out of the scope of this description. The prime aim of this document is to ensure the interoperability of PSTN network equipment and terminal equipment capable to receive the calling number information with DTMF transmission method.

The text in this Annex C specifies the DTMF based subscriber line protocol for the support of PSTN Display services at Terminal Equipment. For the transfer of Display information over analog subscriber lines, use is made of the 16 code DTMF signalling system in accordance with ETR 206 [3]. Except for these special display procedures, the normal signalling procedures and physical properties for analogue subscriber lines apply.

### C2 DATA TRANSMISSION MODES AND TIMING

Two different modes for the data transmission are possible. It will be a network implementation option which mode is used.

For the timing of the data transmission in relation to ringing and polarity reversal the values given in [1] for FSK transmission are recommended to be followed where applicable.

If the TE goes in off-hook state before or during the data transmission, normal incoming call procedure shall occur and the data transmission shall be aborted [1].

#### C2.1 Data transmission during ringing

In this mode the data transmission shall occur during the first long silent period between two ringing patterns. The initial application of ringing will provide an alert signal to the TE that data transmission is to be expected. The data transmission should not start sooner than 500ms after the first ringing pattern. The second ringing will start according to the normal ringing cadence.

**Note**: only one number may be transmitted during ringing, i.e. no diverting numbers are transmitted when this mode is applied.

#### C2.2 Data transmission prior to ringing

In this mode the data transmission shall occur before the beginning of the first ringing pattern. Two different procedures are possible:

a) The subsciber line polarity is reversed as an alert signal to indicate to the TE that data transmission is to be expected.
b) The subsciber line polarity is not reversed.

In case a) the data transmission should not start sooner than 200 ms after the polarity reversal. In both the cases a) and b) the first ringing should start not sooner than 200 ms and not later than 500 ms after the data transmission is stopped.

### C2.3 Data transmission speed

The nominal transmission speed shall be according to the values specified in [3]:
- the duration of signal shall be 70 +/- 5 ms
- the interdigit pause shall have a minimum value of 65 ms.

The receiving equipment shall recognize characterac signals according to the values specified in [4]:
- the continuous signal exists for more than 40 ms, and
- it is preceeded by the continuous non-existence of signal condition for more than 40 ms.

## C3 PARAMETER AND DATA CODING

### C3.1 Data transmission signals

The transmission makes use of the 16 DTMF signals defined in [3] in the following way:

<A> DTMF code "A" is used as a start code for the Calling party number
<B> DTMF code "B" is used as a start code for the special information concerning the "not availability / restriction information" of the Calling party number
<C> DTMF code "C" is used as an end code for the information transfer
<D> DTMF code "D" is used as a start code for the Diverting party number in case of call diversion
<0....9> DTMF codes "0...9" are used as number digits representing the calling/diverting party number or special information code value

### C3.2 Special information code values

The following special information codes are defined

<00> Desimal value "00" is used to indicate, that the calling party number is not available
<10> Desimal value "10" is used to indicate, that the presentation of the calling party number is restricted

Note: this information is always related to original Calling Party number, not to the Diverting number.

## C4 DETAILLED CODING EXAMPLES

In the examples the following convention is used:
<A-no.> represents the Original Calling party number
<D-no.> represents the Diverting party number (last diverting party in case of multiple diversions)
<Infocode> represents the information code to be applied (ref C3.2)

### C4.1 Calling number is available, no presentation restrictions, no diversions have occured

Information to be transferred: <A><A-no.><C>

### C4.2 Calling number is not available or presentation is restricted, no diversions have occured

Information to be transferred: <B><Infocode><C>

### C4.3 Calling number and (last) diverting number are available, no presentation restrictions

Information to be transferred: <A><A-no.><D><D-no.><C>

Note: When tranfermode "during ringing" is used, only A-no. is transferred and the form shown in C4.1 is followed.

### C4.4 Calling number is not available or presentation is restricted, (last) diverting number is available and presentation allowed

Information to be transferred: <B><Infocode><C>

Note: In such case some implementations may send the diverting number as follows:

<D><D-no.><C>

## PART II: SUBSCRIBER LINE PROTOCOL OVER THE LOCAL LOOP FOR DISPLAY (AND RELATED) SERVICES: OFF HOOK DATA TRANSMISSION

The definions given in ETS 300 659-2 [5] are applied with the following options selection. (Note: The numbering refers to the relevant clause in [5].)

6.1.3 TE-Acknowledgement signal

The LE accepts the DTMF ”D” and also ”A” as a valid TE-ACK