



TS-103-B

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**Public Switched Telephone Network (PSTN);
Subscriber line protocol over the local loop for
display (and related) services;**

Part B: Off-hook data transmission

Reference

TS-103-B

Keywords

PSTN, protocol, display, service

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1 Foreword

The present document is part B of a multi-part document covering the PSTN subscriber line protocol over the local loop for display (and related) services, as described below:

Part A: "On-hook data transmission": TS-103-A

Part B: "Off-hook data transmission": TS-103-B

Part C: "Data link message and parameter codings": TS-103-C

2 Scope

The present document specifies the subscriber line protocol for the support of PSTN display services at Local Exchange (LE). The subscriber line protocol is accomplished by using asynchronous voice-band Frequency-Shift Keying (FSK) signalling.

The requirements imposed on the FSK signalling-based subscriber line protocol deal with data encoding, data transmission requirements and the three layers of the protocol at the network side of the interface: presentation layer, data link layer and physical layer.

3 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- [1] ETSI ETS 300 659-1 : Public Switched Telephone Network(PSTN);Subscriber line protocol over the local loop for display (and related) services; part 1: On-hook data transmission.
- [2] ETSI ETS 300 778-1 : Public Switched Telephone Network(PSTN);Protocol over the local loop for display and related services; Terminal equipment requirements; Part 1: Off-line data transmission.
- [3] ETSI ETS 300 659-2 : Public Switched Telephone Network(PSTN);Subscriber line protocol over the local loop for display (and related) services; part 2: Off-hook data transmission.
- [4] ETSI ETS 300 778-2 : Public Switched Telephone Network(PSTN);Protocol over the local loop for display and related services; Terminal equipment requirements; Part 2: On-line data transmission.
- [5] ITU-T Recommendation V.23 (1998): "600/1200-baud modem standardized for use in the general switched network.
- [6] Bellcore GR-30-CORE : Voiceband Data Transmission Interface Requirements.
- [7] ITU-T Recommendation T.50 (1992): "International Reference Alphabet (IRA) (Formerly International Alphabet No.5 or IA5) - Information technology - 7-bit coded character set for information interchange".
- [8] Telenet Specification: TS-101: Specification of physical and electrical characteristics at the 2-wire analogue presented NTP on the Telenet network.

4 Definitions, symbols and abbreviations

4.1. Definitions

For the purposes of the present document, the following terms and definitions apply:

Answer signal	Indication that a terminal is answering an incoming call
Calling line identity	The number (information) identifying the calling party
Clear indication	Indication that the network is attempting to release a connection
Clear signal	Signal indicating that a terminal is attempting to release a connection
Long silent period	Silent period between ring patterns
Loop state	Status of the TE
Mark bit	Symbol "1", presented by a specific FSK signalling tone
Network Termination Point(NTP)	Physical point at boundary of the PSTN intended to accept the connection of a TE
"off hook"	Status of LE in which a DC current drawn by a TE in loop state is sufficient to activate the LE. See Telenet Specification: TS-101 [8].
"on hook"	Status of the LE in which a DC current drawn by a TE in quiescent state is insufficient to activate the LE. See Telenet Specification: TS-101 [8]
Ring pattern	A ring pattern consists of one or more ringing pulses separated by short silent periods
Ringing state	Condition of the network where a ringing/alerting signal has been applied at the NTP
Ring trip	Removal of the ringing signal at the NTP in response to a valid answer signal applied to the NTP
Ringing Pulse Alerting Signal (RP-AS)	Pulse of ringing current used to alert the TE that a data transmission will follow. Duration of RP-AS is specified in the present document.
Seize signal	Signal indicating that a terminal is attempting to establish a connection by means of applying a loop condition
Space bit	Symbol "0", presented by a specific FSK signalling tone

4.2. Abbreviations

For the purposes of the present document, the following abbreviations apply:

AN	Access Network
AS	Alerting Signal
CLI	Calling Line Identity
CPN	Calling Party Name
CLIP	Calling Line Identification Presentation
CLIR	Calling Line Identification Restriction
DT-AS	Dual Tone-Alerting Signal
FSK	Frequency-Shift Keying
IRA	International Reference Alphabet
LE	Local Exchange
MSG	Message
MWI	Message Waiting Indicator
NTP	Network Termination Point
PSTN	Public Switched Telephone Network
RP-AS	Ringing Pulse Alerting Signal
SAS	Subscriber Alerting Signal
TAS	TE Alerting Signal
TE	Terminal Equipment
TE-ACK	TE Acknowledgment Signal

5 Protocol requirements

5.1 Physical layer

Physical layer requirements described in TS-103-A shall be applied.

5.2 Data link layer

Data link layer requirements described in TS-103-A shall be applied with the following differences. See table 1.

Table 1: Data link parameters

Channel seizure signal	Is not transmitted
Mark signal	Consists of a block of 80 ± 25 mark bits

5.3 Presentation layer

Presentation layer requirements described in TS-103-A shall be applied.

6 Data transmission requirements: signalling, timing and tolerance

A TE Alerting Signal (TAS) is used to signal to the TE that data transmission is to be expected. The off-hook-TAS is a Dual Tone-Alerting Signal (DT-AS).

A Subscriber Alerting Signal (SAS) (e.g. Call Waiting Tone) is sent from the LE to the subscriber before the protocol signalling process. The SAS physical characteristics are outside the scope of the present document.

6.1. Sequence of the events at the network end

- Event 1:** The LE shall block the speech path to and from the far-end party in order to minimize interference with any alerting signal and the data transmission. This also prevents the far-end party from receiving these signals.
- Event 2:** The LE transmits the TAS.
- Event 3:** The LE waits for the TE-Acknowledgment signal (TE-ACK).
- Event 4, case a:** If the LE does not recognize a valid TE-ACK within a time-out, the LE shall not send any data transmission and shall restore the speech path.
- Event 4, case b:** If the LE recognize a valid TE-ACK within the time-out, FSK modulation transmission shall follow.
- Event 5:** After FSK modulation transmission the speech transmission shall be restored.

If the TE goes in quiescent state the signalling process should be aborted.

Figure 1 presents the time diagram of the protocol signalling process at the network end of the local loop in case of a successful attempt.

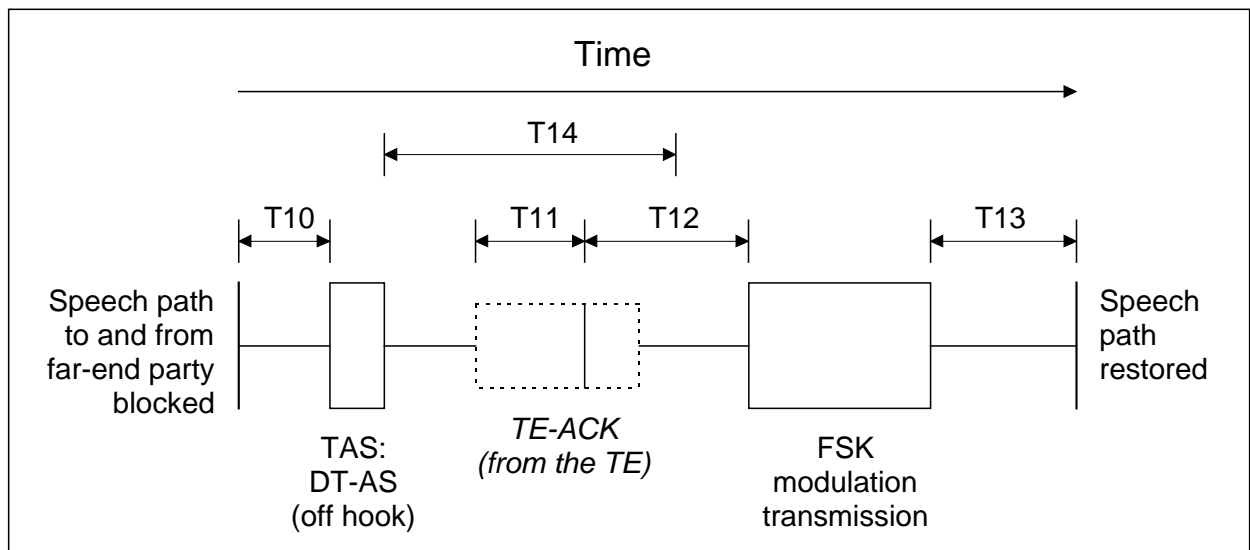


Figure 1: Time diagram at the network end of the local loop: successful attempt

Figure 2 presents the time diagram of the protocol signalling process at the network end of the local loop in case of an unsuccessful attempt.

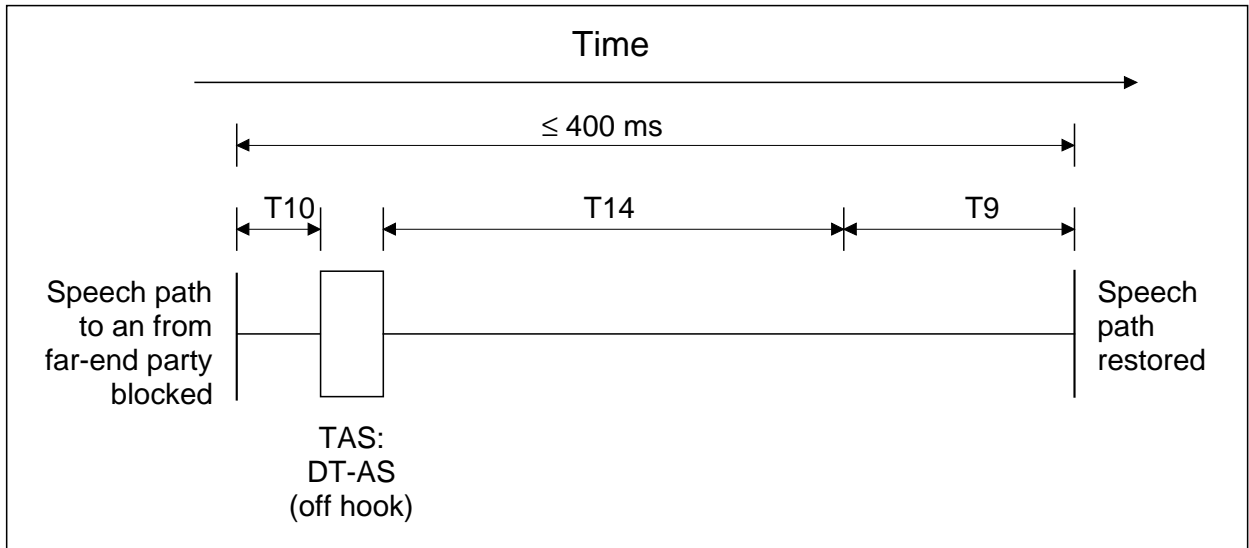


Figure 2: Time diagram at the network end of the local loop: unsuccessful attempt

6.2. TAS (DT-AS) physical characteristics

The off-hook-TAS is a Dual Tone-Alerting Signal (DT-AS). Physical characteristics of the DT-AS (off-hook) are described in table 2.

Table 2: TAS: Dual Tone-Alert Signal (Off-hook)

Nominal frequencies	2130 Hz \pm 0,5 % and 2750 Hz \pm 0,5 %
Signal level	- 15 dBm \pm 2 dBm per tone
Unwanted signals	Total power of all extraneous signal in the band 300-3400 Hz shall be at least 30 dB lower than the power of signal fundamental frequency, measured at the point of application to the loop
Duration	80 ms \pm 5 ms

6.3. TE-Acknowledgment signal

The LE accept the DTMF "D" as described in TS-101[8] as a valid TE-ACK.

6.4 Timing

Table 3 presents time interval and values related to the described events:

Table 3: Off-hook timing definitions and values

Time interval	Value	Definition
T10	0 - 150ms	The time between speech path blocking and beginning of TAS sending. (note)
T11	40 - 55ms	The time for the LE to recognize the TE-ACK.
T12	50 – 500 ms	The time between TE-ACK recognition and the start of FSK modulation transmission.
T13	40 – 120 ms	The time to restore the speech path after the end of FSK modulation transmission.
T14	160 ± 5 ms	The maximum time allowed within which a valid TE-ACK shall be correctly detected. The time interval, for which T14 is the maximum, shall begin at the end of TAS transmission.
T9	0 – 150 ms	The time to restore the speech path after the end of T14.
NOTE: Because the speech path has been blocked before the SAS and is not restored between the SAS and the TAS, therefore T10 shall commence at the end of the SAS.		

History

Document history		
Version	Date	Milestone
1p1	03/04/2000	First Draft, Internal Telenet Review Only
1p2	08/06/2000	Second Draft
1p3	15/06/2000	Third Draft, First comments of vendor included
1	15/06/2000	First released edition