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Terminal Equipment requirements;
Part 2: On-line data transmission

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Contents

Foreword

This European Telecommunication Standard (ETS) has been produced by the ETSI Project Analogue Terminals and Access (EP ATA) of the European Telecommunications Standards Institute (ETSI).

This ETS consists of 2 parts as follows:

Part 1:   "Off-line data transmission";

Part 2:   "On-line data transmission".

Transposition dates	
Date of adoption of this ETS:	2 January 1998
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1 Scope

This European Telecommunication Standard (ETS) specifies the electrical characteristics, the functional characteristics and the corresponding conformance tests for Terminal Equipment (TE) for connection to the network termination points of a Public Switched Telephone Network (PSTN) interface providing a Protocol Over The local Loop For Display Services, based on the protocols defined in ETS 300 659-2 [1]. This ETS contains only variations with respect to ETS 300 778-1 [2].

This ETS applies to on-line data transmission only.

This ETS is not written for regulatory purposes.

The requirements are intended to ensure correct reception and detection of the received data. The method of displaying the received data is not defined.

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]   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".

[2]   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 Definitions and abbreviations

3.1 Definitions

For the purposes of this ETS, the following definitions shall apply in addition to those described in clause 3 of ETS 300 778-1 [2]:

on-line signalling state: On-line state of the TE when the TE is capable of receiving Frequency-Shift Keying (FSK) data, and the normal transmission functions are suspended.

TE-ACK (TE Acknowledgement Signal): The signal sent to the network in response to a specific TE-Alerting Signal (TAS).

FSK Data: Signalling including all FSK modulation.

3.2 Abbreviations

For the purposes of this ETS, the following abbreviations shall apply in addition to those described in clause 3 of ETS 300 778-1 [2]:

CLIP   Calling Line Identification Presentation
DT-AS   Dual Tone Alerting Signal
EMC   ElectroMagnetic Compatibility
FSK   Frequency Shift Keying
LE   Local Exchange
PSTN   Public Switched Telephone Network
TAS   TE Alerting Signal
TE   Terminal Equipment
TE-ACK   TE Acknowledgement Signal
TEUT   Terminal Equipment Under Test

4 Physical layer requirements

4.1 On-line state

There are no on-line access requirements under this ETS.

On-line access requirements are imposed under the various European or National regulatory access requirements.

4.2 On-line data transmission

4.2.1 Network and TE interoperation

The network starts the handshaking sequence by sending a TE Alerting Signal (TAS) as shown in figure 1.

After detection of the TAS the TE mutes voice paths, disables any manual signalling facility, and returns a TE-Acknowledgement signal (TE-ACK) to the network. When the network recognizes a valid TE-ACK, it transmits FSK data to the TE.

After FSK data transmission, the TE restores any voice paths and enables any manual signalling facility.

If the network does not receive a valid TE-ACK, the FSK data is not transmitted and after a time-out period the TE restores any voice paths and enables any manual signalling facility.

4.2.2 TE Alerting Signal (TAS)

Requirement: The TE shall detect a TAS, DT-AS, as specified in table 1.

Table 1: DT-AS signal characteristics

Nominal frequencies	2 130 Hz and 2 750 Hz ± 0,5 %
Signal level	-12 to -35 dBV/tone across line terminals
Twist	6 dB max
Duration	80 ms ± 5 ms

Test: Compliance shall be by suppliers declaration.

4.3 Timing requirements

Table 2: On-line timing definitions and values

| Time interval	Value	Description
T_A	0 – 85 ms	The time between end of DT-AS and start of TE-ACK signal (subclause 4.3.2)
T_{TE-ACK}	65 - 90 ms	Duration of DTMF "TE-ACK" (subclause 4.3.2)
T_F	295 ms	The maximum time the TE waits for FSK data. Measured from the start of the TE-ACK (subclause 4.3.5)
T_u	0 - 120 ms	Restoration time (subclauses 4.3.4, 4.3.5, 5.3.2 and 5.6)
NOTE:	A two-way transmission delay of max. 15 ms between the TE and the Local Exchange (LE) has been assumed for T_A and T_F.	
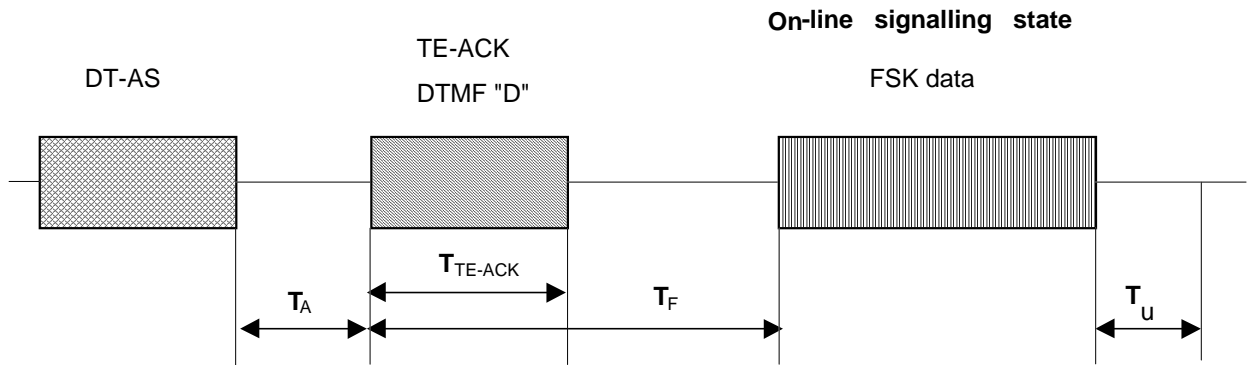
Figure 1: Handshaking sequence and timing requirements

4.3.1 Voice path muting

Requirement: The TE shall mute the voice paths and disable any manual signalling facility before the start of the TE-ACK signal.

Test: Compliance shall be by suppliers declaration.

4.3.2 TE - Acknowledgement signal

Requirement: The TE shall start sending to the network a TE-ACK, DTMF "D", within T_A from the end of a TAS. The TE-ACK signal shall be of duration T_{TE-ACK} (see table 2).

Test: Compliance shall be by suppliers declaration.

> NOTE: It is recommended that sending of the TE-ACK signal is delayed so there is no possibility of overlap with the received DT-AS signal. However, it is also recommended that the delay is not made too great, as this would unnecessarily extend the signalling period.

4.3.3 Start time

Requirement: The TE shall correctly detect FSK data signals starting within the range 95 ms to T_F from the start of the TE-ACK signal (see table 2).

Test: Compliance shall be by suppliers declaration.

4.3.4 End time

Requirement: The TE shall, restore voice paths and enable any manual signalling facility, within T_u from when the FSK data transmission has been completely signalled (see table 2).

Test: Compliance shall be by suppliers declaration.

4.3.5 Time-out - FSK data transmission not received

Requirement: If FSK data is not received within T_F from the start of the TE-ACK signal the TE shall restore voice paths and enable any manual signalling facility within T_u (see table 2).

Test: Compliance shall be by suppliers declaration.

4.4 Signalling format

Signalling format requirements described in subclause 4.1.5 of ETS 300 778-1 [2] shall apply, but with the signalling levels defined in the following subclause 4.4.1.

4.4.1 Signalling levels

Requirement: The TE shall be capable of correctly receiving caller display service signalling tones with levels within the range -11 to -33 dBV measured between the line terminals (and with a twist between the mark and space tones not exceeding 6 dB).

Test: Compliance shall be checked by the test described in clause B.1.

5 Datalink layer - data reception

The structure of the datalink packet is shown in annex E of ETS 300 778-1 [2].

5.1 Channel seizure

> NOTE: There is no channel seizure signal transmitted from the network in the on-line state.

5.2 Mark signal

Requirement: The TE shall correctly receive datalink packets with the following mark signal field length:

- 80 ± 25 mark bits

Test: Compliance shall be checked by the test described in clause B.2.

5.3 Message type

5.3.1 Valid message type

Requirement: The TE shall meet the appropriate message type requirements defined in subclause 5.3 of ETS 300 778-1 [2].

Test: Compliance of "Call setup" and "Message waiting indicator" message types shall be checked by the appropriate tests described in clause B.3.

5.3.2 Incorrect message type

Requirement: If an unrecognized message type parameter is detected, the TE shall restore voice paths and enable any manual signalling facilities within T_u from the end of the FSK data and either ignore the message or indicate an error.

Test: Compliance shall be checked by suppliers declaration.

5.4 Message length

Requirement: The TE shall meet the message length requirements defined in subclause 5.4 of ETS 300 778-1 [2].

Test: Compliance shall be checked by the test described in clause B.4.

5.5 Checksum

Requirement: The TE shall meet the checksum requirements defined in subclause 5.5 of ETS 300 778-1 [2].

Test: Compliance shall be checked by the test described in clause B.5

5.6 Incorrect checksum

Requirement: If an incorrect checksum is detected the TE shall restore voice paths and enable any manual signalling facility within T_u from the end of the FSK data and shall either ignore the message or indicate an error.

Test: Compliance shall be by suppliers declaration.

6 Presentation layer - message interpretation

Presentation layer requirements described in clause 6 of ETS 300 778-1 [2] should apply.

6.1 CLIP on call waiting

Requirement: The TE shall correctly interpret Calling Line Identification Presentation (CLIP) service during Call Waiting as described in ETS 300 659-2 [1].

Test: Compliance shall be checked by the test described in clause B.6.

6.2 Message waiting indicator message

TE with the capability of indicating the presence of waiting messages in the network message system shall meet the requirements of subclause 6.2 of ETS 300 778-1 [2].

Test: Compliance shall be checked by the test described in clause B.7.

6.3 Advice of charge message

This message is used to send information related to the charge of a call.

Requirements related to this message may be introduced in a later enhancement of this standard.

7 Safety

There are no safety requirements under this ETS.

> NOTE: Safety requirements are imposed under the Low Voltage Directive (73/23/EEC) and Articles 4(a) and 4(b) of Directive 91/263/EEC.

8 ElectroMagnetic Compatibility (EMC)

There are no EMC requirements under this ETS.

> NOTE: General EMC requirements are imposed under the EMC Directive (89/336/EEC).

Annex A (normative): Test configuration

A.1 Test configuration

Unless otherwise stated in this ETS, the Terminal Equipment Under Test (TEUT) shall be connected as part of the test circuit shown in figure A1. The data message shall be sent to the TE as defined in the relevant test, and the performance of the TEUT monitored to observe the response. Signalling of the caller display service FSK information for each test shall be defined in 3 parts:

1)   Alerting case;
2)   Signalling case;
3)   Test packet.

The Alerting case defines the characteristics of the initial TAS; the Signalling case defines the physical characteristics of the transmission e.g. tone frequencies and levels; and the Test packet defines the CLIP messages and variants of the datalink packet structure. Each test message shall be defined in the form "TAS1:FSK1:TP3". Where options exist within the test, the options will be separated by the "/" symbol e.g. TASn:FSKn:TP1/TP2/TP3. The TE shall respond with TE-ACK between TASn and FSKn.
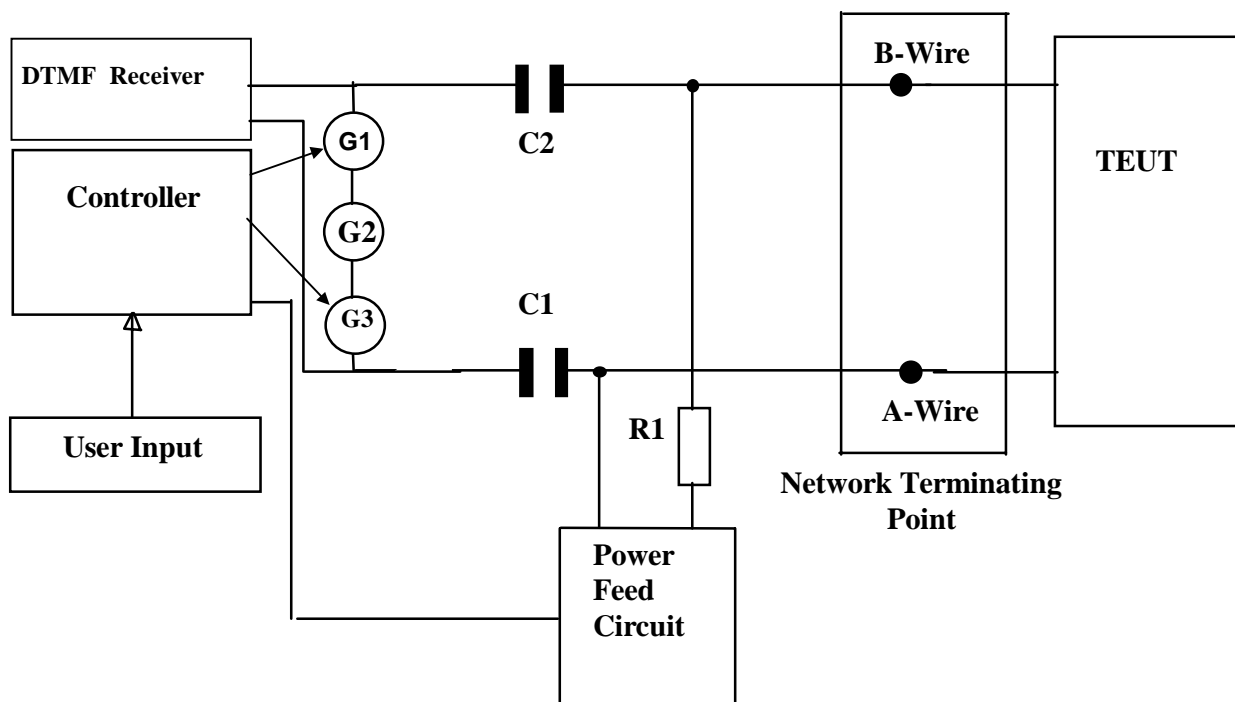
G1 is a generator capable of providing FSK signalling frequencies and levels as defined in table A.3.
G2 is a generator capable of providing unwanted voice band signals as defined in table A.3.
G3 is a generator capable of providing a TE Alerting Signal at frequencies and levels defined in table A.1.

The Power Feed Circuit is a 50V dc power supply with the capability of providing polarity reversals. For the tests, R1 is assigned the values indicated in table A.3.

The controller is used to generate the appropriate bit streams for the test packet types defined in table A.2, and applying them to generator G1 for conversion into FSK signals. The controller may also be used to control the operation of generators G2 and G3.

NOTE 1:   The impedances of the generators are not critical providing they are capable of producing the required levels at the network termination point. Generators G1 and G2 may be combined.

NOTE 2:   C1 and C2 should be of sufficient value so as not to introduce significant measurement errors.

Figure A.1: Test circuit

A.2 Test cases

With the exception of test data values TASn TPn and FSKn, all references to test data are to be found in ETS 300 778-1 [2] unless otherwise stated.

Table A.1: TE Alerting signal (TAS)

Case	Frequency Hz	Level of lower frequency	Level of higher frequency	Duration	Validity
TAS1	2 130 and 2 750	-29 dBV	-35 dBV	75 ms	valid
TAS2	2 130 and 2 750	-12 dBV	-18 dBV	75 ms	valid

Table A.2: Data link packet structure

Test Packet type	TP1	TP2	TP3	TP4	TP5	TP6	TP7	TP8	TP9	TP10	TP11	TP12	TP13	TP14	TP15
Mark period	MK1	MK1	MK1	MK1	MK1	MK1	MK1	MK1	MK1	MK1	MK1	MK1	MK1	MK1	MK1
Message type	MT1	MT2	MT3	MT2	MT2	MT1	MT1	MT1	MT1	MT1	MT1	MT1	MT1	MT1	MT1
Presentation message	PM1	PM11	note 2	PM12	PM12	PM1	PM2 note 3	PM3	PM4	PM5	PM6	PM7	PM8	PM9	PM10
Checksum	CH1	CH1	CH1	CH1	CH2	CH2	CH1	CH1	CH1	CH1	CH1	CH1	CH1	CH1	CH1
NOTE 1: For consistency the table A.2 is in line with table B.3 in ETS 300 778-1 [2].															
NOTE 2: Tests related to this message may be introduced in a later enhancement of this ETS.															
NOTE 3: Test package TP7 is not applicable in the on-line state (ring back when free).															

Table A.3: FSK signalling conditions

Parameter	FSK1	FSK2	FSK3
Mark frequency (logic 1) - Hz	1 300	1 280,5	1 319,5
Space frequency (logic 0) - Hz	2 100	2 068,5	2 131,5
Mark level (between A-wire, B-wire)	-20 dBV	-27 dBV	-11 dBV
Space level (between A-wire, B-wire)	-20 dBV	-33 dBV	-17 dBV
Line feed Resistor value. R1	1 000 Ω	2 000 Ω (see note)	500 Ω
Interfering signal power level referred to the power level of the signal fundamental frequency and with a voice band limited white noise.	none	-25 dB	-25 dB
NOTE: It is recognized that line currents corresponding to a line feed resistance of up to 2 800 Ω can be expected in certain networks in Europe.			

Annex B (normative): Test requirements

B.1 Signalling requirements

The TE shall be connected as shown in figure A.1. The TE is placed in the On-line condition. The controller is set to transmit the appropriate test packet TP1/TP4/TP2/TP3 to the TEUT for each of the following test cases:

Table B.1: Signalling requirements

TAS case	Modem case	Result
TAS1	FSK1	Correct reception of FSK data
TAS1	FSK2	Correct reception of FSK data
TAS2	FSK3	Correct reception of FSK data

Check that the result for each case is in accordance with table B.1.

B.2 Mark signal

NOTE: The mark signal is tested concurrently with clause B1.

B.3 Message type

NOTE: The message type is tested concurrently with clause B.1.

Check that the message is correctly interpreted by the TEUT.

B.4 Message length

There is no specific test for message length.

NOTE: The check for correct interpretation of the message length field by the TEUT is implicit on correct interpretation of the range of CLIP messages tested in clauses B.6 and B.7.

B.5 Checksum

The TE shall be connected as shown in figure A.1. The TE is placed in the On-line condition and the controller is set to transmit the following test message to the TEUT:

- TAS1:FSK1:TP5/TP6.

Check that the message is correctly rejected or an error message displayed by the TEUT.

B.6 CLIP on call waiting

The TE shall be connected as shown in figure A.1. The TE is placed in the On-line condition and the controller is set to transmit the test messages shown in table B.2, to the TEUT.

Check that each message, applicable to the TE, is correctly interpreted by the TEUT.

Table B.2: Presentation layer messages

Test data	Test case	Result
TAS1:FSK1:TP 11	Call type: Message waiting	Correct reception of FSK data
TAS1:FSK1:TP 13	Call type: voice maximum length valid CLI message	Correct reception of FSK data

B.7 Message waiting indicator message

The TE shall be connected as shown in figure A.1. The TE is placed in the On-line condition and the controller is set to transmit the test messages shown in table B.3, to the TEUT.

Check that the message, if applicable to the TE, is correctly interpreted by the TEUT.

Table B.3: Presentation layer messages

Test data	Test case	Result
TAS1:FSK1:TP 2	Visual indicator OFF	Valid message received and indicated.
TAS1:FSK1:TP 4	Visual indicator ON	Valid message received and indicated.

History

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