



SLOVENSKI STANDARD
SIST ETS 300 114 E2:2003
01-december-2003

Javno komutirano telefonsko omrežje (PSTN) – Specifikacije osnovne kategorije I in kategorije II za modeme, standardizirane za uporabo v PSTN

Public Switched Telephone Network (PSTN); Basic Category I and Category II specifications for modems standardized for use on the PSTN

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Ta slovenski standard je istoveten z: **ETS 300 114 Edition 2**
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ICS:

33.040.35 Telefonska omrežja Telephone networks

SIST ETS 300 114 E2:2003 en

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EUROPEAN
TELECOMMUNICATION
STANDARD

ETS 300 114

May 1996

Second Edition

Source:ETSI TC-TE

Reference:RE/TE-05045

ICS: 33.020

Key words: modem, PSTN, testing

**Public Switched Telephone Network (PSTN);
Basic Category I and Category II specifications
for modems standardized for
use on the PSTN**

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Contents

Foreword	7
1 Scope	9
2 Normative references	9
3 Definitions and abbreviations	11
3.1 Definitions	11
3.2 Abbreviations	12
4 Common requirements	13
4.1 General notes	13
4.2 PSTN access requirements	13
4.3 Information to be provided by the applicant	13
4.3.1 Information required for testing purposes	13
4.3.1.1 List of modes	13
4.3.1.2 Other items	13
4.3.2 Instructions for use	14
5 Requirements common to some Category II modems	14
5.1 General notes	14
5.2 Call establishment sequence based upon CCITT Recommendation V.25	14
5.2.1 For modems initiating calls	14
5.2.1.1 Calling tone generation	14
5.2.1.2 Answering tone detection	15
5.2.2 For modems answering calls	15
5.3 Test loop implementation based upon CCITT Recommendation V.54	15
5.3.1 General	15
5.3.2 Remote digital test loop (loop 2)	16
5.3.3 Local analogue test loop (loop 3)	16
5.4 Threshold of received line signal detection	16
5.5 Requirements for modems providing asynchronous to synchronous conversion based upon CCITT Recommendation V.14	17
5.5.1 General	17
5.5.2 Transmission of start-stop characters	17
5.5.2.1 Signalling rate ranges of the start-stop characters at the modem input	17
5.5.2.2 Start-stop character format	17
5.5.2.3 Asynchronous to synchronous conversion	18
5.5.2.3.1 Transmitter	18
5.5.2.3.2 Receiver	18
5.5.2.3.3 Break signal	19
5.5.2.3.3.1 Transmitter	19
5.5.2.3.3.2 Receiver	19
5.6 Performance	19
5.6.1 Overall performance	19
5.6.2 Performance in the presence of metering pulses	19
Annex A (informative): Testing methods for national variants for clause 4	21
A.1 General notes	21
Annex B (normative): Testing methods for clause 5	22
B.1 General conditions for test	22

B.2	Tests of the call establishment sequence specified in subclause 5.2	22
B.2.1	For modems initiating calls.....	22
B.2.1.1	Calling tone.....	22
B.2.1.2	Detection of answering tone	23
B.2.2	For modems answering calls	23
B.3	Tests to verify the test loop implementation specified in subclause 5.3.....	23
B.4	Tests to verify the threshold of line signal detection.....	23
B.5	Tests to verify the process of asynchronous to synchronous conversion specified in subclause 5.5.....	24
B.5.1	Test patterns	24
B.5.1.1	General.....	24
B.5.1.2	Standard test text.....	24
B.5.1.3	Discrete Test Characters (DTC).....	25
B.5.2	Data signalling rates.....	25
B.5.3	Tests	26
B.5.3.1	Transmitter tests.....	26
B.5.3.1.1	Omission of stop elements	26
B.5.3.1.2	Over-speed and under-speed capabilities	26
B.5.3.1.3	Arbitrary character spacing	27
B.5.3.1.4	Break signal transmission	28
B.5.3.2	Receiver tests.....	28
B.5.3.2.1	Over-speed capability	28
B.5.3.2.2	Under-speed capability	29
B.5.3.2.3	Character recovery.....	29
B.5.3.2.4	Break signal reception	29
B.6	Performance testing methodology.....	29
B.6.1	General.....	29
B.6.2	Definitions.....	30
B.6.3	Method of measurement	31
B.6.3.1	Test set-up.....	32
B.6.3.2	Test 1.....	34
B.6.3.3	Test 2.....	37
B.6.3.4	Test 3.....	38
Annex C (normative):	Description of specialised test facilities, specification of test lines for use in assessing the performance of Category II modems	39
C.1	General.....	39
C.2	Test set-up.....	39
C.2.1	Simulated PSTN conditions	40
C.3	Test Line 1 transmission characteristics	45
C.3.1	Local line simulators.....	45
C.3.2	Trunk network simulator.....	45
C.3.3	Permanent impairments.....	46
C.3.3.1	Insertion loss.....	46
C.3.3.2	White noise.....	46
C.3.3.3	Frequency offset and Phase roll	55
C.3.3.4	Phase jitter.....	55
C.3.3.5	Echo.....	55
C.3.3.6	Harmonic distortion.....	55
C.4	Test Line 2 transmission characteristics	55
C.4.1	Local line simulators.....	55
C.4.2	Trunk network simulator.....	63
C.4.3	Permanent impairments.....	63
C.4.3.1	Insertion loss.....	63
C.4.3.2	Frequency offset and phase roll	63

C.4.3.3	Phase jitter	63
C.4.3.4	Echo	63
C.4.3.5	Harmonic distortion	64
C.4.3.6	Noise floor	64
C.5	Test Line 3 transmission characteristics	64
Annex D (normative):	Provision of test tools	65
Annex E (informative):	Example of proforma chart for information request.....	66
Annex F (informative):	Bibliography	67
History.....		68

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[SIST ETS 300 114 E2:2003](https://standards.iteh.ai/catalog/standards/sist/a6144d2a-1268-4542-99ff-f2c82e2ce731/sist-ets-300-114-e2-2003)

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Foreword

This second edition European Telecommunication Standard (ETS) has been produced by the Terminal Equipment (TE) Technical Committee of the European Telecommunications Standards Institute (ETSI).

This ETS is one of a series of ETSs which are applicable to modems. Details of the current series are given in clause 2 of this ETS (Normative references, numbers [1] to [7] inclusive).

This second edition was produced in order to solve some technical errors and problems that were reported on the first version, as well as to reflect the changed regulatory environment in relation to type approval. Where the first edition of the document defines in detail Category I and II approvals concept (in which only Category I approval was mandatory), this second edition still uses the Category I and II terminology. However, these documents, unlike their predecessors, which were used as the basis of the NETs 20 to 25, are not intended for regulatory application.

The regulatory approval of a modem does not require the modem to comply, for instance, with any of the V.series of CCITT/ITU-T Recommendations, nor does it require the modem to function or perform as a modem. An approved modem may or may not be in compliance with certain CCITT/ITU-T Recommendations. However since this is not tested, no assurance of interworking is implied.

Conformity to a Category II specification, which is entirely voluntary and only applicable when the supplier requests it, is only available to modems providing certain combinations of functionality based on the modem specific V.series CCITT/ITU-T Recommendations. The object of this Category II specification is to provide the user with the assurance that a modem can interwork, under most network conditions, with other compatible Category II modems.

NOTE 1: However, as the PSTN is primarily engineered to convey speech traffic, connections not permitting satisfactory data transmission can occur.

To be in conformance with the Category II specifications, and hence be called a "Category II modem" the modem needs, in addition to meeting the appropriate approval requirements, to meet the requirements given in one or more modem-specific ETS (final draft prETS 300 002 [6], ETS 300 115 [2] and final draft prETSs 300 116 to 300 118 ([3] to [5])). Certain requirements common to more than one specific ETS are included, for simplicity in clause 4 and annexes B, C and D, and are referred to (as required) in the modem-specific ETSs. The degree of compliance required by these ETSs with any V. series of CCITT/ITU-T Recommendation has been intentionally limited to that which might reasonably be considered necessary in order to provide the intended assurance of inter-working between modems. In particular, there is no requirement that the digital interface of the modem conform to any particular physical realisation or functionality, and with certain identified exceptions, there are no requirements relating to the digital interface.

For instance, the following types are examples of features which do not affect modem to modem interworking and do not prevent the modem from being in conformance with the Category II specification, as long as it meets the requirements of the appropriate modem-specific ETS:

- PC integral modems that present a bus interface;
- modems employing a proprietary auto-dialling protocol;
- "intelligent" modems that may send messages to a DTE;
- multi-mode modems that may connect to a variety of modem types.

Any modem that can be configured to meet the relevant requirements can potentially be found conforming to this Category II specification and hence be considered as a "Category II modem" for that mode of operation.

It is acceptable for a modem to be tested against Category II specifications in only some of its potential operating modes. Where this is the case, it is necessary to, in other operating modes to be used on the PSTN, meet the appropriate approval requirements. The "Instructions for Use" make it clear to the user those modes which the modem has found to comply with the requirements for contained in the Category II specification.

The requirements and the descriptions of the associated tests described in this ETS are specified to provide correct inter-working with the PSTN, minimise the risk of hazardous electrical conditions appearing on the PSTN, minimise the risk conditions occurring on the PSTN which might create hazards for those using the modem and to ensure end-to-end interpretability between modems in compatible configurations.

NOTE 2: Compliance with a modem specific ETS provides to the user an added degree of assurance of interoperability over the PSTN. However, as the PSTN is primarily engineered to convey speech traffic, connections not permitting satisfactory data transmission can occur.

Transposition dates	
Date of adoption of this ETS:	26 April 1996
Date of latest announcement of this ETS (doa):	31 August 1996
Date of latest publication of new National Standard or endorsement of this ETS (dop/e):	29 February 1997
Date of withdrawal of any conflicting National Standard (dow):	29 February 1997

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1 Scope

This second edition European Telecommunication Standard (ETS) contains the technical characteristics required for end-to-end interworking over the Public Switched Telephone Network (PSTN). Clauses of this ETS also contain Category II specifications define for certain features which may be provided by some modems, but the requirements in these parts are only applicable when invoked by a modem specific ETS.

The term "modem" in the context of this ETS includes all physical implementation practices for voice band modems which are conductively connected to the PSTN.

NOTE: This implies that certain types of modems, e.g. acoustically coupled and cordless modems, are outside the scope of this ETS.

This ETS also contains descriptions of the tests to be performed in order to confirm compliance with the functional requirements contained herein. A general description of the test conditions and test requirements for clause 4 is given in annex A (informative) and for clause 5 in annex B (normative).

Annex C (normative) describes the testing facilities which a testing laboratory may need to provide.

Annex D (normative) indicates additional equipment, or software, that applicants may need to provide in order that testing to Category II can be achieved.

2 Normative references

This ETS incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and 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.

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- [1] ETS 300 001: "Attachments to Public Switched Telephone Network (PSTN); General technical requirements for equipment connected to an analogue subscriber interface in the PSTN".
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- [2] ETS 300 115 (1991): "Attachments to the Public Switched Telephone Network (PSTN); Category II attachment requirements for 300 bits per second duplex modems standardized for use on the PSTN [Candidate NET 21]".
- [3] Final draft prETS 300 116 (1996): "Public Switched Telephone Network (PSTN); Category II specification for 1 200 bits per second duplex modems standardized for use on the PSTN".
- [4] Final draft prETS 300 117 (1996): "Public Switched Telephone Network (PSTN); Category II specification for 2 400 bits per second duplex modems standardized for use on the PSTN".
- [5] Final draft prETS 300 118 (1996): "Public Switched Telephone Network (PSTN); Category II specification for 1 200 bits per second half-duplex and 1 200/75 bits per second asymmetrical duplex modems standardized for use on the PSTN".
- [6] Final draft prETS 300 002 (1996): "Public Switched Telephone Network (PSTN); Category II specification for 9 600 or 4 800 bits per second duplex modems standardized for use on the PSTN".
- [7] Final draft prETS 300 492 (1996): "Public Switched Telephone Network (PSTN); Category II specification for 14 400, 12 000, 9 600, 7 200 and 4 800 bits per second duplex modems standardized for use on the PSTN".
- [8] CCITT Recommendation V.24 (1984): "List of definitions for interchange circuits between Data Terminal Equipment and Data Circuit-Terminating Equipment".

- [9] CCITT Recommendation V.14 (1988): "Transmission of start-stop characters over synchronous bearer channels".
- [10] CCITT Recommendation V.25 (1984): "Automatic answering equipment and/or parallel automatic calling equipment on the general switched telephone network including procedures for the disabling of echo control devices for both manually and automatically established calls".
- [11] CCITT Recommendation V.21 (1984): "300 bits per second duplex modem standardized for use in the General Switched Telephone Network".
- [12] CCITT Recommendation V.54 (1984): "Loop test devices for modems".
- [13] CCITT Recommendation V.4 (1984): "General structure of signals of international alphabet No. 5 code for data transmission over public telephone networks".
- [14] CCITT Recommendation S.33 (1984): "Standardization of an international text for the measurement of the margin of start-stop machines using International Alphabet No. 5".
- [15] CCITT Recommendation V.52 (1984): "Characteristics of distortion and error-rate measuring apparatus for data transmission".
- [16] CCITT Recommendation V.22 (1984): "1200 bits per second duplex modem standardized for use in the general switched telephone network and on point-to-point 2-wire leased telephone-type circuits".
- [17] CCITT Recommendation V.22bis (1988): "2400 bits per second duplex modem using the frequency division technique standardized for use on the general switched telephone network and on point-to-point 2-wire leased telephone-type circuits".
- [18] CCITT Recommendation V.23 (1984): "600/1200-baud modem standardized for use in the General Switched Telephone Network".
- [19] CCITT Recommendation V.32 (1984): "A family of 2-wire, duplex modems operating at data signalling rates up to 9600 bits/s for use on the general switched telephone network and on leased telephone type circuits".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of this and other related ETSs, the following definitions apply:

answer mode: When calls are established with automatic facilities, a standard answer mode is used by the modem at the answering station. This mode consists of conventional characteristics (e.g. use of high channel carrier frequency or particular scrambler generating polynomial) complementary to those used in the standard call mode by the modem at the calling station, in order to ensure proper connection and inter-working. If calls are established on the PSTN by operators, or for leased line operation, bilateral agreement on the use of call mode and answer mode is necessary.

built-in modem: A functionally separate internal modem which is mechanically combined with a terminal.

call mode: When calls are established with automatic facilities, a standard call mode is used by the modem at the calling station. This mode consists of conventional characteristics (e.g. use of low channel carrier frequency or particular scrambler generating polynomial) complementary to those used in the standard answer mode by the modem at the answering station, in order to ensure proper connection and inter-working.

If calls are established on the PSTN by operators, or for leased line operation, a bilateral agreement on the use of call mode and answer mode is necessary.

Data Terminal Equipment (DTE): In the context of this ETS, the expression "DTE" is used to define the origin and destination of signals present at the digital interface of a modem. This expression does not require that a "commercial data terminal" be present to receive or generate such signals; a tester or any suitable device may monitor or generate such signals.

integrated modem: An internal modem which is functionally and physically merged with the terminal.

internal modem: A modem which is physically incorporated in a terminal equipment and which takes its electrical power supply from the terminal.

Different types of internal modems are defined: built-in, plug-in and integrated modems.

intra-character signalling rate: The intra-character signalling rate of a message is the signalling rate of the start element and data elements within each character of this message.

modem: A functional unit that modulates and de-modulates signals in order to enable digital data to be transmitted over analogue transmission facilities.

modem used for reference: A modem used for some of the tests specified herein or in a modem specific ETS. A modem used for reference may, at the discretion of the applicant, be provided by the testing authority or by himself. It is designed:

- to meet the requirements of the same CCITT Recommendation(s) as the modem under test, to the extent necessary for performing the tests;
- to provide the functionalities for a modem used for reference that are specified in the relevant testing clauses; and
- to provide an interface which is accessible and of a type suitable for use in the tests (e.g. CCITT Recommendation V.24 [8]).

Where the applicant has provided the modem used for reference and the test fails, the testing authority may not be in a position to determine the precise reason for failure.

modes of operation: Modes specified in a modem specific ETS, that have an influence upon line signals present at the PSTN interface.

modes of use: Modes specified in a modem specific ETS, that have an influence upon conditions present at a digital interface e.g. a "conventional" CCITT Recommendation V.24 [8] interface or a PC bus interface in the case of an integrated modem.

on-line state: An electrical condition into which, when connected to the network, a modem is placed such that it draws enough current to be capable of activating the exchange.

NOTE: Usually, a modem in the on-line condition is potentially capable of sending or receiving speech-band information to or from the network.

plug-in modem: A physically and functionally separate internal modem which is interchangeable from a terminal.

round trip delay: This is twice the time taken for a transmitted signal to be propagated to the far end of a telephone connection.

For all tests where adherence to CCITT Recommendations is being checked the requirement and test assume a round trip delay of 0 ms. The round trip delay of the test line (test line 3) being used for the tests should be determined and the results of measurement adjusted by subtracting either half the round trip delay or the round trip delay as appropriate from the value obtained before comparing it with the pass/fail limit given in this ETS.

silence: This term is used to describe periods during the hand-shaking sequences where signals are not transmitted.

The period of silence is measured using the start and finish criteria defined below. The levels refer to signals which in the relevant frequency band have an in-band power level and are expressed with respect to the normal transmitted signal level of the modem under test recorded at the point of observation.

The start of the period of silence is defined as the instant at which the transmitted signal level drops below a level that is 6 dB below the normal transmit level.

The period of silence ends the instant the transmitted signal rises above a level that is 6 dB below the normal transmit level. During the period of silence at least one instant is observed where the signal level is at least 30 dB below the normal transmit level.

3.2 Abbreviations

For the purposes of this ETS the following abbreviations apply:

AMM	Answer Mode Modem
CcT	Circuit
CMM	Call Mode Modem
DCE	Data Circuit-Terminating Equipment
DTE	Data Terminal Equipment
MCT	Modem Conformance Tester
NEL	Nominal Element Length
PSTN	Public Switched Telephone Network

4 Common requirements

4.1 General notes

This clause specifies the requirements to be met by all modems seeking conformance with Category I or Category II specifications.

4.2 PSTN access requirements

The requirements of ETS 300 001 [1] apply.

4.3 Information to be provided by the applicant

4.3.1 Information required for testing purposes

The applicant shall provide to the testing authority, at least the information indicated below:

- equipment nature (stand-alone, rack-mounted, integrated in a terminal);
- intended category (Category I and/or Category II);
- countries for which the equipment is intended for attachment.

An example proforma chart to collect this information is provided in annex E.

4.3.1.1 List of modes

The applicant shall specify those modes of the equipment relevant to operation on the PSTN and for which of them assessment of conformance is sought, and which of them are intended for use in specified countries:

- list of carrier modes; [SIST ETS 300 114 E2:2003](https://standards.iteh.ai/catalog/standards/sist/a6144d2a-1268-4542-99f1-f2c82e2ce731/sist-ets-300-114-e2-2003)
- automatic answering; <https://standards.iteh.ai/catalog/standards/sist/a6144d2a-1268-4542-99f1-f2c82e2ce731/sist-ets-300-114-e2-2003>
- automatic calling;
- provision of line loop 3 during a connection;
- special features.

4.3.1.2 Other items

The applicant shall provide the following information:

- additional technical information (transmitted level, minimum received level...);
- power supply;
- environmental characteristics.