



SLOVENSKI STANDARD
SIST ETS 300 492 E1:2003

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**Javno komutirano telefonsko omrežje (PSTN) – Specifikacija kategorije II za
dupleksne modeme s hitrostmi 14 400, 12 000, 9 600, 7 200 in 4 800 b/s,
standardizirane za uporabo v omrežjih PSTN**

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

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Category II specification for 14 400, 12 000, 9 600, 7 200 and
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for use on the PSTN**

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Foreword

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

This ETS specifies the technical characteristics required for end-to-end interworking over the Public Switched Telephone Network (PSTN) for 14 400 bit/s, 12 000 bit/s, 9 600 bit/s, 7 200 bit/s and 4 800 bit/s modems standardized for use over the PSTN.

These requirements are based upon, and do not conflict with, CCITT Recommendation V.32 bis [1]. Additionally, requirements are included relating to end-to-end interoperability over PSTN connections. Such requirements are in excess of the CCITT/ITU-T Recommendations.

Except where otherwise indicated, a modem which complies with CCITT Recommendation V.32 bis [1] should always meet the requirements of this ETS which relate to parameters specified in that CCITT Recommendation.

Clause 4 of this ETS references the requirements common to both Category I and Category II modems, which are contained in clause 4 of final draft prETS 300 114 [2]. The definitions for Category I and Category II modems can be found in the foreword of final draft prETS 300 114 [2].

Clause 5 of this ETS contains Category II requirements specific to CCITT Recommendation V.32 bis [1] modems. In the case of a certain function common to more than one type of modem (e.g. auto-answering sequence) reference is made to clause 5 of final draft prETS 300 114 [2], which contains the relevant requirements.

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 European Telecommunication Standard (ETS) specifies the technical characteristics required for end-to-end interworking over the Public Switched Telephone Network (PSTN) of 14 400 bit/s, 12 000 bit/s, 9 600 bit/s, 7 200 bit/s and 4 800 bit/s duplex modems standardized for use over the PSTN, in accordance with CCITT Recommendation V.32 bis [1].

The objective of this specification, the application of which is entirely voluntary, is to provide the users with an added degree of assurance that modems in compliance with this specification, can interwork, with each other under most network conditions.

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

This ETS specifies ten modes of operation, each with up to five modes of use (see subclause 5.2).

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 is given in annex A (normative).

2 Normative references

This ETS incorporates by dated and undated reference, provisions from other publications. These 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 amendments or revision. For undated references the latest edition of the publication referred to applies.

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- [1] CCITT Recommendation V.32 bis (1991): "A duplex modem operating at data signalling rates of up to 14 400 bits for use on the general switched telephone network and on leased point-to-point 2-wire telephone-type circuits".
- [2] Final draft prETS 300 114: "Public Switched Telephone Network (PSTN); Basic Category I and Category II specifications for modems standardized for use on the PSTN".
- [3] CCITT Recommendation V.32 (1988): "A family of 2-wire duplex modems operating at data signalling rates of up to 9 600 bit/s for use on the general switched telephone network and on leased telephone-type circuits".
- [4] ETS 300 001: "Attachments to the Public Switched Telephone Network (PSTN); General technical requirements for equipment connected to an analogue subscriber interface in the PSTN".
- [5] CCITT Recommendation V.25 (1988): "Automatic answering equipment and/or parallel automatic calling equipment on the general switched telephone network including procedures for disabling of echo control devices for both manually and automatically established calls".
- [6] CCITT Recommendation S.33 (1984): "Standardisation of an international text for the measurement of the margin of start-stop machines using International Alphabet No 5".
- [7] CCITT Recommendation O.153 (1988): "Basic parameters for the measurement of error performance at bit rates below the primary rate".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of this ETS, the definitions in final draft prETS 300 114 [2] apply together with the following.

NOTE: In addition to the following definitions, some other specific definitions apply (see subclauses 5.8.1 and 5.11.1 of this ETS).

Modem Conformance Tester (MCT): A simulator designed to meet the requirements of a modem to the same recommendation as the Modem Under Test (MUT). All individual sub-systems within it are both accessible (e.g. provide test points and permit functions to be enabled or disabled when required) and externally controllable (e.g. permit sequences such as the start up procedure to be selectively repeated). These, within a conformance tester, may be constructed as discrete items of equipment, so as to permit their assembly into varying configurations required to suit the tests (e.g. the asynchronous to synchronous converter may be simply applied to a synchronous CCITT Recommendation V.32 bis [1] conformance tester to achieve an asynchronous CCITT Recommendation V.32 bis [1] conformance tester).

As an interim measure, until the conformance tester is defined and is available, its definition agreed to be appropriate by ETSI, a modem used for reference may be used in its place. In the case that the modem used for reference has not been shown to conform to the ETS in the relevant modes of use/operation, the testing authority ensures that the modem used for reference complies with the relevant ETS to the extent necessary for the performance of the test.

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
GPA	General Polynomial Answer mode modem
GPC	General Polynomial Call mode modem
MCT	Modem Conformance Tester
MUT	Modem Under Test
PSTN	Public Switched Telephone Network
TE	Terminal Equipment

4 General requirements

4.1 References to other ETSS

The modem shall comply with final draft prETS 300 114 [2], clause 4.

NOTE: Final draft prETS 300 114 [2] in turn refers to ETS 300 001 [4] for the majority, if not all, of its requirements.

4.2 Information to be provided by the applicant

4.2.1 Information required for testing purposes

The applicant shall declare for which of the modes of operation/use identified in this ETS, the modem is supposed to undergo tests.

Compliance shall be considered to have been accomplished by provision of the relevant information.

NOTE: This could be accomplished by completion of forms such as those provided in annex B (informative).

4.2.2 Instructions for use

Instructions for use shall be made available with the apparatus. The instructions for use shall include:

- a) the apparatus or types of apparatus to which the instructions apply;
- b) any information specifically indicated in this ETS for inclusion in the "Instructions for use"; and
- c) any national restrictions on the use of the apparatus.

Any additional information that has been included shall be disregarded unless it is the subject of another ETS.

Compliance shall be checked by inspection.

5 Functional requirements specific to Category II modems

5.1 General requirements

To comply with the requirements of this ETS, it shall be necessary that the modem provide:

- duplex mode of operation by means of the modulation scheme specified in CCITT Recommendation V.32 bis [1];
- channel separation by echo cancellation techniques;
- quadrature amplitude modulation;
- signalling rates of 14 400 bit/s, 12 000 bit/s, 9 600 bit/s, 7 200 bit/s and 4 800 bit/s;
- compatibility with CCITT Recommendation V.32 [3] modems;
- use of the rate sequence during call establishment to decide the data rate and method of coding;
- means by which the channels may be selected either manually and/or automatically, where a modem is capable of transmitting in either of the two channels;
- means to respond to a request for a retrain;
- means to respond to a request for an instigation of a digital loop 2;
- means to respond to a request for a rate renegotiation.

NOTE 1: The general requirements described above are a subset of CCITT Recommendation V.32 bis [1]. In the requirements which follow any deviations from the strict interpretation of CCITT Recommendation V.32 bis [1] have been identified.

NOTE 2: In the following, references are made to interchange circuits between the modem and the DTE, as defined in CCITT Recommendation V.24. However, not all modems provide an interface with such circuits. For these cases the references to CCITT Recommendation V.24 type interchange circuits indicate equivalent operation of a DTE and of a modem where this exists.

To further comply with this ETS, the interchange circuits (or equivalent) which are required to change state after an identifiable event or point in time, shall have changed state within a maximum of 3 seconds of that event, unless otherwise specified.

NOTE 3: This requirement is in addition to CCITT Recommendation V.32 bis [1].

Interworking with 9 600 bit/s uncoded modulation is not mandatory for CCITT Recommendation V.32 bis [1] modems.

5.2 Modes of operation/use

The following modes of operation are identified:

- 14 400 bit/s trellis coded, call;
- 14 400 bit/s trellis coded, answer;
- 12 000 bit/s trellis coded, call;
- 12 000 bit/s trellis coded, answer;
- 9 600 bit/s trellis coded, call;
- 9 600 bit/s trellis coded, answer;
- 7 200 bit/s trellis coded, call;
- 7 200 bit/s trellis coded, answer;
- 4 800 bit/s non-redundant coding, call;
- 4 800 bit/s non-redundant coding, answer.

It shall be possible to configure the modem to operate at all of the mentioned data signalling rates, in either call mode or answer mode or both.

For each mode of operation identified for Category II testing, the modem shall provide at least one of the following modes of use:

- a) asynchronous with 8 bits per character;
- b) asynchronous with 9 bits per character; [SIST ETS 300 492 E1:2003](https://standards.iteh.ai/catalog/standards/sist/57772bd7-b26d-4b06-2dc2d4fc/sist-ets-300-492-e1-2003)
- c) asynchronous with 10 bits per character; <https://standards.iteh.ai/catalog/standards/sist/57772bd7-b26d-4b06-2dc2d4fc/sist-ets-300-492-e1-2003>
- d) asynchronous with 11 bits per character;
- e) synchronous.

In the asynchronous (start-stop) modes of use, the modem shall accept a data stream from the DTE at one of the nominal rates as mentioned above. The asynchronous data to be transmitted shall be converted into a synchronous data stream in accordance with subclause 5.9 suitable for transmission.

Demodulated data shall be decoded in accordance with subclause 5.5, then descrambled in accordance with subclause 5.6, it shall then be passed for reconversion into an asynchronous data stream in accordance with subclause 5.9.

In the synchronous modes of use, the modem shall accept synchronous data from the DTE. The data shall then be scrambled in accordance with subclause 5.6 and passed to the modulator for encoding in accordance with subclause 5.5.

Demodulated data shall be decoded in accordance with subclause 5.5, then descrambled in accordance with subclause 5.6.

The modem shall respond to a request to execute a retrain. Optionally, the modem may also provide facilities to instigate a retrain during data transmission if the modem detects a loss of equalization.

The modem shall respond to a request to execute a rate renegotiation procedure. Optionally, the modem may also provide facilities to instigate a rate renegotiation procedure during data transmission.

It shall be the applicant's responsibility to specify for which of the above mentioned modes of operation/use the modem is supposed to undergo tests.

5.3 Line signals

5.3.1 Transmitted carrier frequency

The carrier frequency transmitted shall be 1 800 Hz \pm 1 Hz.

Compliance shall be checked by the method described in annex A, clause A.2.

5.3.2 Receiver carrier tolerance

The receiver shall be able to operate correctly with a received carrier frequency in the range of 1 800 Hz \pm 7 Hz.

Compliance shall be checked by the method described in annex A, clause A.3.

5.3.3 Transmitted spectrum

The national network specific spectral power limits are specified in final draft prETS 300 114 [2], clause 4.

NOTE: Final draft prETS 300 114 [2], clause 4 in turn refers to ETS 300 001 [4].

There are no requirements in this ETS relating to the spectrum of signals presented to the PSTN over and above those for PSTN access invoked by clause 4 of ETS 300 001 [4].

5.4 Line signalling rates

The signalling rates transmitted to line shall be 2 400 baud \pm 0,01 %.

Compliance shall be checked by the method described in annex A, clause A.4.

5.5 Encoding of data

The signal element coding shall be as defined in CCITT Recommendation V.32 bis [1], paragraph 2.3.1 (trellis coding for 14 400 bit/s operation), paragraph 2.3.2 (trellis coding for 12 000 bit/s operation), paragraph 2.3.3 (trellis coding for 9 600 bit/s operation), paragraph 2.3.4 (trellis coding for 7 200 bit/s operation) and paragraph 2.3.5 (non-redundant coding for 4 800 bit/s operation).

Compliance shall be checked by the method described in annex A, clause A.5.

5.6 Scrambler and descrambler

A self-synchronizing scrambler and a self-synchronizing descrambler, as specified in CCITT Recommendation V.32 bis [1], paragraph 4 (introduction) shall be provided in the transmitting part and the receiving part, respectively, of the modem.

Compliance shall be checked by performing the test for encoding of data, described in annex A, clause A.6.

5.7 Channel allocation

5.7.1 Channel selection

A modem which is capable of being configured as both a Call Mode Modem (CMM) and an Answer Mode Modem (AMM) shall provide facilities for at least one of the following techniques of channel selection:

- a) manual selection of the channels using facilities provided on the modem;
- b) selection of the channels by the DTE (equivalent: CcT 126 control);
- c) automatic selection of the channels as described in subclause 5.7.2.