



SLOVENSKI STANDARD
SIST ETS 300 002 E2:2003
01-december-2003

>Uj bc`_ca i hfUbc`hY YZ: bg_c`ca fYy`Y`fDGHBL`E`Df]_`1]hj YbY`nU hYj Y`_UH[cf]`Y`=
nUXi d`Y_gbY`a cXYa Y`nU\]hfcgh]- * \$\$`V#g`U]` (, \$\$`V#g`ghUbXUfX]n]fUbY`nUi dcfUvc
j`DGHB

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

ITeH STANDARD PREVIEW
(standards.iteh.ai)

[SIST ETS 300 002 E2:2003](https://standards.iteh.ai/catalog/standards/sist/c5d2c00c-9f0a-46ae-b77c-66c08c1d1fbc/sist-ets-300-002-e2-2003)

Ta slovenski standard je istoveten z: **ETS 300 002 Edition 2**

ICS:

33.040.35 Telefonska omrežja Telephone networks

SIST ETS 300 002 E2:2003 en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST ETS 300 002 E2:2003

<https://standards.iteh.ai/catalog/standards/sist/c5d2c00c-9f0a-46ae-b77c-66c08cfd1bc/sist-ets-300-002-e2-2003>



EUROPEAN
TELECOMMUNICATION
STANDARD

ETS 300 002

May 1996

Second Edition

Source: ETSI TC-TE

Reference: RE/TE-05044

ICS: 33.020

Key words: PSTN, modems, access, analogue

iTeh STANDARD PREVIEW
Public Switched Telephone Network (PSTN);
(standards.iTeh.ai)
Category II specification for 9 600 or 4 800 bits per
second duplex modems standardized for use on the PSTN

SIST ETS 300 002 E2:2003
66c08cfd1f1bc/sist-ets-300-002-e2-2003

ETSI

European Telecommunications Standards Institute

ETSI Secretariat

Postal address: F-06921 Sophia Antipolis CEDEX - FRANCE

Office address: 650 Route des Lucioles - Sophia Antipolis - Valbonne - FRANCE

X.400: c=fr, a=atlas, p=etsi, s=secretariat - **Internet:** secretariat@etsi.fr

Tel.: +33 92 94 42 00 - Fax: +33 93 65 47 16

*

Copyright Notification: No part may be reproduced except as authorized by written permission. The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 1996. All rights reserved.

iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST ETS 300 002 E2:2003

<https://standards.iteh.ai/catalog/standards/sist/c5d2c00c-9f0a-46ae-b77c-66c08cfd1bc/sist-ets-300-002-e2-2003>

Contents

| | |
|--|----|
| Foreword | 7 |
| 1 Scope | 9 |
| 2 Normative references | 9 |
| 3 Definitions and abbreviations | 10 |
| 3.1 Definitions | 10 |
| 3.2 Abbreviations | 10 |
| 4 General requirements | 10 |
| 4.1 References to other ETSs | 10 |
| 4.2 Information to be provided by the applicant | 11 |
| 4.2.1 Information required for testing purposes | 11 |
| 4.2.2 Instructions for use | 11 |
| 5 Functional requirements specific to Category II modems | 11 |
| 5.1 General requirements | 11 |
| 5.2 Modes of operation/use | 12 |
| 5.3 Line signals | 12 |
| 5.3.1 Transmitted carrier frequency | 12 |
| 5.3.2 Receiver carrier tolerance | 13 |
| 5.3.3 Transmitted spectrum | 13 |
| 5.4 Line signalling rates | 13 |
| 5.5 Encoding of data | 13 |
| 5.6 Scrambler and descrambler | 13 |
| 5.7 Channel allocation | 13 |
| 5.7.1 Channel selection | 13 |
| 5.7.2 Automatic channel selection | 14 |
| 5.8 Hand-shaking sequences | 14 |
| 5.8.1 Definitions | 14 |
| 5.8.2 Calling and answering procedures | 15 |
| 5.8.2.1 Calling tone | 15 |
| 5.8.2.2 Answer tone recognition | 16 |
| 5.8.2.3 Answer tone generation | 16 |
| 5.8.3 Start-up procedure | 16 |
| 5.8.3.1 Call Mode Modem (CMM) | 16 |
| 5.8.3.1.1 Initiation of the start-up procedure | 16 |
| 5.8.3.1.2 Round trip delay determination | 16 |
| 5.8.3.1.3 Rate negotiation | 17 |
| 5.8.3.1.4 Completion of the rate negotiation | 17 |
| 5.8.3.1.5 Completion of the hand-shake | 17 |
| 5.8.3.2 Answer Mode Modem (AMM) | 18 |
| 5.8.3.2.1 Initiation of the start-up procedure | 18 |
| 5.8.3.2.2 Round trip delay determination | 18 |
| 5.8.3.2.3 Rate negotiation | 18 |
| 5.8.3.2.4 Completion of rate negotiation | 19 |
| 5.8.3.2.5 Completion of the hand-shake | 19 |
| 5.8.4 Retrain sequence | 19 |
| 5.8.4.1 Initiating signal | 19 |
| 5.8.4.1.1 Call Mode Modem (CMM) | 20 |
| 5.8.4.1.2 Answer Mode Modem (AMM) | 20 |
| 5.8.4.2 Response signal | 20 |
| 5.8.4.2.1 Call Mode Modem (CMM) | 20 |
| 5.8.4.2.2 Answer Mode Modem (AMM) | 20 |
| 5.9 Transmission of start-stop characters | 20 |
| 5.10 Threshold of received line signal detector | 21 |

| | | |
|---|--|----|
| 5.11 | Test loop 2..... | 21 |
| 5.11.1 | Definitions..... | 21 |
| 5.11.2 | Instigation of a remote loop 2..... | 21 |
| 5.11.3 | Termination of a remote loop 2..... | 22 |
| 5.12 | Receiver performance..... | 22 |
| 5.12.1 | Normal case..... | 22 |
| 5.12.2 | Case with satellite delay..... | 22 |
| Annex A (normative): Testing methods..... | | 24 |
| A.1 | General testing conditions..... | 24 |
| A.1.1 | General notes..... | 24 |
| A.1.1.1 | Test set-up..... | 24 |
| A.1.1.2 | Determination of signals..... | 24 |
| A.1.2 | Limitation of number of tests..... | 25 |
| A.1.2.1 | Introduction..... | 25 |
| A.1.2.2 | General rules..... | 25 |
| A.1.2.3 | Specific rules..... | 25 |
| A.1.3 | Proposed order for performing the tests..... | 26 |
| A.2 | Test for subclause 5.3.1 (Transmitted carrier frequency)..... | 27 |
| A.3 | Test for subclause 5.3.2 (Receiver carrier tolerance)..... | 27 |
| A.4 | Test for subclause 5.4 (Line signalling rates)..... | 27 |
| A.5 | Test for subclause 5.5 (Encoding of data)..... | 27 |
| A.6 | Test for subclause 5.6 (scrambler and descrambler)..... | 28 |
| A.7 | Test for subclause 5.7 (Channel allocation)..... | 28 |
| A.8 | Test for subclause 5.8 (Hand-shaking sequences)..... | 28 |
| A.8.1 | Test for subclause 5.8.2 (Calling and answering procedures)..... | 28 |
| A.8.1.1 | Test for subclause 5.8.2.1 (Calling tone)..... | 28 |
| A.8.1.2 | Test for subclause 5.8.2.2 (Answer tone recognition)..... | 28 |
| A.8.1.3 | Test for subclause 5.8.2.3 (Answer tone generation)..... | 28 |
| A.8.2 | Tests for subclause 5.8.3 (Start-up procedure)..... | 29 |
| A.8.2.1 | Tests for subclause 5.8.3.1 (CMM)..... | 29 |
| A.8.2.1.1 | Test for subclause 5.8.3.1.1 (Initiation of the start-up procedure)..... | 29 |
| A.8.2.1.2 | Test for clause 5.8.3.1.2 (Round trip delay determination)..... | 29 |
| A.8.2.1.3 | Test for subclause 5.8.3.1.3 (Rate negotiation)..... | 29 |
| A.8.2.1.4 | Test for subclause 5.8.3.1.4 (Completion of rate negotiation)..... | 30 |
| A.8.2.1.5 | Test for subclause 5.8.3.1.5 (Completion of the hand-shake)..... | 30 |
| A.8.2.2 | Tests for subclause 5.8.3.2 (AMM)..... | 31 |
| A.8.2.2.1 | Test for subclause 5.8.3.2.1 (Initiation of the start-up procedure)..... | 31 |
| A.8.2.2.2 | Test for subclause 5.8.3.2.2 (Round trip delay determination)..... | 31 |
| A.8.2.2.3 | Test for subclause 5.8.3.2.3 (Rate negotiation)..... | 32 |
| A.8.2.2.4 | Test for subclause 5.8.3.2.4 (Completion of rate negotiation)..... | 32 |
| A.8.2.2.5 | Test for subclause 5.8.3.2.5 (Completion of the hand-shake)..... | 33 |
| A.8.3 | Tests for subclause 5.8.4 (Retrain sequence)..... | 34 |
| A.8.3.1 | Tests for subclause 5.8.4.1 (Initiating signal)..... | 34 |
| A.8.3.1.1 | Tests for subclause 5.8.4.1.1 (CMM)..... | 34 |
| A.8.3.1.2 | Tests for subclause 5.8.4.1.2 (AMM)..... | 34 |
| A.8.3.2 | Tests for subclause 5.8.4.2 (Response signal)..... | 34 |
| A.8.3.2.1 | Tests for subclause 5.8.4.2.1 (CMM)..... | 34 |

| | | |
|------------------------|--|----|
| A.8.3.2.2 | Tests for subclause 5.8.4.2.2 (AMM)..... | 34 |
| A.9 | Test for subclause 5.9 (Transmission of start-stop characters)..... | 34 |
| A.10 | Tests for subclause 5.11 (Test loop 2)..... | 35 |
| A.10.1 | Tests for subclause 5.11.2 (Instigation of a Remote loop 2) | 35 |
| A.10.1.1 | Transmission of the test loop initiation signal - Test for subclause 5.11.2(a) (Controlling modem under test) | 35 |
| A.10.1.2 | Response to the test loop initiation signal (Test for subclause 5.11.2(b)) (Controlled modem under test) | 35 |
| A.10.2 | Tests for subclause 5.11.3 (Termination of a remote test loop 2) | 35 |
| A.10.2.1 | Transmission of the de-activation signal (Test for subclause 5.11.3(a) - Controlling modem) | 35 |
| A.10.2.2 | Response to the de-activation signal (Test for subclause 5.11.3(b) - Controlled modem)..... | 36 |
| Annex B (informative): | Example proforma for the declaration of modes of operation/use | 37 |
| Annex C (informative): | Formal description of the start-up sequence | 40 |
| Annex D (informative): | Bibliography | 60 |
| History..... | | 61 |

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST ETS 300 002 E2:2003](https://standards.iteh.ai/catalog/standards/sist/c5d2c00c-9f0a-46ae-b77c-66c08cfd1bc/sist-ets-300-002-e2-2003)

<https://standards.iteh.ai/catalog/standards/sist/c5d2c00c-9f0a-46ae-b77c-66c08cfd1bc/sist-ets-300-002-e2-2003>

Blank page

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST ETS 300 002 E2:2003](https://standards.iteh.ai/catalog/standards/sist/c5d2c00c-9f0a-46ae-b77c-66c08cfd1bc/sist-ets-300-002-e2-2003)

<https://standards.iteh.ai/catalog/standards/sist/c5d2c00c-9f0a-46ae-b77c-66c08cfd1bc/sist-ets-300-002-e2-2003>

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 specifies the technical characteristics required for end-to-end interworking over the Public Switched Telephone Network (PSTN) for 9 600 bit/s or 4 800 bit/s duplex modems standardized for use over the PSTN.

These requirements are based upon, and do not conflict with, CCITT Recommendation V.32 [2]. 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 [2] 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 [1]. The definitions for Category I and Category II modems can be found in the foreword of final draft prETS 300 114 [1].

Clause 5 of this ETS contains Category II requirements specific to 9 600 bit/s or 4 800 bit/s duplex modems. In the case of certain functions common to a number of different types of modem (e.g. auto-answering sequence), reference is made to clause 5 of final draft prETS 300 114 [1], which contains the relevant requirements.

iTeh STANDARD PREVIEW

Transposition dates

| | |
|---|------------------|
| Date of adoption of this ETS: standards.iteh.ai | 26 April 1996 |
| Date of latest announcement of this ETS (doa): SIST ETS 300 002 E2:2003 | 31 August 1996 |
| Date of latest publication of new National Standard or endorsement of this ETS (dop/e): https://standards.iteh.ai/catalog/standards/sist/c5d2c00c-9f0a-46ae-b77c-300000000000/sist-cs-300-002-e2-2003 | 29 February 1997 |
| Date of withdrawal of any conflicting National Standard (dow): | 29 February 1997 |

Blank page

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST ETS 300 002 E2:2003](https://standards.iteh.ai/catalog/standards/sist/c5d2c00c-9f0a-46ae-b77c-66c08cfd1bc/sist-ets-300-002-e2-2003)

<https://standards.iteh.ai/catalog/standards/sist/c5d2c00c-9f0a-46ae-b77c-66c08cfd1bc/sist-ets-300-002-e2-2003>

1 Scope

This ETS specifies the technical characteristics required for end-to-end interworking over the Public Switched Telephone Network (PSTN) of 9 600 bit/s or 4 800 bit/s modems standardized for use over the PSTN, in accordance with CCITT Recommendation V.32 [2].

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 six 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 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 amendments or revision. For undated references the latest edition of the publication referred to applies.

- [1] Final draft prETS 300 114 (1996): "Public Switched Telephone Network (PSTN); Basic Category I and Category II specifications for modems standardized for use on the PSTN".
- [2] 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 lines telephone-type circuits".
- [3] 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".
- [4] CCITT Recommendation V.32 bis (1991): "A duplex modem operating at data signalling rates of up to 14 400 bit/s for use on the general switched telephone network and on leased point-to-point 2-wire telephone-type circuits".
- [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 [1] apply, together with the following:

NOTE: In addition to the following definitions, some other specific definitions are applicable (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. 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 [2] conformance tester to achieve an asynchronous CCITT Recommendation V.32 [2] conformance tester).

As an interim measure, until the conformance tester is defined and such a tester is available, its definition as agreed to be appropriate by ETSI is that 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.

silence: Periods during the handshaking sequences where signals are not transmitted.

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

start of the period of silence: 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 |
| 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 |

4 General requirements

4.1 References to other ETSS

The modem shall comply with final draft prETS 300 114 [1], clause 4.

NOTE: Final draft prETS 300 114 [1] in turn refers to ETS 300 001 [3] 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 which of the modes of operation/use identified in this ETS the modem is supposed to undergo tests.

Compliance is 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 (standards.iteh.ai)

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 [2];
- channel separation by echo cancellation techniques;
- quadrature amplitude modulation;
- signalling rates of 4 800 bit/s and/or 9 600 bit/s;
- 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.

NOTE 1: The general requirements described above are a subset of CCITT Recommendation V.32 [2]. In the requirements which follow any deviations from the strict interpretation of CCITT Recommendation V.32 [2] 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 [2].

5.2 Modes of operation/use

The following modes of operation are identified:

- 9 600 bit/s trellis coded, call;
- 9 600 bit/s trellis coded, answer;
- 9 600 bit/s non-redundant coding, call;
- 9 600 bit/s non-redundant coding, 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 either 4 800 bit/s or 9 600 bit/s, in either call mode or answer mode or both. Optionally, the modem may operate at both 4 800 bit/s and 9 600 bit/s. Where the modem operates at 9 600 bit/s using trellis coding then non-redundant coding at 9 600 bit/s shall also be provided.

For each mode of operation to be tested for compliance, 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;
- c) asynchronous with 10 bits per character;
- d) asynchronous with 11 bits per character;
- e) synchronous.

STANDARD PREVIEW
(standards.iteh.ai)

In the asynchronous (start-stop) modes of use, the modem shall accept a data stream from the DTE at a nominal rate of 9 600 bit/s and/or 4 800 bit/s. The asynchronous data to be transmitted shall be converted into a synchronous data stream in accordance with subclause 5.9 suitable for transmission.

66c08cfd1bc/sist-ets-300-002-e2-2003

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 reversion 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.

NOTE: This facility can also be used to effect a change of rate from 9 600 bit/s to 4 800 bit/s or vice versa, without disconnection from the PSTN.

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 [1], clause 4.

NOTE: Final draft prETS 300 114 [1], clause 4 in turn refers to ETS 300 001 [3].

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 [3].

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 [2], paragraph 2.4.1.1 (non-redundant coding for 9 600 bit/s operation) and/or paragraph 2.4.2 (4 800 bit/s operation).

Trellis coding, as defined in CCITT Recommendation V.32 [2], paragraph 2.4.1.2, may optionally be provided.

The provision of non-redundant coding at 9 600 bit/s shall be mandatory if trellis coding at 9 600 bit/s has been provided.

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 [2], 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.

NOTE: Other means of channel selection may also be provided but verification of the correct functioning of such facilities is not a requirement of this ETS.

For techniques a) and b), compliance shall be checked by the method described in annex A, clause A.7.