



SLOVENSKI STANDARD
SIST EN 300 420 V1.2.1:2004
01-oktober-2004

Dostop in terminali (AT) - Digitalni zakupljeni vodi za prenosno hitrost 2 048 kbit/s in za strukturirane signale (D2048S) - Vmesnik terminalske opreme

Access and Terminals (AT); 2 048 kbit/s digital structured leased lines (D2048S); Terminal equipment interface

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European Standard (Telecommunications series)

**Access and Terminals (AT);
2 048 kbit/s digital structured leased lines (D2048S);
Terminal equipment interface**

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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Access and Terminals (AT).

The present document results from a mandate from the Commission of the European Community (CEC) to provide standards for the support of the Directive on Open Network Provision (ONP) of leased lines (92/44/EEC).

There are two other standards directly related to the present document:

- EN 300 418: "Access and Terminals (AT); 2 048 kbit/s digital unstructured and structured leased lines (D2048U and D2048S); Network interface presentation".
- EN 300 419: "Access and Terminals (AT); 2 048 kbit/s digital structured leased lines (D2048S); Connection characteristics".

The present document is based on information from ITU-T Recommendations and ETSI publications and the relevant documents are quoted where appropriate.

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Introduction

The Council Directive on the application of ONP to leased lines (92/44/EEC) concerns the harmonization of conditions for open and efficient access to, and use of, the leased lines provided over public telecommunications networks, and the availability throughout the European Union (EU) of a minimum set of leased lines with harmonized technical characteristics.

The consequence of the Directive is that telecommunications organizations within the EU shall make available a set of leased lines between points in these countries with specified connection characteristics and specified interfaces.

Two categories (voluntary and regulatory) of standard were used for the interfaces of terminal equipment designed for connection to the ONP leased lines. Technical Basis for Regulations (TBRs) gave the earlier essential requirements under the Directive 91/263/EEC, later replaced by 98/13/EC, for attachment to the leased lines, whereas other voluntary standards (ETSS or ENs) gave the full technical specifications for these interfaces. This document, which is based on an earlier ETS, belongs to the second category.

The requirements of TBR 13 are a subset of the present document.

The present version of the present document has been produced to introduce some necessary changes.

ETS 300 166 and ITU-T Recommendations G.703 [1], G.704 [2] and G.706 were used as the basis for the terminal interface aspects of the present document.

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1 Scope

The present document specifies the physical and electrical characteristics (except safety, over voltage and EMC aspects), the necessary functional characteristics and the corresponding test principles for a terminal equipment interface for connection to the Network Termination Points (NTPs) of Open Network Provision (ONP) 2 048 kbit/s digital structured leased lines using 120 Ω interfaces with an information transfer rate of 1 984 kbit/s without restriction on binary content.

The present document is to ensure that the interface of the terminal equipment is compatible with the ONP 2 048 kbit/s digital structured leased line. A terminal equipment interface that conforms to the present document will also be compatible with an ONP 2 048 kbit/s unstructured leased line. The present document is applicable to all interfaces designed for connection to the leased line, however in the cases of apparatus that carries a particular service, of complex apparatus and of apparatus in private networks, other requirements may apply in addition to the present document.

Customer premises wiring and installation between the terminal equipment and the NTP are outside the scope of the present document.

2 References

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

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

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- [1] ITU-T Recommendation G.703 (1998): "Physical/electrical characteristics of hierarchical digital interfaces".
 - [2] ITU-T Recommendation G.704 (1998): "Synchronous frame structures used at 1 544, 6 312, 2 048, 8 448 and 44 736 kbit/s hierarchical levels".
 - [3] ITU-T Recommendation O.151 (1992): "Error performance measuring equipment operating at the primary rate and above".
 - [4] ITU-T Recommendation O.171 (1997): "Timing jitter and wander measuring equipment for digital systems which are based on the plesiochronous digital hierarchy (PDH)".
 - [5] ETSI EN 300 418: " Access and Terminals (AT); 2 048 kbit/s digital unstructured and structured leased lines (D2048U and D2048S); Network interface presentation".
 - [6] ETSI EN 300 419: "Access and Terminals (AT); 2 048 kbit/s digital structured leased lines (D2048S); Connection characteristics".

3 Definitions and abbreviations

3.1 Definitions

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

errored Sub-MultiFrame: Sub-MultiFrame (SMF) where the calculated Cyclic Redundancy Check-4 bit (CRC-4) does not correspond with the CRC-4 contained within the next SMF (see clause C.2.2)

frame: sequence of 256 bits of which the first 8 bits define the frame structure (see annex C)

leased lines: telecommunications facilities provided by a public telecommunications network that provide defined transmission characteristics between NTPs and that do not include switching functions that the user can control, (e.g. on-demand switching)

multiframe: sequence of two SMFs containing the multiframe alignment word (see annex C)

Network Termination Point (NTP): physical connections and their technical access specifications which form part of the public telecommunications network and are necessary for access to and efficient communication through that public network

PRBS(2¹⁵-1): Pseudo Random Bit Sequence (PRBS) (as defined in clause 2.1 of ITU-T Recommendation O.151 [3])

S_a bits: bits 4 to 8 (bits S_{a4} to S_{a8}) in frames not containing the frame alignment signal (see annex C)

Sub-Multiframe (SMF): sequence of 8 frames, each of 256 bits, over which the CRC-4 is calculated (see annex C)

terminal equipment: equipment intended to be connected to the public telecommunications network, i.e.:

- to be connected directly to the termination of a public telecommunication network; or
- to interwork with a public telecommunications network being connected directly or indirectly to the termination of a public telecommunications network,

in order to send, process, or receive information.

3.2 Abbreviations

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

AIS	Alarm Indication Signal
AMI	Alternate Mark Inversion
CRC-4	Cyclic Redundancy Check-4 bit
D2048S	2 048 kbit/s digital structured leased line
dc	direct current
EMC	ElectroMagnetic Compatibility
HDB3	High Density Bipolar code of order 3 (see annex B)
ISDN	Integrated Services Digital Network
NTP	Network Termination Point
ONP	Open Network Provision
ppm	parts per million
PRBS	Pseudo Random Bit Sequence
RAI	Remote Alarm Indication
rms	root mean square
RT	Requirements Table
RX	RX is a signal input (at either the terminal equipment interface or the test equipment, see figure 1)
SDH	Synchronous Digital Hierarchy
SMF	Sub-MultiFrame
TX	TX is a signal output (at either the terminal equipment interface or the test equipment, see figure 1)
UI	Unit Interval

4 Requirements

The terminal equipment interface is for use with 2 048 kbit/s structured leased lines that provide bi-directional, point-to-point digital connections with an information transfer rate of 1 984 kbit/s without restriction on binary content. Any structuring of the data within the transparent 1 984 kbit/s part of the frame is the responsibility of the user.

4.1 Physical characteristics

Currently no standardized connector is readily available. Consequently, the only method of connection that can be specified in the present document is the use of solid conductors of 0,4 mm to 0,6 mm. The present document requires the terminal equipment to be capable of presenting either a point for the attachment of unterminated solid conductors, or solid conductors themselves (see clause 4.1.1). It is a requirement that such a connection method be available to be provided for use with the terminal equipment if necessary.

In order to allow connection to be made using other methods (e.g. connectors), the terminal equipment is permitted to be supplied with a connection method suitable for use with those methods (see clause 4.1.2).

NOTE 1: The following are examples of arrangements that comply with the requirements. The list below should not be regarded as an exhaustive list of all permitted arrangements:

- a) a cord, permanently connected to the terminal equipment at one end and unterminated at the other end, with wires that are solid conductors with diameters in the range 0,4 mm to 0,6 mm;
- b) a cord, connected via a plug and socket to the terminal equipment at one end and unterminated at the other end, with wires that are solid conductors with diameters in the range 0,4 mm to 0,6 mm;
- c) an insulation displacement connector, designed to accept wires with solid conductors with diameters in the range 0,4 mm to 0,6 mm, but with no cord;
- d) a screw connector, designed to accept wires with solid conductors with diameters in the range 0,4 mm to 0,6 mm, but with no cord;
- e) the arrangement in b) plus one or more additional alternative cords with the same plug or socket arrangement at the terminal end and any plug or socket at the other end;
- f) the arrangement in c) or d) plus one or more cords suitable for connection to the terminal equipment at one end and any plug or socket at the other end.

The transmit pair is the output from the terminal equipment interface. The receive pair is the input to the terminal equipment interface, as shown in figure 1. Where the terms "output" and "input" are used without qualification in the present document, they refer to the terminal equipment interface.

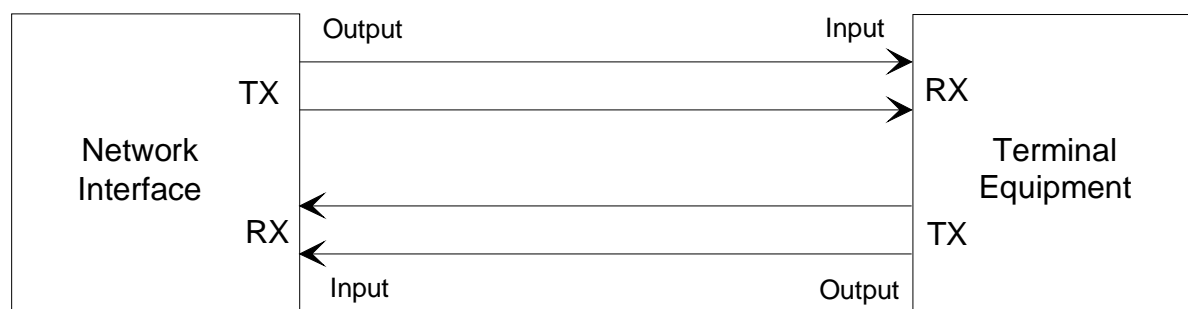


Figure 1

NOTE 2: The use of a shielded cord or cable may be necessary to meet radiation and immunity requirements defined in ElectroMagnetic Compatibility (EMC) standards.

4.1.1 Hardwired connection

Requirement: the terminal equipment shall provide:

- a) a set of connection contacts (e.g. an insulation displacement connector or a screw terminal block) to which solid wire conductors with diameters in the range 0,4 mm to 0,6 mm may be connected; or
- b) a wiring arrangement connected by any means to the terminal equipment, with unterminated solid wire conductors with diameters in the range 0,4 mm to 0,6 mm at the end distant from the terminal equipment.

Test: there is no test. All subsequent tests are carried out via the specified connection method.

4.1.2 Alternative means of connection

Any alternative means of connection may be provided in addition to the connection arrangements under clause 4.1.1.

4.2 Electrical characteristics

4.2.1 Output port

4.2.1.1 Signal coding

Requirement: the signal transmitted at the output port shall comply with the High Density Bipolar code of order 3 (HDB3) encoding rules (see annex B).

Test: the test shall be conducted according to clause A.2.1.

4.2.1.2 Waveform shape

Requirement: the pulse at the output port shall comply with the requirements given in table 1 and figure 2, based on ITU-T Recommendation G.703 [1].

Table 1: Waveform shape at output port

Pulse shape (nominally rectangular)	All marks of a valid signal shall conform to the mask (see figure 2) irrespective of the polarity. The value V corresponds to the nominal peak voltage of a mark.
Test load impedance	120 Ω non-reactive
Nominal peak voltage V of a mark	3 V
Peak voltage of a space	0 \pm 0,3 V
Nominal pulse width	244 ns
Ratio of the amplitudes of positive and negative pulses at the centre of the pulse interval	0,95 to 1,05
Ratio of the widths of positive and negative pulses at the nominal half amplitude	0,95 to 1,05

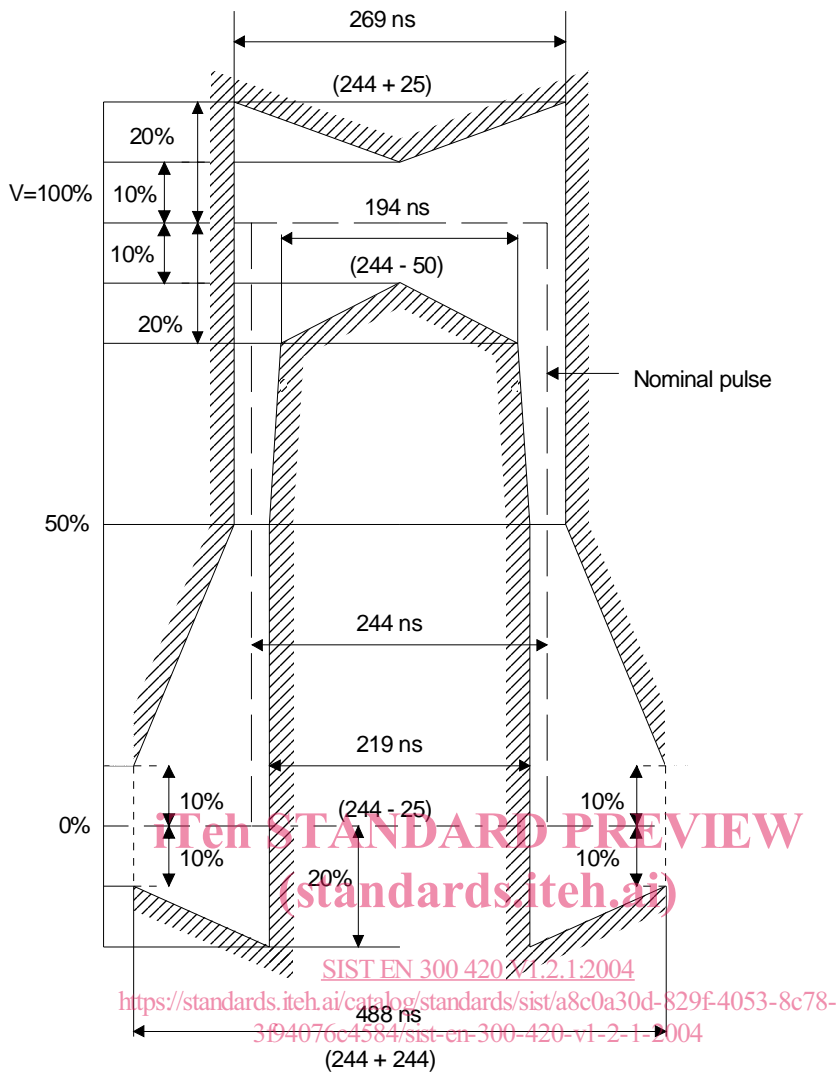


Figure 2: Pulse mask for 2 048 kbit/s pulse

Test: the test shall be conducted according to clause A.2.2.

4.2.1.3 Output timing

This requirement is such that the terminal equipment is capable of operating when connected to leased lines capable of carrying user timing within the range 2 048 kbit/s ± 50 parts per million (ppm) and when connected to leased lines that provide timing that is synchronous to the network timing. For further information see annex E.

Requirement: the terminal equipment shall have:

- an internal clock which shall provide a bit rate at the output port within the limits of 2 048 kbit/s ± 50 ppm; and
- the capability to provide a clock loop such that the signal timing at the output port is derived from the timing at the input port.

The terminal equipment may also have:

- an external reference signal input from which the output timing may be derived.

Test: for case a) the test shall be conducted according to clause A.2.3. The capability to provide a clock loop, case b), and the derivation of a clock signal from an external reference signal input, case c), are covered by the test of clause A.2.8.