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Access and Terminals (AT); 2 048 kbit/s digital unstructured lease line (D2048U);
Connection characteristics

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European Standard (Telecommunications series)

**Access and Terminals (AT);
2 048 kbit/s digital unstructured leased line (D2048U);
Connection characteristics**

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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 300 248: "Access and Terminals (AT); 2 048 kbit/s digital unstructured leased line (D2048U) Terminal equipment interface".

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 Open Network Provision (ONP) to leased lines (92/44/EEC) (see annex C), concerns the harmonization of conditions for open and efficient access to, and use of, the leased lines provided on public telecommunications networks and the availability throughout the Community (EEC) of a minimum set of leased lines with harmonized technical characteristics.

The consequence of the Directive is that Telecommunications Organizations within the EEC shall make available a set of leased lines between points in these countries with specified connection characteristics and specified interfaces. Under the Directive 91/263/EEC (see annex C), later replaced by 98/13/EC (see annex C), terminal equipment for connection to these leased lines was required to fulfil certain essential requirements.

The present version of the present document has been produced to introduce some necessary changes. ITU-T Recommendation I.340 (see annex C) for ISDN connection types was used as a basis for the connection characteristics.

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1 Scope

The present document specifies the technical requirements and test principles for connection characteristics of ONP 2 048 kbit/s digital unstructured leased lines.

A connection is presented via interfaces at Network Termination Points (NTP) and includes any equipment that may provide the NTP. Signals between terminal equipments are subject to impairments during their transfer over the connection. The limits to these impairments are stated in the present document. Together with the companion standard, EN 300 418 [3] defining the interface presentation, the present document describes the service offered.

The leased line provides access to the full digital bit rate of 2 048 kbit/s with no restrictions on the binary content.

The tests specified in the present document cannot be carried out, nor can the performance be monitored by the leased line provider, while the leased line is in service, i.e. carrying users' traffic. Thus the tests are designed for bringing into and returning into service, although there is no obligation to perform these tests each time a leased line is brought into or returned into service.

The present document is applicable to leased lines, including part time leased lines, for which the establishment or release do not require any protocol exchange or other intervention at the NTP.

The present document specifies the compliance tests for the connection requirements. The present document does not include details concerning the implementation of the tests, nor does it include information on any relevant regulations.

The present document describes those characteristics of the connection that cannot be determined only by the equipment providing the NTPs. The related standard EN 300 418 [3] defines the interface presentation and places no further constraints on the connection.

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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.

- [1] ITU-T Recommendation O.151 (1992): "Error performance measuring equipment operating at the primary bit rate and above".
- [2] ITU-T Recommendation O.153 (1992): "Basic parameters for the measurement of error performance at bit rates below the primary rate".
- [3] ETSI EN 300 418: "Access and Terminals (AT); 2 048 kbit/s digital unstructured and structured leased lines (D2048U and D2048S); Network interface presentation".
- [4] ETSI EN 300 248: "Access and Terminals (AT); 2 048 kbit/s digital unstructured leased line (D2048U) Terminal equipment interface".

3 Definitions and abbreviations

3.1 Definitions

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

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

Network Termination Point (NTP): all 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

unavailability period: period of time beginning at the first of 10 consecutive severely errored seconds and ending immediately before the first following period of 10 consecutive seconds none of which are severely errored

errored block: block with one or more bit errors (see ITU-T Recommendation G.826 (see annex C))

NOTE: The duration of a block is 1 millisecond.

errored second: one-second period with one or more errored blocks (see ITU-T Recommendation G.826 (see annex C))

severely disturbed period: occurs when, over a minimum period of time equivalent to four contiguous blocks, either all the contiguous blocks are affected by a high binary error density of at least 10^{-2} , or a loss of signal information is observed (see ITU-T Recommendation G.826 (see annex C))

severely errored second: one-second period which contains at least 30 % errored blocks or at least one severely disturbed period (see ITU-T Recommendation G.826 (see annex C))

slip: sequence of one or more extra or missing consecutive unit intervals in the bit stream

errored seconds ratio: ratio of errored seconds over all seconds within a specified measuring period, where neither are counted during unavailability periods (see ITU-T Recommendation G.826 (see annex C))

severely errored seconds ratio: ratio of severely errored seconds over all seconds within a specified measuring period, where neither are counted during unavailability periods (see ITU-T Recommendation G.826 (see annex C))

background block error ratio: ratio of errored blocks over all blocks within a specified measuring period, where neither are counted during unavailability periods nor during severely errored seconds (see ITU-T Recommendation G.826 (see annex C))

satellite transmission: transmission via an earth orbiting satellite

3.2 Abbreviations

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

D2048U	2 048 kbit/s digital unstructured ONP leased line
ONP	Open Network Provision
NTP	Network Termination Point
ppm	parts per million
PRBS(2 ⁹ - 1)	Pseudo Random Bit Sequence (as defined in clause 2.1 of ITU-T Recommendation O.153 [2])
PRBS(2 ¹⁵ - 1)	Pseudo Random Bit Sequence (as defined in clause 2.1 of ITU-T Recommendation O.151 [1])
RX	Receive (a signal input at either the leased line interface or the test equipment)
TX	Transmit (a signal output at either the leased line interface or the test equipment)
UI	Unit Interval

4 Requirements

The performance of the leased line shall comply with these requirements only if the conditions of supply of the network equipment providing the NTP are met, (e.g. if the equipment is connected to an appropriate power supply on the customer's premises).

The ITU-T attribute technique is used to express the connection requirements. The following attributes from ITU-T Recommendation I.140 (see annex C) are specified in the present document:

- information transfer rate;
- information transfer susceptance;
- structure;
- establishment of communication;
- symmetry;
- communication configuration;
- network performance.

NOTE: "Bit rate" is equivalent to "information transfer rate" in the present document.

The following network performance sub-attributes are considered relevant for the present document:

- transmission delay;
- jitter;
- slip;
- error.

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4.1 Attributes

The connection attributes are displayed in table 1. In effect, these attributes define the service being offered.

The values and the associated compliance tests can be found in the subsequent clauses.

Table 1: Connection attributes

Connection type attributes		Value	
Description	Nature	Reference clause	
Information transfer rate	2 048 ± 50 ppm kbit/s	See 5.1.1	
Information transfer susceptance	Unrestricted digital	See 5.1.2	
Structure	Unstructured	See 5.1.3	
Establishment of communication	Without user intervention	See 5.1.4	
Symmetry	Symmetrical in both directions	See 5.1.5	
Communication configuration	Point-to-point	See 5.1.6	
Network performance sub-attributes			
Connection type attributes		Value	
Description	Nature	Reference clause	
Transmission delay	Terrestrial and satellite options	See 5.1.7.1	
Jitter	Input and output ports	See 5.1.7.2	
Slip	5 per 24 hour period	See 5.1.7.3	
Error parameters			
Time interval with errored blocks		Value	
Description	Nature	Reference clause	
Errored seconds	2 889 per 24 hour period	See 5.1.7.4.1	
Severely errored seconds	117 per 24 hour period	See 5.1.7.4.2	
Background block errors	22 395 per 24 hour period	See 5.1.7.4.3	

4.1.1 Information transfer rate

Requirement: The connection shall be capable of transferring an information rate of 2 048 kbit/s \pm 50 ppm.

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

4.1.2 Information transfer susceptance

Requirement: The connection shall be capable of transferring unrestricted digital information.

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

4.1.3 Structure

Requirement: The connection shall be unstructured. The full bit rate of 2 048 kbit/s shall be available to the user for unrestricted digital information transfer.

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

4.1.4 Establishment of communication

Requirement: Establishment or release of the connection shall not require any protocol exchange or other intervention at the NTP by the user.

Test: By declaration.

4.1.5 Symmetry

Requirement: The connection shall be symmetrical, i.e. each direction of transmission shall have the same nominal characteristics, although the actual values shall be independent.

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

4.1.6 Communication configuration

Requirement: The connection configuration shall be point-to-point.

Test: By declaration.

4.1.7 Network performance

The network performance sub-attributes are displayed in table 1. The values and the associated compliance tests can be found in the subsequent clauses.

4.1.7.1 Transmission delay

Requirement: The requirement depends upon whether satellite transmission is involved in the connection or not:

- a) for connections where satellite transmission is not involved the one way end-to-end delay shall be less than $(10 + 0,01 G)$ ms, where G is the geographical distance in kilometres, as shown in figure 1; or
- b) for connections where satellite transmission is involved the one-way end-to-end delay shall be less than 350 ms.

NOTE 1: Requirements a) and b) are based on ITU-T Recommendation G.114 (see annex C), clauses A.2 and A.3.