

**Terminals' access to Public Telecommunications Networks;
Application of the Directive 1999/5/EC (R&TTE), article 4.2;
Guidelines for the publication of interface specifications;
Part 2: Analogue narrow-band wireline interfaces**



Reference

REG/AT-010121-2

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Foreword

This ETSI Guide (EG) has been produced by ETSI Technical Committee Access and Terminals (AT).

The present document is part 2 of a multi-part deliverable covering the Terminals' access to Public Telecommunications Networks; application of the Directive 1999/5/EC (R&TTE), article 4.2; Guidelines for the publication of interface specifications as identified below:

Part 1: General and common aspects;

Part 2: Analogue narrow-band wireline interfaces;

Part 3: Digital wireline interfaces;

Part 4: Broadband multimedia cable network interfaces.

NOTE: Parts 3 and 4 are presently being developed.

Later new parts may be created and this will be reflected in the present document.

Introduction

Directive 1999/5/EC [1] introduced a fundamental change in the area of terminal equipment interworking with the public telecommunications telephone network. Formerly there were specifications that applied to terminal equipment ensuring, to varying degrees of confidence, interworking with and via different networks. Under Directive 1999/5/EC [1] an obligation is placed on PNOs and PSPs to publish specifications of network interfaces they provide. Article 4.2 of the Directive states:

"...Member States shall ensure that such operators publish accurate and adequate technical specifications of such interfaces before services provided through those interfaces are made publicly available, and regularly publish any updated specifications. The specifications shall be in sufficient detail to permit the design of telecommunications terminal equipment capable of utilizing all services provided through the corresponding interface. The specifications shall include, inter alia, all the information necessary to allow manufacturers to carry out, at their choice, the relevant tests for the essential requirements applicable to the telecommunications terminal equipment. Member States shall ensure that those specifications are made readily available by the operators."

The present document provides guidance on the minimum content of such publications for the area of analogue wired access to the public telecommunications network in order to meet this requirement.

The present document was produced in the context of the integration of all ETSI deliverables published with the aim of facilitating the application of the R&TTE Directive, article 4.2, in a single consistent set of documents. It is also an update of the contents of TR 101 730 Publication of interface specification under Directive 1999/5/EC [1]; Guidelines for describing analogue interfaces:

NOTE: A more complete introductory text is offered in EG 201 730-1 [10].

1 Scope

The purpose of the present document is to assist the public network operators and public service providers in producing interface publications according to article 4.2 of Directive 1999/5/EC [1].

The present document lists the parameters of the analogue narrow-band wireline interface to the public telecommunications network which could be necessary for a description of that interface.

NOTE: General aspects of the guidance on producing interface publications according to article 4.2 of Directive 1999/5/EC [1] are offered in EG 201 730-1 [10]. The present document gives technology specific guidance.

The interface types dealt with are as follows:

- Analogue access to PSTN.
- Analogue leased lines, 2-wire and 4-wire.

Indirect access to services and networks are also covered in the present document. The timing and other administrative issues of publications are not covered in 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.

Referenced documents which are not found to be publicly available in the expected location might be found at <http://docbox.etsi.org/Reference>.

- [1] Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity (R&TTE Directive).
- [2] ETSI EG 201 188: "Public Switched Telephone Network (PSTN); Network Termination Point (NTP) analogue interface; Specification of physical and electrical characteristics at a 2-wire analogue presented NTP for short to medium length loop applications".
- [3] ETSI EG 201 120: "Public Switched Telephone Network (PSTN); Method of rating terminal equipment so that it can be connected in series and/or in parallel to a Network Termination Point (NTP)".
- [4] ETSI ES 201 235-3: "Access and Terminals (AT); Specification of Dual-Tone Multi-Frequency (DTMF) Transmitters and Receivers; Part 3: Receivers".
- [5] ETSI EN 300 659-1: "Access and Terminals (AT); Analogue access to the Public Switched Telephone Network (PSTN); Subscriber line protocol over the local loop for display (and related) services; Part 1: On-hook data transmission".
- [6] ETSI EN 300 659-2: "Access and Terminals (AT); Analogue access to the Public Switched Telephone Network (PSTN); Subscriber line protocol over the local loop for display (and related) services; Part 2: Off-hook data transmission".
- [7] ETSI TR 101 092 (V1.1.1): "Network Aspects (NA); Report on Carrier Selection".

- [8] ITU-T Recommendation G.711: "Pulse code modulation (PCM) of voice frequencies".
- [9] ETSI TR 102 083: "Human Factors (HF); Supplementary service codes for use in public network services".
- NOTE: See also the "ETSI Register of Supplementary Service codes"
http://portal.etsi.org/HF/hf_service_codes.asp.
- [10] ETSI EG 201 730-1: "Terminals' access to Public Telecommunications Networks; Application of the Directive 1999/5/EC (R&TTE), article 4.2; Guidelines for the publication of interface specifications; Part 1: General and common aspects".

3 Definitions and abbreviations

3.1 Definitions

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

A-wire: one of the wires used in the 2-wire local loop to provide connection to the NTP

B-wire: other wire (in relation to A-wire) used in the 2-wire local loop to provide connection to the NTP

Carrier Selection Code (CSC): part of the dialling procedure, which indicates selection and provides information about the required transport network provider

Network Termination Point (NTP): point at the boundary of the PSTN which constitutes the physical division of the public network infrastructure and the customer's premises installation

NOTE: In its basic form the NTP may accept the connection of appropriate TE by appropriate installation means.

park condition: condition which may be applied at the NTP by the network in order to facilitate reduced power consumption in the network

public telecommunications network: telecommunications network used to provide publicly available telecommunications services

3.2 Abbreviations

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

AoC	Advice of Charge
CEC	Commission of the European Communities
CLI	Calling Line Identity
CSC	Carrier Selection Code
DC	Direct Current
DTMF	Dual Tone Multi-Frequency (signalling)
IP	Internet Protocol
ITU-T	International Telecommunication Union - Telecom
NGN	Next Generation Network
NTP	Network Termination Point
PNO-A	Public Network Operator-A
PNO-B	Public Network Operator-B
POTS	Plain Old Telephone Service
PSP	Public Service Provider
PSTN	Public Switched Telephone Network
TE	Terminal Equipment
ULL	Unbundled Local Loop

4 Applicability of parameters to interface types

A more complete analysis on the possible scenarios and configuration of the user access to the Public Network is presented in the clause 7 of EG 201 730-1 [10]. In this clause only most common configurations used for access systems in the scope of the document are cited.

The parameters described in the present document are applicable to various types of analogue access to the public telecommunications network. Direct access to telecommunications networks is considered, the most common scenarios are described in table 1. Indirect access to telecommunications networks is also considered, the most common scenarios are described in table 2.

Table 1: Methods of direct access to PNO

NOTE: Table 1 is the same as table 2 of EG 201 730-1 [10].

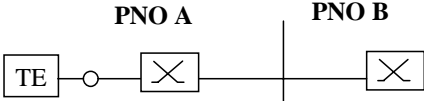
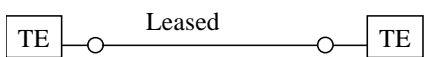
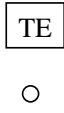

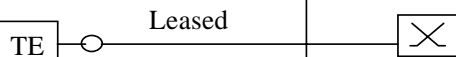
Scenario	Who Publishes	Comments
Scenario 1 	Network Operator A only publishes specifications relating to Network A.	Standard Interconnect. Customer only has contract with PNO A.
Scenario 2 	Network Operator A publishes specification.	Customer only has contract with PNO A.
Key  Terminal Equipment Switch NTP		
NOTE: The PNO indicates the person or body responsible for the Network. It is assumed that PNO B can also be the PSP.		

Table 2: Methods of indirect access to PNO

NOTE: Table 2 is the same as table 3 of EG 201 730-1 [10].

Scenario	Who Publishes	Comments
Scenario 1 	Network Operator B (PNO A will need to supply PNO B with technical information on local access network used by PNO B).	Unbundled Local Loop (ULL).
Scenario 2 	Network Operator B (and Network Operator A in the case where the user has a direct contract with PNO A for the leased line).	PNO A provides lease line connection between TE and PNO B.

Scenario	Who Publishes	Comments
Scenario 3 	Network Operator A and Network Operator B. For PNO A it is likely to be the same interface specification as in Scenario 1 of direct access (table 1). For PNO B, only the information above and beyond information already provided by PNO A needs to be published e.g. second dial tone, Call Party Answer signal.	Indirect Access where CSC is the carrier selection code as described in TR 101 092 [7]. Carrier pre-selection is also covered in this scenario except that no carrier selection codes will be dialled by the customer.
Key <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> TE </div> <div style="text-align: center;"> Switch </div> </div> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> NTP </div> </div>		

The applicability of the parameters listed in clause 5 is shown in table 3. In the case of scenarios 1 and 2 of table 1 (directly connected), there are no publication obligations relating to PNO B.

Table 3: Applicability of parameters to interface types and connection arrangements

Parameter		Directly Connected (PNO A) as described in table 1		Indirectly Connected PNO (PNO B) or PSP as described in table 2		
		Scenario 1: Analogue PSTN (POTS)	Scenario 2: Analogue Leased line	Scenario 1	Scenario 2	Scenario 3
5.1	Connection method	X	X	X	X	
5.2	Wiring Arrangement	X		X	X	
5.3	DC conditions					
5.3.1						
5.3.2		X		X	X	
5.3.3						
5.3.4						
5.4	Seizure					
5.4.1						
5.4.2		X		X	X	
5.4.3						
5.4.4						
5.4.5						
5.5	Transmission					X
5.5.1						X
5.5.2						X
5.5.3		X	X	X	X	
5.5.4						
5.5.5						X
5.5.6						X
5.6	Acceptable signal levels	X	X	X	X	X
5.7	Supervisory tones	X		X	X	X
5.8	Dialling					
5.8.1						
5.8.2		X		X	X	X
5.8.3						
5.8.4						
5.8.5						

Parameter		Directly Connected (PNO A) as described in table 1		Indirectly Connected PNO (PNO B) or PSP as described in table 2		
		Scenario 1: Analogue PSTN (POTS)	Scenario 2: Analogue Leased line	Scenario 1	Scenario 2	Scenario 3
5.9	Ringling	X		X	X	
5.10	Register Recall	X		X	X	
5.10.1						
5.11	Answer Signal	X		X	X	
5.12	Charge Information	X		X	X	
5.12.1						
5.13	Clearing signal from the network	X		X	X	
5.14	Supplementary services	X		X	X	
5.15	PSTN Display services	X		X	X	

5 Parameters to be specified

Where a terminal equipment standard exists which would ensure an appropriate level of functionality when connected to the network, these standards may be referenced as additional information.

Annex A offers an overview of the most common standards covering the large majority of interfaces treated in the scope of the present document.

5.1 Connection method

The mechanical and contact assignments of the Network Termination Point (NTP) should be described in detail.

5.2 Wiring arrangements and driving capability

EG 201 120 [3] describes how terminal manufacturers should calculate the loading factor of a terminal based on the parameters which are affected by parallel or series connection. The driving capabilities of the NTP should be specified based on the parameters in EG 201 120 [3], guidance on this may be found in EG 201 188 [2].

Any special wired arrangement, if used or recommended, should be described.

5.3 DC Voltages and feed conditions

5.3.1 DC Voltage - on hook

The DC voltage conditions should be described in such a manner that the terminal manufacturer can anticipate the minimum and maximum DC voltage that a terminal could find on the network in the on hook state; this should include voltages applied during line testing. It is recommended that these voltages be specified into a high resistance value.

5.3.2 Polarity

Information should be given as to whether the network maintains a specific polarity on one wire of the line with respect to the other. If polarity reversal occurs then this should be stated along with its purpose.

5.3.3 Line current

The DC current available on the line should be specified for both maximum and minimum possible feed currents. In cases where DC feeding conditions change during a call or call attempt then this should also be specified. As the network operator will not know what resistance the terminal will present at the NTP, it is recommended that the maximum and minimum DC current should be specified into defined load along with the voltage drop across that load. It may be necessary on some networks to advise the terminal manufacturer on any possible particular specific function or requirement that the terminal should perform or fulfil in association with certain feeding conditions. An indication should be given as to whether DC current is supplied using constant current or resistive feeding or other conditions.

5.3.4 Park condition

In cases where the network applies a park condition at the NTP, this should be specified in the same way as stated in clauses 5.3.1 and 5.3.3.

5.4 Seizure

5.4.1 Conditions at the NTP not recognized as a seizure

The conditions presented at the NTP, which will not be recognized as a seizure condition, should be stated. It is recommended that this should be expressed as the minimum resistance value which can be placed across the A-wire and B-wire at the NTP.

It should be noted that where parallel or series connection of terminals is allowed, this parameter will be affected.

5.4.2 Conditions at the NTP to facilitate line testing

Many network operators perform automatic line testing to permit them to make early detection of line faults. For this reason the resistance required at the NTP may need to be higher than that specified in clause 5.4.1. In such or similar cases, where special values would be required, the minimum resistance (and eventually other parameters) across the A-wire and B-wire required at the NTP in order to facilitate automatic line testing should be stated.

It should be noted that where parallel or series connection of terminals is allowed that this parameter will be affected.

5.4.3 Conditions at the NTP which will be interpreted as a seize signal

The conditions presented at the NTP, which will be recognized as a seizure signal, should be specified. It is recommended to express these conditions by specifying:

- the maximum resistance which will be recognized as a seizure when placed across the A-wire and B-wire at the NTP; and
- the DC current flowing as a result of connecting above mentioned resistance.

Additionally an optimum terminal DC mask may be recommended by the PNO as further guidance to terminal manufacturers.

5.4.4 Time required for seizure signal to be recognized

The minimum time during which the seizure condition is applied across the A-wire and B-wire in order to be interpreted as a seizure condition should be stated and also the maximum time during which the seizure condition may be applied without the network interpreting it as a seizure condition.

5.4.5 TE clearing seizure and return to on hook state

These conditions are to be described if they are different from the on hook quiescent state, especially the minimal loop resistance considered from the network as a clear signal from the TE to clear the seizure.

The minimum time between two seizures, i.e. from the clearing signal to the next seizure signal, should be specified.

NOTE: The minimum delay before the next seizure is necessary to:

- preserve the possibility for a waiting coming call to be efficiently presented and answered;
- differentiate clearly from the register recall signal as specified in the clause 5.10.1.

5.5 Transmission

The relative level is assumed to be 0 dBr on the digital side of the analogue/digital conversion point in the local network. See figure 1.

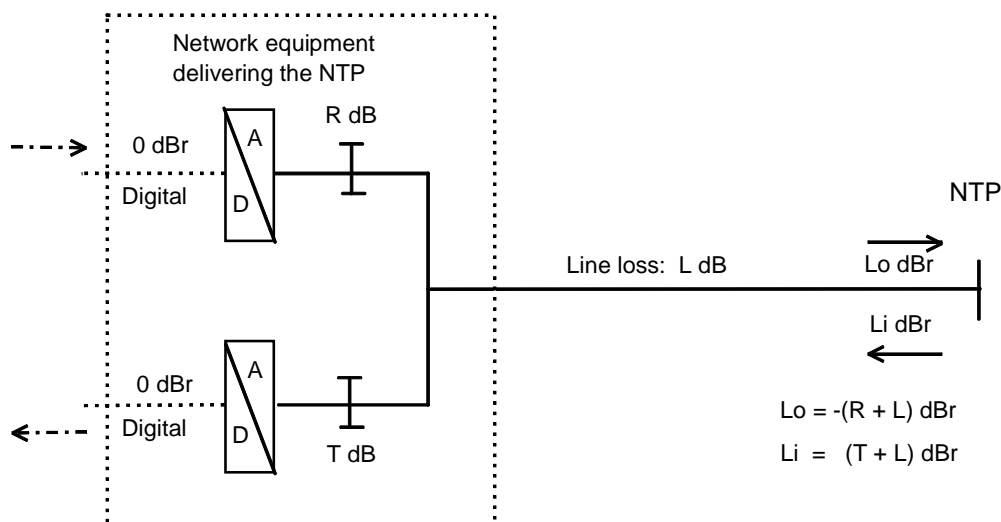


Figure 1: Relative Levels

5.5.1 Frequency band

The frequency band available should be specified. The worst case frequency response for frequencies within this band within the network of the PNO should also be specified.

5.5.2 Relative level

For interfaces providing analogue access to the PSTN the input and output relative levels should be specified at a reference frequency within the band specified in clause 5.5.1. It is recommended that figures be given for best and worst case scenarios. Nominal recommended send and receive loudness ratings for voice terminals should also stated.

5.5.3 Input impedance

The input impedance for frequencies within the band specified in clause 5.5.1 should be specified. It is recommended that this be done by:

- specifying a nominal network reference impedance and specifying worst case return loss figures for the frequency range in question; or
- specifying the terminating impedance(s) used in the exchange termination and also the possible line lengths and cable characteristics used to deliver service to the NTP.

5.5.4 Longitudinal conversion loss

Minimum longitudinal conversion loss for signals within the frequency range specified in clause 5.5.1 should be specified.

5.5.5 Coding law

Where the speech signal is coded (digital systems) and the code used is other than A-law according to ITU-T Recommendation G.711 [8], this should be stated.

NOTE: The use of digital pads within the network can reduce the performance of some types of terminal equipment e.g. V90 modems. In such instances their characteristics should be stated by the PNO.

5.5.6 Noise

The maximum level of noise introduced by the network when the line is terminated by a reference impedance should be specified.

5.6 Acceptable signal levels at the NTP

The maximum signal level acceptable at the NTP should be specified for signals within the frequency band referred to at clause 5.5.1 using the following parameters:

- The maximum mean signal level.
- Maximum peak voltage.

For frequencies outside that band the maximum acceptable level should be specified.

5.7 Supervisory tones

Supervisory tones such as dial tone, progress tone, busy tone, congestion tone, call waiting tone and ringing tone should be specified in terms frequency including tolerance, cadence including tolerances and maximum and minimum signal levels possible at the NTP. Where verbal announcements or other kind of signals are used or may be activated, this should also be stated. The time period during which any tones or announcements are applied by the network should be specified.

5.8 Dialling

5.8.1 Dialling type

It should be stated if the network supports DTMF and/or Loop disconnect dialling.

5.8.2 Reception of first digit

The time period following line seizure where the network will accept the first digit should be specified.

5.8.3 Number and timing of call attempts

The maximum frequency of call attempts acceptable by the network should be specified.

5.8.4 DTMF dialling

ES 201 235-3 [4] specifies the DTMF receiver in the local exchange, however the acceptable level of DTMF tones at the NTP should be additionally specified.

In cases where DTMF receivers do not conform to ES 201 235-3 [4] then the following information should be published:

- Tone combinations and tolerances acceptable for each digit.
- Acceptable range of level of DTMF tones at the NTP.

- Maximum acceptable level of unwanted frequency components transmitted at the same time as the DTMF tones.
- Range of DTMF tone duration that will be recognized by the network.
- Range of DTMF tone duration that will be rejected by the network.
- Acceptable range of pause duration between DTMF digits.

5.8.5 Loop disconnect dialling

Where networks accept loop disconnect dialling the following parameters should be specified:

- Coding.
- Acceptable frequency range.
- Acceptable range of make period duration.
- Acceptable range of break period duration.
- Minimum acceptable make period current.
- Maximum acceptable break period current.
- Acceptable range of inter-digit pause.

5.9 Ringing signals

The ringing signals used on the network should be specified using the following parameters:

- Frequency range and waveform of ringing signal.
- Maximum and minimum ringing voltages possible at the NTP, it is recommended that these be specified into a fixed impedance.
- Maximum duration for which a ringing signal may be applied following ring trip at the NTP.
- Cadence of ringing signals used including tolerances.
- Method of applying ringing signal, if superimposed on DC Voltage and if it is balanced or unbalanced.

5.10 Register recall

Where register recall is provided the signalling used should be specified.

5.10.1 Timed break recall

Where timed break recall is used to signal register recall the acceptable range of duration of the break in the loop current should be specified along with the maximum acceptable residual current during the break period.

5.11 Answer signal

Where an answer signal is applied by the network to the calling party at the NTP this should be specified.

5.12 Charge information

Where charging information is applied by the network at the NTP this should be specified.

5.12.1 Meter Pulses

Where meter pulses are used to deliver charge information the following parameters should at a minimum be specified.

- The frequency used including tolerances.
- The maximum and minimum level of meter pulses possible at the NTP.
- The maximum and minimum duration of the pulse and between pulses.
- The maximum and minimum number of successive meter pulses possible at the NTP.
- The possibility and conditions under which the pulses can be sent to NTP during the line release and off-hook status.
- The meaning of the signals explained, in cases where one pulse does not correspond to one tax unit.

Where meter pulses use signalling methods other than the most common single frequency sinusoidal signals near (or in) the voice band, the signalling parameters should be specified at the NTP and the meaning of the signal explained.

5.13 Clearing signal from the network

When a call is cleared by the network, any signals sent to the terminal equipment should be specified.

5.14 Signalling for supplementary services

Where supplementary services such as call diversion, call hold, call retrieve and call conference are available, the necessary signalling methods, codes and protocols should be defined.

NOTE: An ETSI register of supplementary service codes is listed in TR 102 083 [9]. The ETSI Register of Supplementary Service codes http://portal.etsi.org/HF/hf_service_codes.asp is often updated and may also be helpful.

5.15 Signalling for PSTN display services

EN 300 659-1 [5] and EN 300 659-2 [6] specify possible signalling methods which may be used to deliver display services over the PSTN, these standards contain options, PNOs should publish which options are implemented and which coding parameters are implemented. Where display services are implemented using methods other than the methods covered in these standards then the following parameters should be published:

- Method of alerting terminal equipment prior to data being sent.
- Data modulation and coding.
- Maximum and minimum possible levels of data signal at the NTP.
- Timing of various events in the service delivery.

Annex A (informative): List of most useful standards

A.1 General

This clause can be used by the PNO as a source of information for the publication of the specifications of the publicly offered interfaces.

Unless specific regulation states otherwise, a PNO may refer partly to one standard or to the standard as a whole. The PNO may also refer to a standard and indicate some specific points in addition or in replacement of some clauses or requirements in the standard.

In all the cases a short overview of the standards in this sector may be useful.

A.2 List of standards

A.2.1 Main document: ES 201 970

ES 201 970 is the main document describing analogue narrow-band (voice band) wireline network interfaces for short and medium length access lines. It focuses on traditional switched systems (analogue PSTN/ POTS and similar) where the feeding bridge is not too far away from the terminals, i.e. where no special measures for additional compensation of line losses are needed.

ES 201 970 was produced to match harmonized terminals under the TBR 021 and TS 103 021, recently updated and upgraded to ES 203 021 series. From the beginning a wider base of terminals (not only those complying with TBR 021) was considered in order to facilitate a quicker convergence to harmonized solutions.

TBR 038 is the standard specifying additional requirements for simple voice telephony terminals intended to connect to interfaces in the scope of the present document. ES 201 970 interfaces support terminals compliant to TBR 038.

NOTE 1: ES 201 970 was recommended by CEC in 'List of standards and/or specifications for electronic communications networks, services and associated facilities and services (interim issue) (2002/C 331/04)'. It was also referred to in SR 002 211 (V1.1.1) as a candidate to be a part of the future versions of the above mentioned 'List of Standards' to be published by CEC.

NOTE 2: TS 101 524 for SDSL, TS 102 971 for very short line interfaces and TS 101 909-18 for IPCablecom technologies are applications of ES 201 970.

A.2.2 Additional documents

ES 201 970 lists in clause 14 a number of options associated to interfaces in the scope of the present document.

Other standards may be needed to cover special aspects.

The use of standards is in all the cases strongly recommended.

The objective of EG 201 973 parts 1 and 2 is to reflect the wider European implementation of network characteristics supported by Analogue PSTN terminals. These contain recommendations intended as guidance for the definition and design of broadband IP networks and equipment (NGNs) supporting legacy terminals.

ES 200 659-3 offers a number of facilities including support of AoC, CLI messages and many others using the protocols specified in parts 1 and 2 of the same document. These messages and associated services are largely standardised and references to such standards are available in the document.

A.2.3 Leased lines

In the annex to Commission (CEC) Decision 2003/548/EC (List of standards and/or specifications for electronic communications networks, services and associated facilities and services) the "mandatory part", identifies a minimum set of leased lines with harmonized characteristics by referring to associated standards which are listed in the table below:

Table A.1: ANALOGUE LEASED LINES (minimum set of leased lines with harmonized characteristics)

Leased line type	Reference	Notes
Ordinary quality voice bandwidth (see note 1)	- 2-wire: EN 300 448; or - 4-wire: EN 300 451	Connection characteristics and network interface presentation
Special quality voice bandwidth (see note 2)	- 2-wire: EN 300 449; or - 4-wire: EN 300 452	Connection characteristics and network interface presentation
NOTE 1: Leased lines meeting the requirements of ETS 300 448 (2-wire) or ETS 300 451 (4-wire) are deemed to comply with the requirements for this type of leased line.		
NOTE 2: Leased lines meeting the requirements of ETS 300 449 (2-wire) or ETS 300 452 (4-wire) are deemed to comply with the requirements for this type of leased line.		

The above information was taken from SR 002 211, clause 9.3.25, where important studies on the application of regulatory framework for the European Networks are made.

Further the above mentioned standards are also recommended in general and are also cited in clause A.3.5.1 from SR 002 211. These standards match the requirements of TBR 015 and EN 300 450 (2-wire) and TBR 017 and EN 300 453 (4-wire) terminals.

Annex B (informative): Bibliography

CEC decision 2002/C 331/04: "List of standards and/or specifications for electronic communications networks, services and associated facilities and services (interim issue)".

CEC decision 2003/548/EC: "List of standards and/or specifications for electronic communications networks, services and associated facilities and services".

ETSI EG 201 973 series: "Access and Terminals (AT); Public Switched Telephone Network; Support of legacy terminals by Broadband IP networks and equipment".

ETSI EN 300 448: "Access and Terminals (AT); Ordinary quality voice bandwidth 2-wire analogue leased line (A2O); Connection characteristics and network interface presentation".

ETSI EN 300 449: "Access and Terminals (AT); Special quality voice bandwidth 2-wire analogue leased line (A2S); Connection characteristics and network interface presentation".

ETSI EN 300 450: "Access and Terminals (AT); Ordinary and Special quality voice bandwidth 2-wire analogue leased lines (A2O and A2S); Terminal equipment interface".

ETSI EN 300 451: "Access and Terminals (AT); Ordinary quality voice bandwidth 4-wire analogue leased line (A4O); Connection characteristics and network interface presentation".

ETSI EN 300 452: "Access and Terminals (AT); Special quality voice bandwidth 4-wire analogue leased line (A4S); Connection characteristics and network interface presentation".

ETSI EN 300 453: "Access and Terminals (AT); Ordinary and Special quality voice bandwidth 4-wire analogue leased lines (A4O and A4S); Terminal equipment interface".

ETSI ES 200 659-3: "Access and Terminals (AT); Analogue access to the Public Switched Telephone Network (PSTN); Subscriber line protocol over the local loop for display (and related) services; Part 3: Data link message and parameter codings".

ETSI ES 201 970: "Access and Terminals (AT); Public Switched Telephone Network (PSTN); Harmonized specification of physical and electrical characteristics at a 2-wire analogue presented Network Termination Point (NTP)".

ETSI ES 203 021 series: "Access and Terminals (AT); Harmonized basic attachment requirements for Terminals for connection to analogue interfaces of the Telephone Networks; Update of the technical contents of TBR 021, EN 301 437, TBR 015, TBR 017".

ETSI ETS 300 448: "Business TeleCommunications (BTC); Ordinary quality voice bandwidth 2-wire analogue leased line (A2O); Connection characteristics and network interface presentation".

ETSI ETS 300 449: "Business TeleCommunications (BTC); Special quality voice bandwidth 2-wire analogue leased line (A2S); Connection characteristics and network interface presentation".

ETSI ETS 300 451: "Business TeleCommunications (BTC); Ordinary quality voice bandwidth 4-wire analogue leased line (A4O); Connection characteristics and network interface presentation".

ETSI ETS 300 452: "Business TeleCommunications (BTC); Special quality voice bandwidth 4-wire analogue leased line (A4S); Connection characteristics and network interface presentation".

ETSI SR 002 211 (V.1.1.1): "List of standards and/or specifications for electronic communications networks, services and associated facilities and services; in accordance with Article 17 of Directive 2002/21/EC".

ETSI TBR 015: "Business TeleCommunications (BTC); Ordinary and Special quality voice bandwidth 2-wire analogue leased lines (A2O and A2S); Attachment requirements for terminal equipment interface".

ETSI TBR 017: "Business TeleCommunications (BTC); Ordinary and Special quality voice bandwidth 4-wire analogue leased lines (A4O and A4S); Attachment requirements for terminal equipment interface".

ETSI TBR 021: "Terminal Equipment (TE); Attachment requirements for pan-European approval for connection to the analogue Public Switched Telephone Networks (PSTNs) of TE (excluding TE supporting the voice telephony service) in which network addressing, if provided, is by means of Dual Tone Multi Frequency (DTMF) signalling".

ETSI TBR 038: "Public Switched Telephone Network (PSTN); Attachment requirements for a terminal equipment incorporating an analogue handset function capable of supporting the justified case service when connected to the analogue interface of the PSTN in Europe".

ETSI TS 101 524: "Transmission and Multiplexing (TM); Access transmission system on metallic access cables; Symmetric single pair high bitrate Digital Subscriber Line (SDSL)".

ETSI TS 101 909-18: "Digital Broadband Cable access to the Public Telecommunications Network; IP Multimedia Time Critical Services; Part 18: Embedded Media Terminal Adapter (e-MTA) offering an interface to analogue terminals and Cable Modem".

ETSI TS 103 021 series: "Access and Terminals (AT); Harmonized basic attachment requirements for Terminals for connection to analogue interfaces of the Telephone Networks; Update of the technical contents of TBR 021, EN 301 437, TBR 015, TBR 017".

ETSI TS 102 971: "Access and Terminals (AT); Public Switched Telephone Network (PSTN); Harmonized specification of physical and electrical characteristics of a 2-wire analogue interface for short line interface".

History

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