

**Publication of interface specification under
Directive 1999/5/EC;
Guidelines for describing analogue interfaces**



Reference

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Foreword

This ETSI Technical Report (TR) has been produced by ETSI Project Analogue Terminals and Access (ATA).

Introduction

Directive 1999/5/EC introduces 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 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 has been produced at the request of AHGC to assist in their output to the Commission.

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 interface to the public telecommunications network which could be necessary for a description of that interface. The present document does not give guidance on the presentation format of interface publications to be made by PNOs

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, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

- [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.
- [2] 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] 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] ETR 206: "Public Switched Telephone Network (PSTN); Multifrequency signalling system to be used for push-button telephones [CEPT Recommendation T/CS 46-02 E (1985)]".
- [5] EN 300 659-1: "Public Switched Telephone Network (PSTN); Subscriber line protocol over the local loop for display (and related) services; Part 1: On-hook data transmission".
- [6] EN 300 659-2: "Public Switched Telephone Network (PSTN); Subscriber line protocol over the local loop for display (and related) services; Part 2: Off-hook data transmission".
- [7] TR 101 092 (V1.1): "Network Aspects (NA); Report on Carrier Selection".
- [8] CCITT Recommendation G.711 (1988): "Pulse code modulation (PCM) of voice frequencies".
- [9] TR 102 083: "Human Factors (HF); Supplementary service codes for use in public network services".

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: one of the wires 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. 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

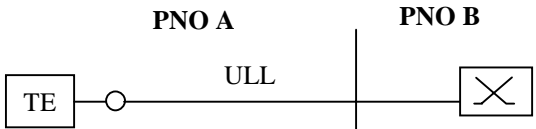
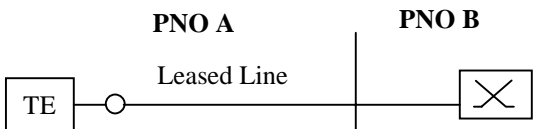
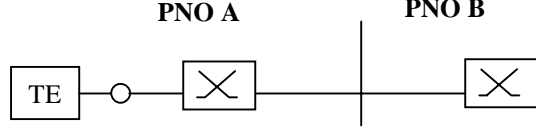




For the purposes of the present document, the following abbreviations apply:

AHGC	Ad hoc group C, one of the groups set up by the European Commission to preliminarily study the implementation of Directive 1999/5/EC [1], group C was given the task of studying the operator's obligation to publish interface specifications under Article 4.2 of the Directive.
CSC	Carrier Selection Code
DC	Direct Current
NTP	Network Termination Point
PNO	Public Network Operator
PSP	Public Service Provider
PSTN	Public Switched Telephone Network
TE	Terminal Equipment
ULL	Unbundled Local Loop

4 Applicability of parameters to interface types

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

Table 1: Methods of indirect access to PNO

Scenario	Who Publishes	Comments
<p>Scenario 1.</p> 	<p>Network Operator B (PNO A will need to supply PNO B with technical information on local access network used by PNO B).</p>	<p>Unbundled Local Loop (ULL). Customer has contract only with PNO B.</p>
<p>Scenario 2.</p> 	<p>Network Operator B (and Network Operator A in the case where the user has a direct contract with PNO A for the leased line).</p>	<p>PNO A provides lease line connection between TE and PNO B. Contract for leased line may be with PNO B or directly with customer.</p>
<p>Scenario 3.</p> 	<p>Network Operator A Only publishes specifications relating to Network A.</p>	<p>Standard Interconnect. Customer only has contract with PNO A.</p>
<p>Scenario 4.</p> 	<p>Network Operator A and Network Operator B. For PNO A it is likely to be the same interface specification as in Scenario 3. 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.</p>	<p>Indirect Access (where CSC is the carrier selection code as described in TR 101 092, V1.1. Customer has contract with PNO A (to provide access) and PNO B (for call connection). Carrier preselection is also covered in scenario 4 except that no carrier selection codes will be dialled by the customer.</p>
<p>Key</p> <p>  Terminal Equipment  NTP  Switch </p>		

The applicability of the parameters listed in section 5 is shown in table 2. In the case of scenario 3 above, there are no publication obligations relating to PNO B.

Table 2: Applicability of parameters to interface types and connection arrangements

Parameter		PSTN Directly Connected Scenario 3 (PNO A)	Analogue Leased line Directly Connected	Indirectly Connected PNO or PSP as described in table 1 (PNO B)		
				Scenario 1	Scenario 2	Scenario 4
5.1	Connection method	X	X	X	X	
5.2	Wiring Arrangement	X		X	X	
5.3.1	DC conditions	X		X	X	
5.3.2		X		X	X	
5.3.3		X		X	X	
5.3.4		X		X	X	
5.4.1	Seizure	X		X	X	
5.4.2		X		X	X	
5.4.3		X		X	X	
5.4.4		X		X	X	
5.5.1	Transmission	X	X	X	X	X
5.5.2		X		X	X	X
5.5.3		X	X	X	X	
5.5.4		X	X	X	X	
5.5.5		X	X	X	X	X
5.5.6		X	X	X	X	X
5.6	Acceptable signal levels	X	X	X	X	X
5.7	Supervisory tones	X	X	X	X	X
5.8	Dialling	X		X	X	X
5.9	Ringling	X		X	X	
5.10	Register Recall	X		X	X	
5.11	Answer Signal	X		X	X	
5.12	Charge Information	X		X	X	
5.13	Supplementary services	X		X	X	
5.14	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.

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

ETSI Guide 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 subclauses 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. The resistance required at the NTP would normally need to be higher than that specified in subclause 5.4.1. The minimum resistance 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, should be specified. It is recommended that this be expressed in terms of maximum resistance value and the resultant DC current that would flow when placed across the A-wire and B-wire at the NTP, which will be recognized as a seizure signal.

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.

5.5 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.

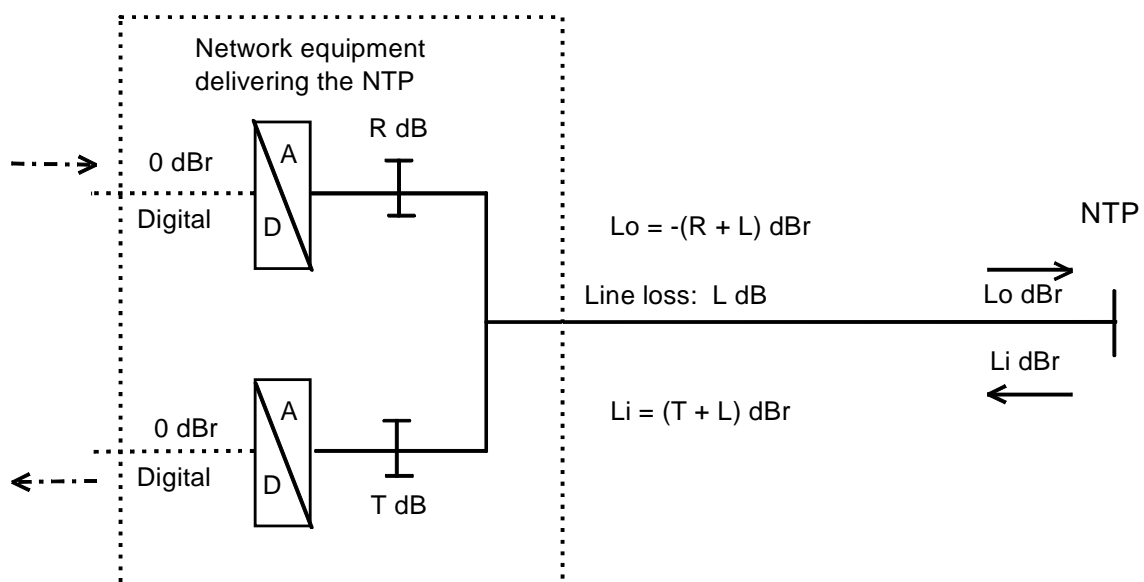


Figure 1: Relative Levels

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 subclause 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 be stated.

5.5.3 Input Impedance

The input impedance for frequencies within the band specified in subclause 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 subclause 5.5.1 should be specified.

5.5.5 Coding Law

Where other than A-law conversion according to ITU-T Recommendation G.711 [8] is used, 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 subclause 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 are used 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

ETR 206 [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 ETR 206 [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, if ringing signal is applied on one wire of the line or on both wires.

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 duration of the pulse.
- The maximum and minimum level of meter pulses possible at the NTP.

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.

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.

History

Document history		
V1.1.1	January 2000	Publication