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*Belgacom / BELCOMLAB
Rue Carlistraat 2
B-1140 Evere
Belgium*

tel: +32 2 244.58.88

fax: +32 2 244.59.99

E-mail: belcomlab@belgacom.be

Analogue leased lines of special quality

Analogue leased lines of special quality

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1. Introduction

This document contains the technical specifications for the BELGACOM analogue leased lines of special quality. These leased line specifications are based on a generic model as shown in annex 1. The central part of the model is the "connection". A connection includes a series of transmission channels or telecommunication circuits. It's set up to provide for the point-to-point transfer of signals between the terminal equipments of the customer.

The connection is presented to the user via an "interface presentation" at the Network Termination Point (NTP). The NTP comprises all physical connections and their technical access specifications that form part of the BELGACOM transmission network. In some cases the NTP is presented by means of an electrical equipment referred to as the Network Termination Unit (NTU). For the description of the analogue leased lines of special quality, the NTU is considered as being contained within the connection.

Concerning the BELGACOM offer of analogue leased lines of special quality, the customer has the choice between several types :

- M1020 analogue leased line, 4-wire;
- ONP analogue leased line, special quality, 4-wire;
- ONP analogue leased line, special quality, 2-wire.

A large part of the service description will be the same for all of the above mentioned analogue leased lines types of special quality. Therefore, they're all treated together and only where needed there's made the distinction between the different analogue leased lines types.

Basically, the M1020 (4-wire) analogue leased lines offered by BELGACOM are at least conform to ITU-T Recommendation M.1020. The ONP analogue leased lines of special quality, 4-wire and 2-wire, are at least conform to the ONP technical requirements defined in ETS 300 452 and ETS 300 449 respectively.

The following paragraphs give details of the specific requirements for the BELGACOM offer of analogue leased lines of special quality.

2. Connection characteristics

The analogue leased line of special quality is a bi-directional line, configured point-to-point, nominally covering the voice bandwidth (300Hz to 3400Hz).

2.1. Overall loss

The overall loss, including long term variations, presented to a signal frequency of 1020Hz, sent in each direction of transmission with the line terminated in 600 Ohms at each end of the connection, shall be in the range :

- $0 \text{ dB} \leq \text{overall loss} \leq 10 \text{ dB}$ for M1020 analogue leased lines;
- $0 \text{ dB} \leq \text{overall loss} \leq 13 \text{ dB}$ for ONP 4-wire analogue leased lines of special quality;
- $0 \text{ dB} \leq \text{overall loss} \leq 17 \text{ dB}$ for ONP 2-wire analogue leased lines of special quality.

2.2. Loss/frequency distortion

The loss at frequencies in the voice band may deviate from the loss at 1020Hz. However, BELGACOM guarantees that the overall loss *relative* to that defined in paragraph 1.1 above, shall lie between:

- the limits given in figure 2.2-1 for the M1020 analogue leased lines (which is taken from ITU-T Recommendation M.1020);
- the limits given in figure 2.2-2 for the ONP 2-wire and 4-wire analogue leased lines of special quality.

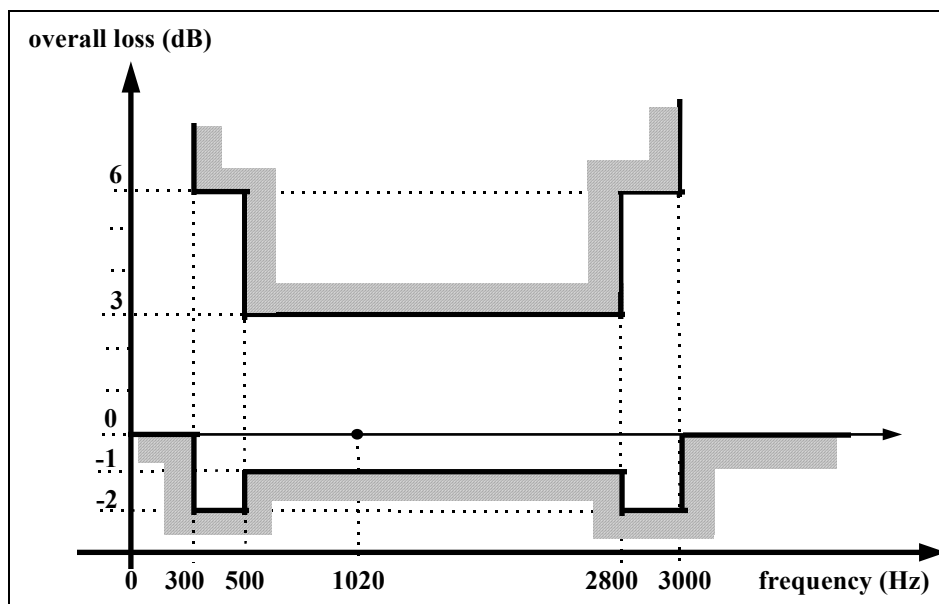


Figure 2.2-1

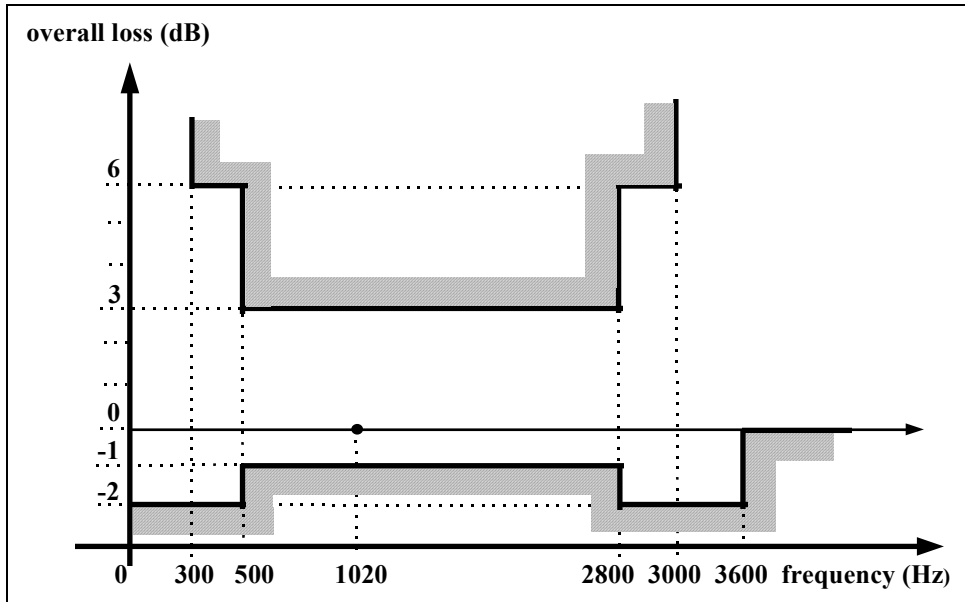


Figure 2.2-2

2.3. Maximum mean input power

The input level of the analogue leased line of special quality is specified in terms of a “maximum mean input power”; that is, a mean power level with which the analogue leased line is capable of operating.

The analogue leased line of special quality is capable of carrying voice band signals presented at the input at a one minute mean power level of :

- - 6 dBm for M1020 analogue leased line, 4-wire;
- -13 dBm for ONP analogue leased line, special quality, 4-wire;
- - 9 dBm for ONP analogue leased line, special quality, 2-wire.

2.4. Transmission delay

The one way end-to-end delay is less than $(15 + 0,01G)$ ms, where G is the geographical distance in kilometers. *(In the exceptional case that a satellite transmission has to be involved for the realization of the analogue leased line, the one way end-to-end shall be less than 350 ms).*

2.5. Group delay distortion

The limits that apply to the group-delay distortion¹ of the analogue leased lines of special quality are given in figure 2 of the ITU-T Recommendation M.1020.

2.6. Amplitude hits

Amplitude hits are defined as sudden positive or negative changes in amplitude of an observed test signal which exceed a specified threshold and persist for a period of time greater than a specified duration.

When measurements are made on the analogue leased line connection of special quality, using an instrument complying with ITU-T Recommendation O.95, the number of amplitude hits greater than +/- 2 dB shall not exceed 10 in any 15 minutes period.

2.7. Variation of overall loss with time

Variations with time of the overall loss at 1020Hz (including daily and seasonal variations but excluding amplitude hits) shall be as small as possible but not exceeding +/- 4 dB.

2.8. Random circuit noise

The value of the "random circuit noise" ensures that the noise, weighted according to the sensitivity of the human ear to various frequencies, will be at a suitable level below the minimum signal delivered to the receiver.

The level of the psophometric noise power at the output of the analogue leased line of special quality shall be at least 28 dB below a received 1020Hz test signal sent at the level specified in paragraph 2.3.

2.9. Impulsive noise

The analogue leased line of special quality will not have more than 18 impulsive noise peaks exceeding a threshold level of -21dBmO within a period of 15 minutes.

2.10. Phase jitter

The phase jitter on the analogue leased line of special quality is less or equal to 10° peak-to-peak when measured at a frequency of 1020Hz.

¹ Group delay distortion: for the definition, see annex 2.

2.11. Total distortion ratio

The signal to total distortion ratio of the analogue leased line of special quality is greater than 28dB.

2.12. Single tone interference

The power level of a single tone interference in the band 300Hz to 3400Hz is at least 3dB below the permitted noise power level defined in paragraph 2.8.

2.13. Frequency error

The frequency error introduced by the analogue leased line connection is less than:

- +/- 2 Hz for the national M1020 analogue leased line, 4-wire;
- +/- 5 Hz for the international M1020 analogue leased line, 4-wire;
- +/- 5 Hz for the ONP analogue leased line, special quality, 2- and 4-wire.

2.14. Harmonic distortion

When a 700Hz test frequency is injected at the input of the analogue leased line of special quality, with a sent level as defined in paragraph 2.3, the level of any individual harmonic frequency at the output of the analogue leased line connection shall be at least 25dB below the received level of the fundamental frequency.

3. Network interface presentation

3.1. Physical characteristics

The physical connection arrangements for the interface presentation of the analogue leased line of special quality are normally realized by means of a socket. The type of socket is described hereafter and its function of the chosen type of analogue leased line of special quality, namely:

- the M1020 analogue leased line, 4-wire:
the network interface of the M1020 analogue leased line provides an ADO 8-pole female connector which is defined in the specification BE/SP-222. As a summary, the contact assignments of this ADO connector are given in table 3.1-1:

contact	4-wire network interface
1 & 4	transmit pair ←
5 & 7	receive pair →
2 & 3	unused
6 & 8	unused

Table 3.1-1

- the ONP analogue leased line of special quality, 4-wire:
The network interface of the ONP analogue leased line of special quality, 4-wire, provides an 8-contact socket of the type specified in EN 28877 and with contact assignments as specified in table 3.1-2.

contact	4-wire network interface
4 & 5	transmit pair ←
3 & 6	receive pair →
1 & 2	unused
7 & 8	unused

Table 3.1-2

- the ONP analogue leased line of special quality, 2-wire:
The network interface of the ONP analogue leased line of special quality, 2-wire, provides an 8-contact socket of the type specified in EN 28877 and with contact assignments as specified in table 3.1-3.

contact	2-wire network interface
4 & 5	pair
1 & 2	unused
3 & 6	unused
7 & 8	unused

Table 3.1-3

As an option, BELGACOM offers also an alternative means of connection to her customers, which consists of a hardwired connection, using insulation displacement connectors or a terminal block; in this case, the NTP of the analogue leased line of special quality provides a means of terminating wire with solid conductors having diameters in the range 0,4mm to at least 0,6mm.

3.2. Safety

Regarding the safety, the NTP complies with EN 60950 (IEC 950).

3.3. ElectroMagnetic Compatibility (EMC)

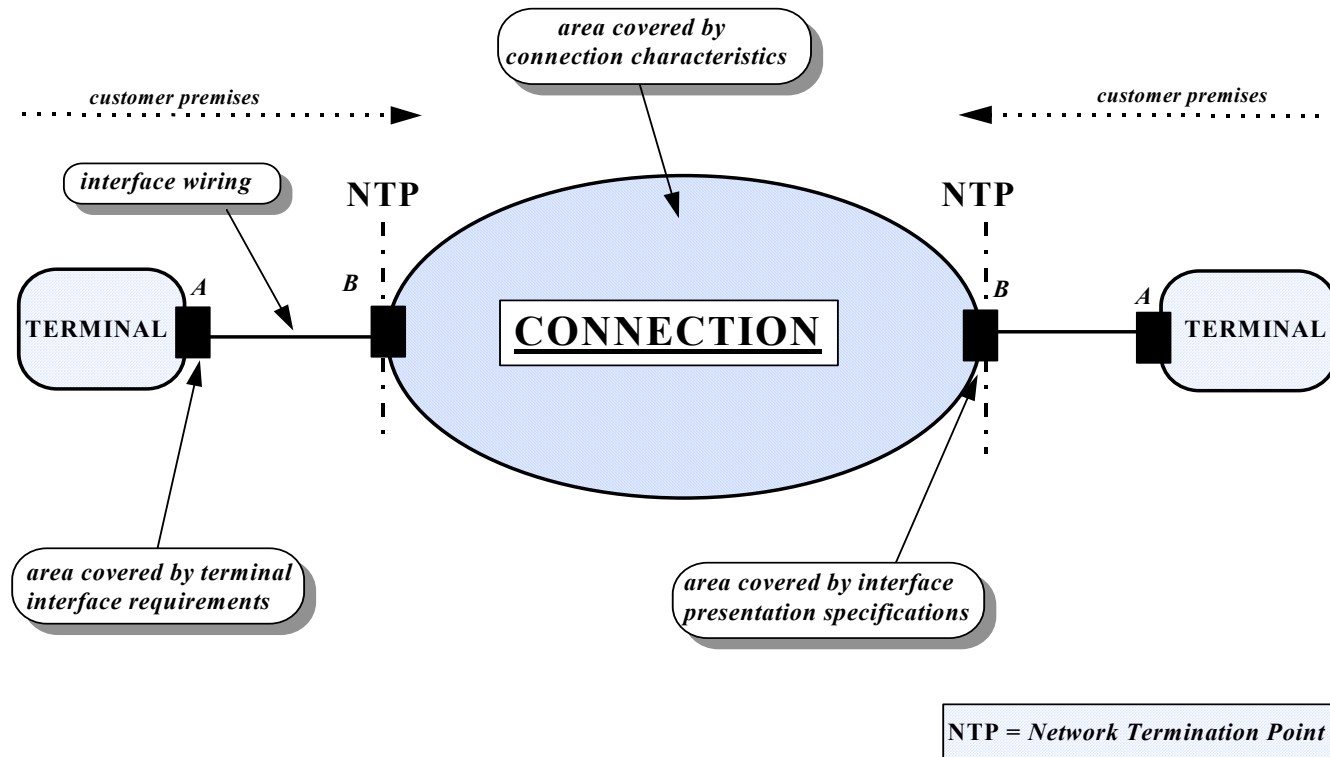
The network interface presentation fulfils to the EMC requirements which are imposed under the EMC Directive 89/336/EEC.

4. Terminal equipment

For connection to the NTP of an analogue leased line of special quality, the terminal of the customer has to be approved to the appropriate technical requirements;

- for connection to a NTP of a M1020 analogue leased line (4-wire), the terminal of the customer has to be approved to BE/SP-202;
- for connection to a NTP of an ONP analogue leased line of special quality, 4-wire, the terminal of the customer has to be approved to CTR 17;
- for connection to a NTP of an ONP analogue leased line of special quality, 2-wire, the terminal of the customer has to be approved to CTR 15.

Generic model for leased lines specifications



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ANNEX 2

Definitions, symbols and abbreviations.

A) Definitions

For the purpose of these technical specifications, the following definitions apply:

Group delay distortion

Group delay is a measure of the propagation time through the leased line. The difference between group delay at a given frequency and the minimum group delay in the frequency band of interest, is called the "group delay distortion".

Leased lines

The telecommunications facilities provided by the BELGACOM public telecommunications network that provide defined transmission characteristics between network termination points (NTP) and that do not include switching functions that the user can control.

Local BELGACOM network

The BELGACOM national telephone network is subdivided into three parts:

- the local networks;
- the junction networks;
- the trunk network.

The *local network* assures the connection of the subscriber's telephone set (or PABX, or terminal,...) to the local exchange. This network is star-shaped; one subscriber line (in most cases one symmetrical copper pair in underground cables) links directly each telephone set to its numbered position in the exchange. The *junction network* links all the local exchanges of the same telephone zone to a primary exchange. The *trunk network* links the primary exchanges either directly between themselves (for the heavy traffic routes) or to an intermediate transit exchange, for the low traffic routes.

Network Termination Point (NTP)

All physical connections which form part of the BELGACOM telecommunications network and which are necessary for access to and efficient communication through the BELGACOM network.

Open Network Provision (ONP)

Open Network Provision (ONP) is a regulatory concept introduced by the Commission of the European Communities. It is intended to ensure "harmonized conditions for open and efficient access to and use of public telecommunications networks and, where applicable, public telecommunications services." In particular, ONP specifies a set of harmonized conditions which govern the technical interfaces (including the definitions of network termination points), conditions of use, and tariff principles of the network or service to which they are applied.

The general principles of ONP are contained in the Council Directive 90/387/EEC, the "ONP Framework Directive". These principles are applied to a number of areas of telecommunications, including leased lines. In addition, the leased lines are specifically covered by the Directive 92/44/EEC, the "ONP leased line Directive". The ONP Leased Line Directive calls upon Member States to ensure that the respective telecommunications organizations (TO) provide a minimum set of leased line types, defined in annex II of the Directive by means of compliance with ITU-T Recommendations. These leased line types are:

- ordinary quality voice bandwidth analogue, 2 and 4 wire;
- special quality voice bandwidth analogue, 2 and 4 wire;
- 64 kbit/s digital unrestricted with octet integrity;
- 2048 kbit/s digital unstructured;
- 2048 kbit/s digital structured.

Voice bandwidth

The band of frequencies over the range 300 Hz to 3400 Hz.

B) Symbols and abbreviations

For the purpose of these technical specifications, the following abbreviations apply:

<u>CTR:</u>	<i>Common Technical Regulations.</i>
<u>DCE:</u>	<i>Data Circuit-terminating Equipment.</i>
<u>DTE:</u>	<i>Data Terminal Equipment.</i>
<u>ITU:</u>	<i>International Telecommunication Union.</i>
<u>NTP:</u>	<i>Network Termination Point.</i>
<u>ONP:</u>	<i>Open Network Provision.</i>
<u>ppm:</u>	<i>Parts per million.</i>