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## **Analogue leased lines of ordinary quality**

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Ref : BGC\_D\_48\_9805\_20.13\_E.DOC  
Version: 1.1 of 8<sup>TH</sup> FEBRUARY 1999  
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## 1. Introduction

This document contains the technical specifications for the BELGACOM analogue leased lines of ordinary 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 line of ordinary quality, the NTU is considered as being contained within the connection.

The analogue leased line of ordinary quality is a bi-directional line, configured point-to-point, nominally covering the voice bandwidth (300Hz to 3400Hz). In fact, these analogue leased lines of ordinary quality are intended for voice applications only, although in the majority of cases they will carry data without undue degradation. In practice they're already widely used for the transport of data notwithstanding the fact that there's no complete guarantee of their adequate performance in this field; where it is necessary to guarantee the communication of data, then analogue leased lines of special quality must be selected.

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

- the analogue leased line M1040, 4-wire;
- the analogue leased line M1040, 2-wire;
- the ONP analogue leased line of ordinary quality, 4-wire;
- the ONP analogue leased line of ordinary 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 ordinary quality. Therefore, they're all treated together and only where needed there's made the distinction between the different analogue leased lines types of ordinary quality.

Basically, the analogue leased lines M1040, 4-wire and 2-wire, offered by BELGACOM are at least conform to ITU-T Recommendation M.1040. The ONP analogue leased lines of ordinary quality, 4-wire and 2-wire, are at least conform to the ONP technical requirements defined in ETS 300 451 and ETS 300 448 respectively.

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

## 2. Connection characteristics

The analogue leased line of ordinary quality is a bi-directional line, configured point-to-point, nominally covering the voice bandwidth (300Hz to 3400Hz), with no restrictions on the use of the frequencies.

### 2.1. Overall loss

The overall loss of the analogue leased line of ordinary quality is function of the chosen type of analogue leased line of ordinary quality, namely:

- the overall loss of the *ONP analogue leased line of ordinary quality, 4-wire*, including long term variations, presented to a signal frequency of 1020Hz, sent at a power of -13dBm in each direction with the line terminated in 600  $\Omega$  at each end, shall be in the range: **0 dB  $\leq$  overall loss  $\leq$  21 dB**;
- the overall loss of the *ONP analogue leased line of ordinary quality, 2-wire*, including long term variations, presented to a signal frequency of 1020Hz, sent at a power of -9 dBm in each direction with the line terminated in 600  $\Omega$  at each end, shall be in the range: **0 dB  $\leq$  overall loss  $\leq$  25 dB**;
- the overall loss of the *analogue leased line M1040, 4-wire*, including long term variations, presented to a signal frequency of 1800Hz, sent at each direction with the line terminated in 600  $\Omega$ , shall be in the range: **0 dB  $\leq$  overall loss  $\leq$  22 dB**;
- the overall loss of the *analogue leased line M1040, 2-wire*, including long term variations, presented to a signal frequency of 1800Hz, sent at each direction with the line terminated in 600  $\Omega$ , shall be in the range: **0 dB  $\leq$  overall loss  $\leq$  34 dB**.

### 2.2. Loss/frequency distortion

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

- the limits given in figure 2.2-1 for the analogue leased lines M1040, 4-wire and 2-wire (which is taken from ITU-T Recommendation M.1040);
- the limits given in figure 2.2-2 for the ONP analogue leased lines of ordinary quality, 4-wire and 2-wire.

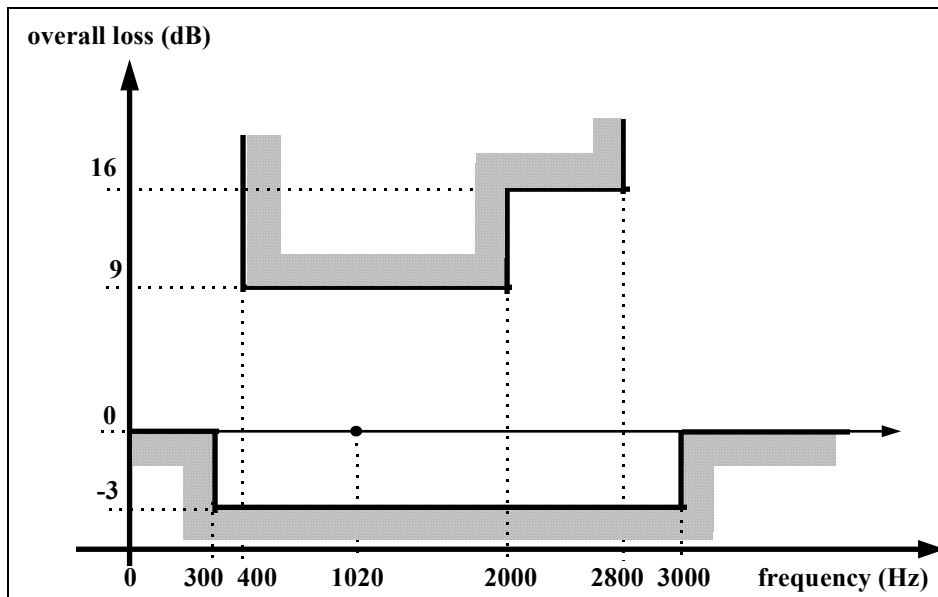


Figure 2.2-1

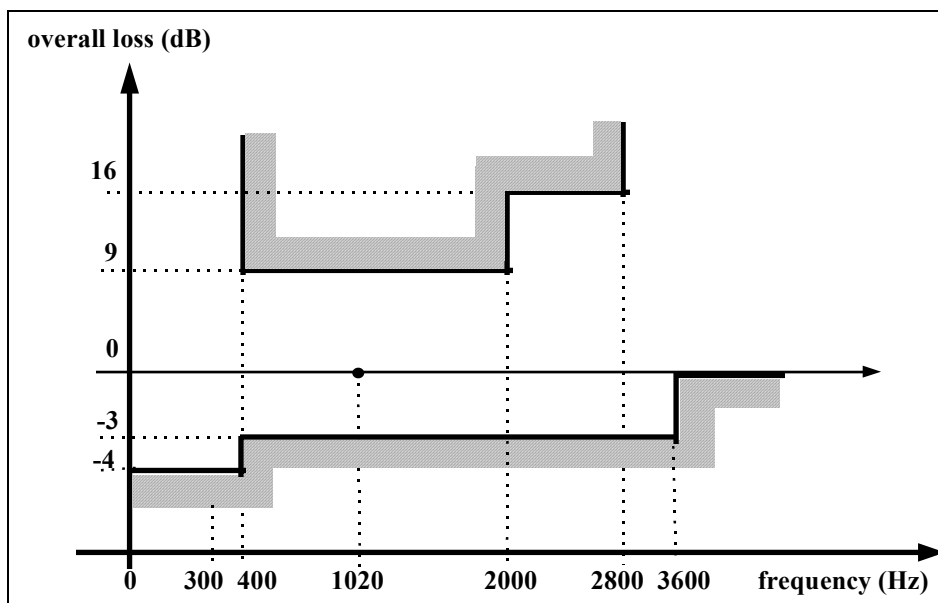


Figure 2.2-2

### 2.3. Maximum mean input power

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

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

- - 13 dBm for the ONP analogue leased line of ordinary quality, 4-wire;
- - 9 dBm for the ONP analogue leased line of ordinary quality, 2-wire;
- - 6 dBm for the analogue leased line M1040, 4-wire;
- for the analogue leased line M1040, 2-wire, this mean input power will be maximum 0 dBm (this is function of the local loop attenuation).

### 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. Variation of overall loss with time

The variations with time of the overall loss at 1020Hz (including daily and seasonal variations but excluding amplitude hits) shall be as small as possible. Regarding the ONP analogue leased lines of ordinary quality (4-wire and 2-wire), these variations will not exceeding +/- 4 dB.

## 2.6. 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 ordinary quality shall be:

- less than -38 dBmOp for the *international* analogue leased lines M1040, 4-wire and 2-wire;
- less than -45 dBmOp for the *national* analogue leased lines M1040, 4-wire and 2-wire;
- less than -41 dBmOp for the ONP analogue leased line of ordinary quality, 4-wire and 2-wire.

### 3. Network interface presentation

#### 3.1. Physical characteristics

The physical connection arrangements for the interface presentation of the analogue leased line of ordinary 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 ordinary quality, namely:

- *the analogue leased line M1040, 4-wire:*

The network interface of the analogue leased line M1040, 4-wire, 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

The transmit pair is the output from the network

The receive pair is the input to the network

Table 3.1-1

- *the analogue leased line M1040, 2-wire:*

The network interface of the analogue leased line M1040, 2-wire, 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 3.1-2

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

Table 3.1-2

- *the ONP analogue leased line of ordinary quality, 4-wire:*  
The network interface of the ONP analogue leased line of ordinary quality, 4-wire, provides an 8-contact socket of the type specified in EN 28877 and with contact assignments as specified in table 3.1-3

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

Table 3.1-3

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

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

Table 3.1-4

As an option, BELGACOM offers also an alternative means of connection to her customers, which shall consist of a hardwired connection, using insulation displacement connectors or a terminal block; in this case, the NTP of the analogue leased line of ordinary 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)

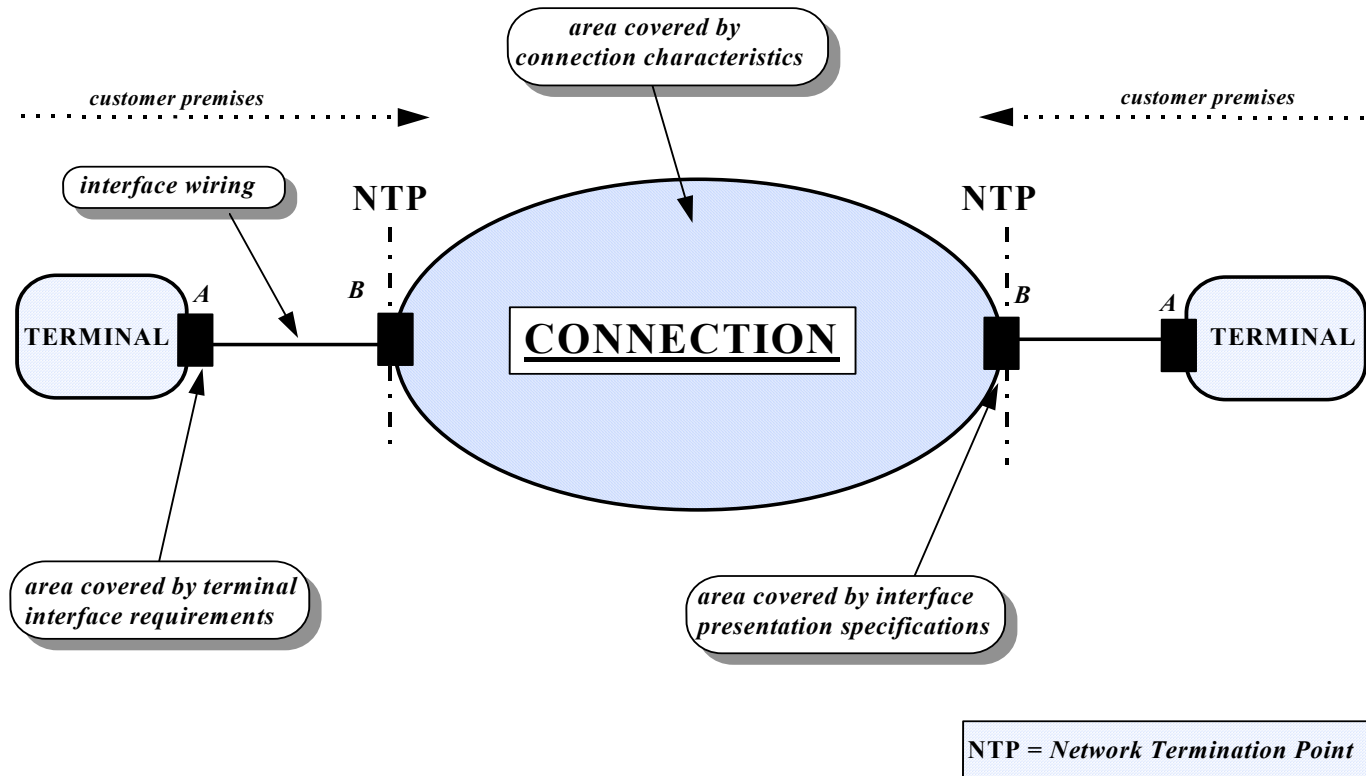
The network interface presentation fulfils to the EMC requirements which are imposed under the EMC Directive 89/336/EEC.

#### **4. Terminal equipment**

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

- for connection to a NTP of an analogue leased line M1040, 4-wire, the terminal of the customer has to be approved to BE/SP-202;
- for connection to a NTP of an analogue leased line M1040, 2-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 ordinary 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 ordinary 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>