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**Multidestination leased lines (MD)**  
*or*  
**Multifractional E1 (MFE1)**

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**or**  
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## 1. Introduction

This document contains the technical specifications for the Belgacom *multidestination (MD)* leased lines service, synonymous with *multifractional E1*. 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 multidestination leased line service, the NTU is considered as being contained within the connection.

A functional scheme of the multidestination leased line is shown in figure 1-1. The multidestination digital leased line provides M times a bi-directional, digital point-to-point (Nx64)kbit/s connection between the MD type of NTP (NTP<sub>1</sub> in figure 1-1) and either :

- an (Nx64)kbit/s digital leased line type of NTP (e.g. NTP<sub>a</sub> in figure 1-1);  
*and/or*
- an 64kbit/s digital leased line type of NTP (e.g. NTP<sub>b</sub> in figure 1-1);  
*and/or*
- a fractional E1 type of NTP (e.g. NTP<sub>c</sub> in figure 1-1).

The M different (Nx64)kbit/s connections don’t need to have the same value for N. In fact, the MD digital leased line provides M different (N<sub>i</sub>x64)kbit/s connections with the following restriction:

$$\left( \sum_{i=1}^M N_i \right) \leq 31$$

N<sub>i</sub> may take a value from 1 to 31.

As a result, the MD leased line offers several Nx64kbit/s connections at the same time where at least one end of the MD leased line is presented in a 2048kbit/s interface (*the MD interface*); this MD interface is in fact a FE1 type of NTP, programmed for several Nx64kbit/s user information channels. As a result, the MD leased line includes a wide variety of cases and configurations such as:

- A number of 64kbit/s leased lines presented in a single 2048kbit/s interface at one location (*the MD interface*) but each connecting to a different location with a 64kbit/s leased line interface.
- A single 64kbit/s leased line together with a (Nx64)kbit/s leased line, presented in a single 2048kbit/s at one location location (*the MD interface*) but each connecting to a different location with respectively a 64kbit/s leased line interface and a (Nx64)kbit/s leased line interface.
- A number of (Nx64)kbit/s leased lines between two 2048kbit/s interfaces. Please note that in this case there’s no guarantee that these leased lines connections will follow the same route and have the same transmission delay; i.e. octets of data that share the same frame at the input of the MD leased line will not necessarily share the same frame at the output of the MD leased line.
- ...

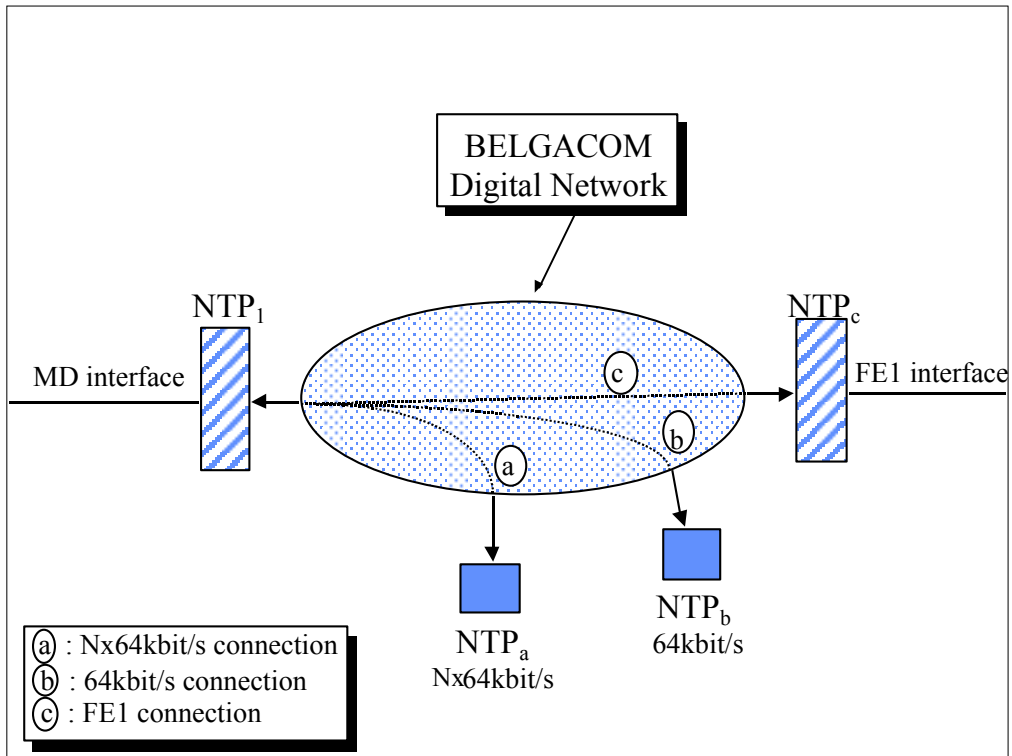


Figure 1-1

**Multidestination leased lines (MD)  
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## 2. Connection characteristics

### 2.1. Transfer rate

#### 2.1.1. Leased line timing

By default the MD digital leased line provides timing that is synchronous to the Belgacom network timing<sup>1</sup>.

#### 2.1.2. Information transfer rate

The MD connection is capable of transferring an information rate of M times (N<sub>i</sub>×64)kbit/s, with the following restriction:

$$\left( \sum_{i=1}^M N_i \right) \leq 31$$

N<sub>i</sub> may take a value from 1 to 31.

### 2.2. Information transfer susceptance

The connection is capable of transferring digital information with bit sequence integrity and without restriction on the binary content.

### 2.3. Structure

The multidestination digital leased line (MD) provides M times a bi-directional digital point-to-point (N×64)kbit/s connection between the MD type of NTP (NTP<sub>1</sub> in figure 1-1) and either :

- an (N×64)kbit/s digital leased line type of NTP (e.g. NTP<sub>a</sub> in figure 1-1);  
and/or
- an 64kbit/s digital leased line type of NTP (e.g. NTP<sub>b</sub> in figure 1-1);  
and/or
- a FE1 type of NTP (e.g. NTP<sub>c</sub> in figure 1-1).

The MD type of NTP is in fact a FE1 type of NTP, programmed for several N×64kbit/s user information channels. So, regarding the MD type of NTP (NTP<sub>1</sub> in figure 1-1), the specifications for the “structure” are identical to those of a FE1 digital leased line. At the other NTP(s) of the MD leased line (e.g. NTP<sub>a</sub>, NTP<sub>b</sub> and NTP<sub>c</sub> of figure 1-1), the specifications for the “structure” are function of the installed type of NTP; as a consequence, they meet the same requirements as mentioned in the specifications of the digital leased line, having the same type of NTP.

### 2.4. Establishment of communication

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

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<sup>1</sup> Network timing is the timing that is derived from the source or sources of timing that are used for the whole Belgacom network. Therefore, the timing provided by the leased line will be similar to that provided by other digital BELGACOM services.

## 2.5. Network performance

### 2.5.1. Transmission delay

The one way end-to-end delay shall be less than  $(10 + 0.01G)$ ms, where G is the geographical distance in kilometers.

### 2.5.2. Jitter

The same principles as mentioned above in paragraph 2.3 apply to the jitter requirements of an MD leased line; i.e. the jitter at the NTP meet the same requirements as mentioned in the specifications of the digital leased line, having the same type of NTP.

### 2.5.3. Slip

The same principles as mentioned above in paragraph 2.3 apply to the slip requirements of an MD leased line.

### 2.5.4. Error parameters

The same principles as mentioned above in paragraph 2.3 apply to the error performance of an MD leased line.

### **3. Network interface presentation**

#### **3.1. Physical characteristics**

The same principles as mentioned above in paragraph 2.3 apply to the NTP physical characteristics of an MD leased line; i.e. the physical characteristics of the NTP meet the same requirements as mentioned in the specifications of the digital leased line, having the same type of NTP.

#### **3.2. Electrical characteristics**

The same principles as mentioned above in paragraph 2.3 apply to the NTP electrical characteristics of an MD leased line; i.e. the electrical characteristics of the NTP meet the same requirements as mentioned in the specifications of the digital leased line, having the same type of NTP.

#### **3.3. Safety**

Regarding the safety, the NTP complies with EN 60950.

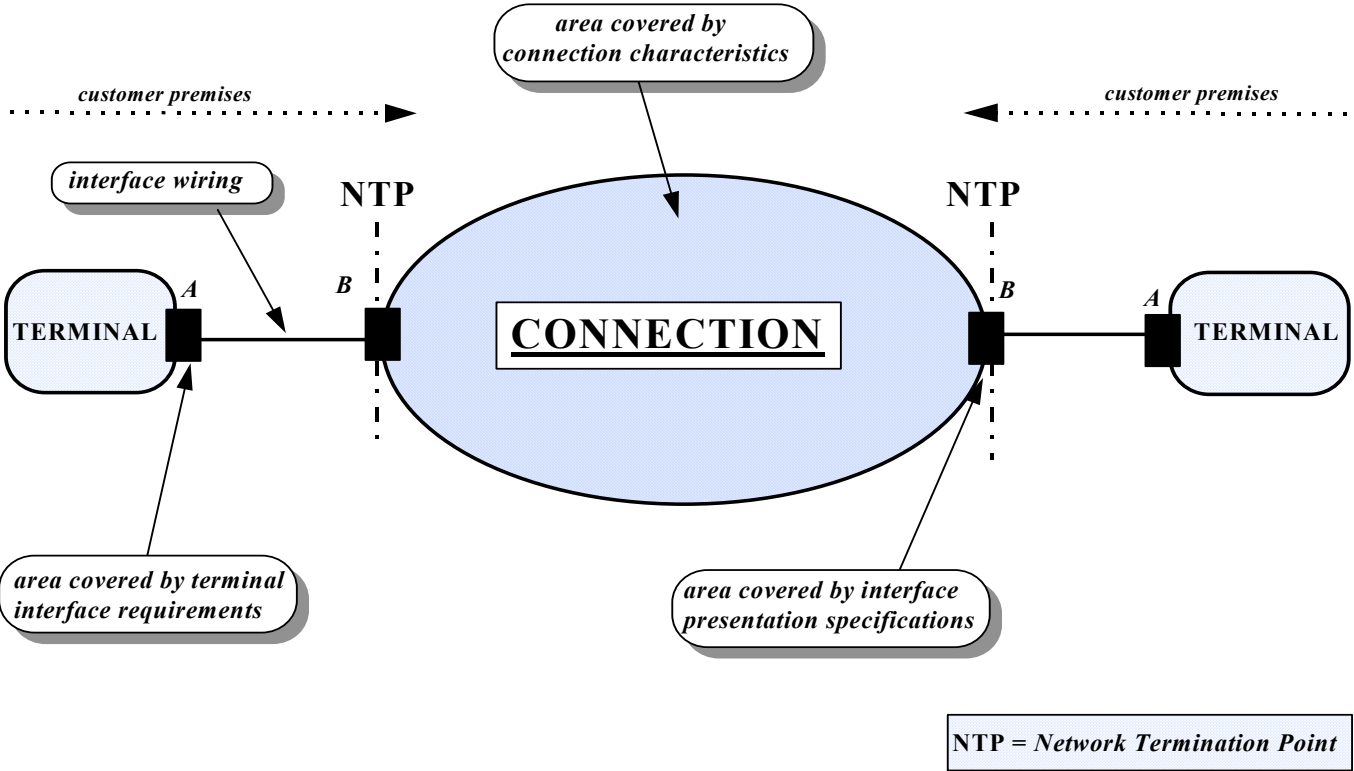
#### **3.4. ElectroMagnetic Compatibility (EMC)**

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

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

For a connection to the NTP of a MD digital leased line, the terminal of the customer has to be conform to the appropriate technical requirements; i.e. the terminals have to meet the same requirements as mentioned in the specifications of the digital leased line, having the same type of NTP.

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:

##### *Errored second*

A second in available time with one or more bit errors.

##### *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.

##### *Octet slip*

A slip of one complete octet. In a structured communication channel, the slips can be controlled such that either a frame of data is inserted or lost; this is known as a controlled slip or frame slip. Where a slip is not a complete frame (typically one bit), this is known as an uncontrolled slip.

##### *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." The general principles of ONP are contained in the Council Directive 90/387/EEC, the "ONP Framework Directive".

##### *Severely errored second*

A second in available time where at least 0,1% of the bits are errored.

##### *Slip*

One or more extra or missing consecutive unit intervals in the bit stream. Slip occurs at a point between two pieces of the communication link that are operating at similar but not identical bit rates (plesiochronously). If a piece of equipment is transmitting data at a rate X towards another piece of equipment which is operating at a rate Y, then depending on whether X is greater or less than Y, there will be either a loss of, or a gain of data at the received piece of equipment. The addition or loss of bits in a bit stream is referred to as slip.

##### *Unavailable time*

A 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.

## **B) Symbols and abbreviations**

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

<u>CRC-4:</u>	<i>Cyclic Redundancy Check-4 bit.</i>
<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>ES:</u>	<i>Errored Seconds.</i>
<u>FE1:</u>	<i>Fractional E1 digital leased line.</i>
<u>ITU:</u>	<i>International Telecommunication Union.</i>
<u>MD:</u>	<i>Multidestination leased line.</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>
<u>SES:</u>	<i>Severely Errored Seconds.</i>
<u>UI:</u>	<i>Unit Interval.</i>

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