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

*Tel: +32 2 244.58.88 Fax:  
+32 2 244.59.99  
E-mail: [belcomlab@Proximus.be](mailto:belcomlab@Proximus.be)*

## **Nx64kbit/s digital leased lines**

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## 1. Introduction

This document contains the technical specifications for the PROXIMUS Nx64kbit/s leased lines service. 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 PROXIMUS 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 Nx64kbit/s leased line service, the NTU is considered as being contained within the connection.

Concerning the PROXIMUS Nx64kbit/s leased lines offer, the customer has the choice between several types of network interface presentation, namely:

- V35-interface;
- V36/V11-interface;
- X21(X24/X27)-interface; •
- G703/G704-interface.

## 2 Connection characteristics

### 2.1 Transfer rate

#### 2.1.1 Leased line timing

Under normal operating conditions, the timing of the output signal (i.e. from the network to the customer's terminal) is the network timing.

#### 2.1.2 Information transfer rate

The connection is capable of transferring information at a nominal information rate of Nx64kbit/s which is synchronous to the network timing. N may take a value from 1 to 31.

### 2.2 Information transfer susceptance

The connection is capable of transferring unrestricted digital information.

### 2.3 Structure

In principle, the connection of an Nx64kbit/s leased line is unstructured. The full bit rate of Nx64kbit/s is available to the user for unrestricted digital information transfer.

However, at the NTP of an Nx64kbit/s leased line with *an G703/G704 interface presentation* the signal has to be structured in accordance with ITU-T Recommendation G.704. The bit stream is divided into frames of 256 bits each; the bits 1 to 256 in the basic frame carry 32 octet interleaved time slots, numbered 0 to 31. By default, the first bit of the frame (the S<sub>i</sub>-bit) is used for the CRC-4 procedure, conform to ITU-T Recommendations G.704 and G.706. As an option, the S<sub>i</sub>-bit can also be permanently fixed at 1 by PROXIMUS.

The loss and recovery of the frame alignment and the frame synchronization are conform to ITU-T Recommendation G.706. As by default the first bit of the frame (the S<sub>i</sub>-bit) is used for the CRC-4 procedure, the CRC multiframe alignment, the CRC-bit monitoring and the monitoring for false frame alignment are also conform to ITU-T Recommendation G.706. However, as an option, the first bit of the frame can also be permanently fixed at 1 by PROXIMUS (see above); by doing so, the CRC-4 procedure is switched off.

### 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.

### 2.5 Symmetry

The connection is symmetrical, i.e. each direction of transmission has the same information transfer capability.

### 2.6 Connection configuration

The connection configuration is point-to-point.

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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 Proximus network. Therefore, the timing provided by the leased line will be similar to that provided by other digital PROXIMUS services.

## 2.7. Network performance

### 2.7.1. Transmission delay

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

### 2.7.2. Slip

The slip objectives for the Nx64kbit/s digital leased lines comply with ITU-T Recommendation G.822.

### 2.7.3. Error parameters

#### 2.7.3.1. Performance level

The error performance level for the Nx64kbit/s leased lines are at least conform to ITU-T Recommendation G.821.

### 3. Network interface presentation

#### 3.1. Physical characteristics

The physical characteristics of the NTP of an Nx64kbit/s digital leased line are function of the network interface presentation chosen by the customer;

- NTP with V.35-interface:

The physical connection arrangements shall be by a connector. The interface connector and pin assignments are in accordance with the 34-pin ISO 2593 connector with 6/32 UNC screw. The NTP is equipped with the female connector type (compatible with the male connector type having pins of 1,6mm in diameter).

- NTP with V.36/V.11-interface:

The physical connection arrangements shall be by a connector. The interface connector and pin assignments are in accordance with the 37-pin ISO 4902 connector with screw. The NTP is equipped with the female type of the connector.

- NTP with X21(X24/X27)-interface:

The physical connection arrangements shall be by a connector. The interface connector and pin assignments are in accordance with the 15-pin ISO 4903 connector with screw. The NTP is equipped with the female type of the connector.

- NTP with G703/G704-interface:

The physical connection arrangements are provided by means of an RJ45 socket and with contact assignments as specified in table 3.1-1.

contact	network interface
1&2	transmit pair
3	shield reference point
4&5	receive pair
6	shield reference point
7	unused
8	unused

The transmit pair is the output from the Proximus network to the customer's terminal.

*table 3.1-1*

### 3.2. Electrical characteristics

The electrical characteristics of the NTP are function of the network interface presentation chosen by the customer. For that reason, the electrical characteristics are described hereafter per NTP type, i.e.:

- NTP with V.35-interface:

The V.35-interface operates as a Data Circuit-terminating Equipment (DCE). The V.35-NTP provides interchange circuits in accordance with ITU-T Recommendation V.24; the interface circuits provided are mentioned in table 3.2-1.

<b>Designation</b>	<b>Function</b>	<b>Direction</b>
102	signal ground or common return	
103	transmitted data	DTE-->DCE
104	received data	DCE-->DTE
105	request to send	DTE-->DCE
106	ready for sending	DCE-->DTE
107	data set ready	DCE-->DTE
109	data channel received line signal detector	DCE-->DTE
113	transmitter signal element timing (DTE)	DTE-->DCE
114	transmitter signal element timing (DCE)	DCE-->DTE
115	receiver signal element timing (DCE)	DCE-->DTE

Table 3.2-1

The electrical characteristics of the interchange circuits are in accordance with the following:

- \* circuits 103, 104, 113, 114 and 115 are in accordance with ITU-T Recommendation V.35 or V.11 (information on the interworking of electrical interfaces in accordance with ITU-T Recommendation V.35 and ITU-T Recommendation V.11 can be found in ITU-T Recommendation V.11);
- \* the other circuits (105, 106, 107 and 109) meet ITU-T Recommendation V.28 (or V.10).

- NTP with V.36/V.11-interface:

The V.36/V.11 NTP-interface operates as a Data Circuit-terminating Equipment (DCE). The V.36/V.11-NTP provides interchange circuits in accordance with ITU-T Recommendation V.24; the interface circuits provided are the same as mentioned in table 3.2-1. The electrical characteristics of the interchange circuits are in accordance with the following:

- \* for circuits 103, 104, 113, 114 and 115 both the generators and receivers are in accordance with ITU-T Recommendation V.11;
- \* the other circuits meet ITU-T Recommendation V.10.

- NTP with X21(X.24/X.27)-interface:

The X21(X.24/X.27) NTP-interface operates as a Data Circuit-terminating Equipment (DCE). The X.24/X.27 NTP provides interchange circuits in accordance with ITU-T Recommendation X.24; the interface circuits provided are mentioned in table 3.2-2.

The electrical characteristics of the interchange circuits are in accordance with ITU-T Recommendation X.27.

<i>Designation</i>	<i>Function</i>	<i>Direction</i>
G	signal ground or common return	
T	Transmitted data	DTE-->DCE
R	received data	DCE-->DTE
C	Control	DTE-->DCE
I	Indication	DCE-->DTE
S	signal element timing	DCE-->DTE
X	DTE signal element timing	DTE-->DCE

Table 3.2-2

- NTP with G703/G704-interface:

The electrical characteristics of this NTP are in accordance with ITU-T Recommendation G.703 (120 Ohms).

### 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 connection to the NTP of a Nx64kbit/s digital leased line, the terminal of the customer has to be in accordance with the appropriate technical requirements;

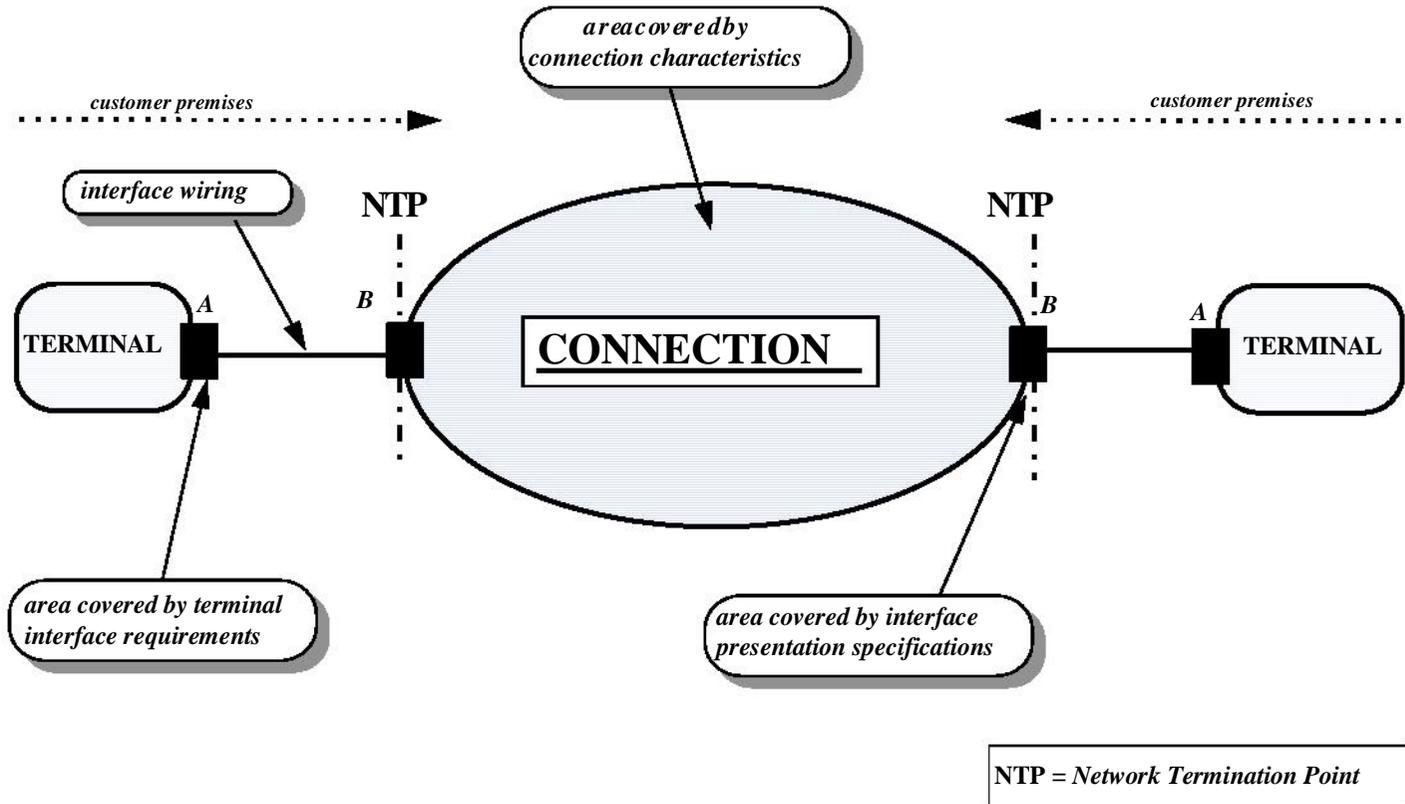
- for connection to an NTP with a V35-interface, the terminal of the customer has to be conform to BE/SP-135;
- for connection to an NTP with a V36/V11-interface, the terminal of the customer has to be conform to BE/SP-136;
- for connection to an NTP with a X21(X24/X27)-interface, the terminal of the customer has to be conform to BE/SP-121;
- for connection to an NTP with a G703/G704-interface, the terminal of the customer has to be conform to BE/SP-103.

At the NTP the customer shall provide Proximus with a grounding connection point. This grounding connection point should be easily accessible, located near the NTP, and shall enable Proximus to attach a 4 mm<sup>2</sup> (minimum section) ground cable with lug, bolt and washer. The characteristics of the grounding connection point provided by the customer must be conform to article 69 of the actual RGIE<sup>2</sup>; this grounding point shall have a resistance value not exceeding 30 Ohms.

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<sup>2</sup> RGIE: Règlement Général des Installations Electriques

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 block*

A block with one or more bit errors.

*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 PROXIMUS telecommunications network and which are necessary for access to and efficient communication through the PROXIMUS network.

*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. Data</i>
<u>DTE:</u>	<i>Terminal Equipment. Errored Seconds.</i>
<u>ES:</u>	<i>Fractional E1 digital leased line.</i>
<u>FE1:</u>	<i>International Telecommunication Union.</i>
<u>ITU:</u>	<i>Network Termination Point. Parts per million.</i>
<u>NTP:</u>	<i>Réglement Général des Installations Electriques</i>
<u>ppm:</u>	<i>Severely Errored Seconds. Unit Interval.</i>
<u>RGIE</u>	
<u>SES:</u>	
<u>UI:</u>	