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**COLO TO COLO OR COLO TO POP BACKHAUL LEASED LINE**

**Provision of SDH VC-4 digital links**

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## 0. Document history

Every update of this document results in a complete new version with new version number and release date.

Version	Date	Main or important changes since previous version
1.0	12 JUN 2002	<ul style="list-style-type: none"><li>• First version</li></ul>

## 1. Introduction

This document contains the technical specifications of the Belgacom STM-1 Colo to Colo or Colo to PoP Backhaul Leased Line service. Basically, it is the intention of Belgacom and the OLO to co-operate for the joint establishment of an end-to-end STM-1 leased line path.

These specifications are based on a generic model as shown in annex 1.

The Colo to Colo Backhaul Leased Line of Belgacom is presented to the OLO via an “interface presentation” at the related End Point, namely the EP<sub>OLO</sub>. These EPs comprise all physical connections and their technical access specifications that form part of the Belgacom transmission network. The EP is presented by means of an equipment which is an integral part of the Belgacom Colo to Colo Backhaul Leased Line and which is referred to as the End Point Unit (EPU). For the description of the Belgacom Colo to Colo Backhaul Leased Line service for STM-1 leased lines, the EPU is considered as being contained within the Belgacom Colo to Colo Backhaul Leased Line.

The Colo to PoP Backhaul Leased Line of Belgacom is presented to the OLO via an “interface presentation” at the related End Point, namely the EP<sub>OLO</sub>. These EPs comprise all physical connections and their technical access specifications that form part of the Belgacom transmission network. The EP is presented by means of an equipment which is an integral part of the Belgacom Colo to PoP Backhaul Leased Line and which is referred to as the End Point Unit (EPU). For the description of the Belgacom Colo to PoP Backhaul Leased Line service for STM-1 leased lines, the EPU is considered as being contained within the Belgacom Colo to PoP Backhaul Leased Line. On one end, the EPU is located in a LEX or in an AGE, on the other end, the EPU is located in a LEX and offer interface to the local tail to the PoP.

## 2. Colo to Colo or Colo to PoP Backhaul Leased Line characteristics

### 2.1. Transfer rate

The Belgacom Colo to Colo or Colo to PoP Backhaul Leased Line is capable of carrying a signal with a line rate within the limits of 155520 kbit/s  $\pm$  20 ppm as specified by ITU-T Recommendation G.703 (STM-1 electrical) or within the limits of 155520 kbit/s  $\pm$  20 ppm as specified by ITU-T Recommendation G.957 (STM-1 optical).

### 2.2. Information transfer susceptance

The Belgacom Colo to Colo or Colo to PoP Backhaul Leased Line is capable of transferring transparently a complete and bi-directional VC-4 except the N1 byte.

### 2.3. Structure

The structure of a VC-4 is shown in figure 1. The bytes of a VC-4 are transmitted with a frequency of 8 kHz; i.e. the frame length is 125  $\mu$ s.

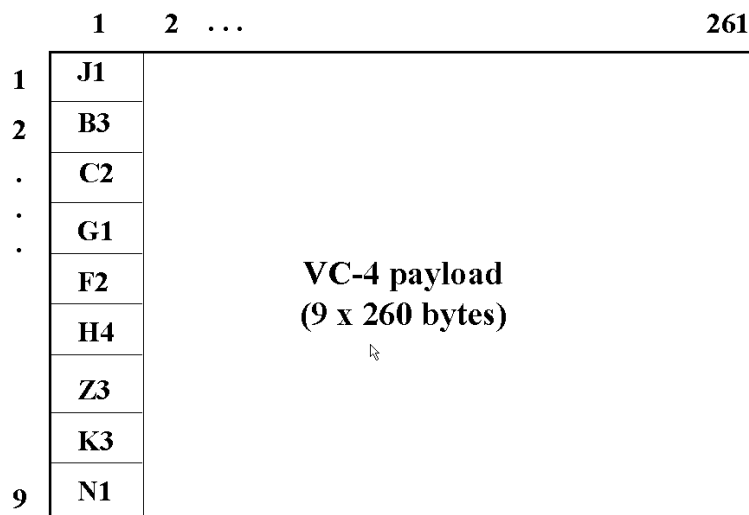


Figure 1

*Note: the content of the B3 byte may change at Belgacom tandem connection monitoring processes; however, the integrity of B3 parity information is maintained through the connection.*

#### 2.4. Establishment of communication

Establishment or release of the Belgacom Colo to Colo or Colo to PoP Backhaul Leased Line shall not require any protocol exchange or other intervention by the OLO.

#### 2.5. Symmetry

The Belgacom Colo to Colo or Colo to PoP Backhaul Leased Line shall be symmetrical, i.e. each direction of transmission shall have the same nominal characteristics, although the actual values shall be independent.

#### 2.6. Connection configuration

The Belgacom Colo to Colo or Colo to PoP Backhaul Leased Line configuration is point-to-point.

#### 2.7. Network performance

##### 2.7.1. Transmission delay

The one way delay through the Belgacom Colo to Colo or Colo to PoP Backhaul Leased Line shall be less than  $(5 + 0.01G)$  ms, where G is the geographical distance in kilometers.

##### 2.7.2. Performance level

The overall end-to-end error performance level of the STM-1 leased line path shall be based on the model mentioned in ITU-T Recommendation G.826.

### 3. End point interface presentation

The physical connection is presented to the OLO via a Belgacom-sited End Point interface EP<sub>OLO</sub>. The EPs of the SDH link will be provided with a STM-1 interface, complying with the ITU-T Recommendations G.707 and G.783. Its multiplex structure is in accordance with ETS 300 147 and ITU-T Recommendation G.707.

#### 3.1. Characteristics of the EP<sub>OLO</sub>

Dependent on the OLO's choice, the EP<sub>OLO</sub> of the SDH link shall be provided with one of the following interfaces:

- STM-1 electrical interface;
- STM-1 optical interface at 1310 nm.

##### 3.1.1. STM-1 electrical interface

- The electrical characteristics of this EP<sub>OLO</sub> comply with ITU-T Recommendation G.703 and with ETS 300 166.
- The EP<sub>OLO</sub> equipped with an electrical STM-1 interface, shall be provided with two coaxial 75 ohms sockets, one each for transmit and receive. These interface connectors are 1,6/5,6 type sockets complying with IEC 169-13. The outer conductor of the coaxial pair shall be connected to signal ground both at the input and at the output port.
- The physical section layer functions of the EP<sub>OLO</sub>, equipped with a STM-1 electrical interface, are in accordance with ETS 300 417-2-1.
- The jitter and wander tolerance of the EP<sub>OLO</sub> input port, as well as the output jitter and wander generation at the EP<sub>OLO</sub> are in accordance with ITU-T Recommendation G.825.

##### 3.1.2. STM-1 optical interface

- The optical characteristics of the EP<sub>OLO</sub>, equipped with a STM-1 optical interface, are in accordance with ITU-T Recommendation G.957; this EP<sub>OLO</sub> interface is designed for operation on *single-mode* optical fibres.
- The physical section layer functions of the EP<sub>OLO</sub>, equipped with an STM-1 optical interface, are in accordance with ETS 300 417-2-1.
- The jitter and wander tolerance of the EP<sub>OLO</sub>, as well as the output jitter and wander generation at the EP<sub>OLO</sub> are in accordance with ITU-T Recommendation G.825.
- The EP<sub>OLO</sub>, equipped with an optical STM-1 interface, shall be provided with two optical sockets, one each for transmit and receive.

The STM-1 boards are connected to the optical fibre. This fibre is terminated onto an optical distribution frame (OSDF, OMDf or cable head).

The optical connectors that have to be mounted on the fibre cord relaying the optical distribution frame are of the type Optoclip II.

The Optoclip II connectors have the following characteristics:

- attenuation (25°C) :
  - Less than to 0.3 dB.
  - Mean value (measurement on more than 10 samples): < 0.25 dB.
  - After 200 connections/disconnections (15°<T<35°): < 0.4 dB and mean value (measurement on more than 10 samples): < 0.35 dB.
- Return loss :
  - More than 50 dB.
  - Mean value (measurement on more than 10 samples): more than 54 dB.
- Thermal behaviour :
  - Variation in attenuation between -20°C and 50°C: less than 0.004 dB/°C.
  - Mean value (measurement on more than 10 samples): < 0.003 dB/°C.

### 3.2. Safety

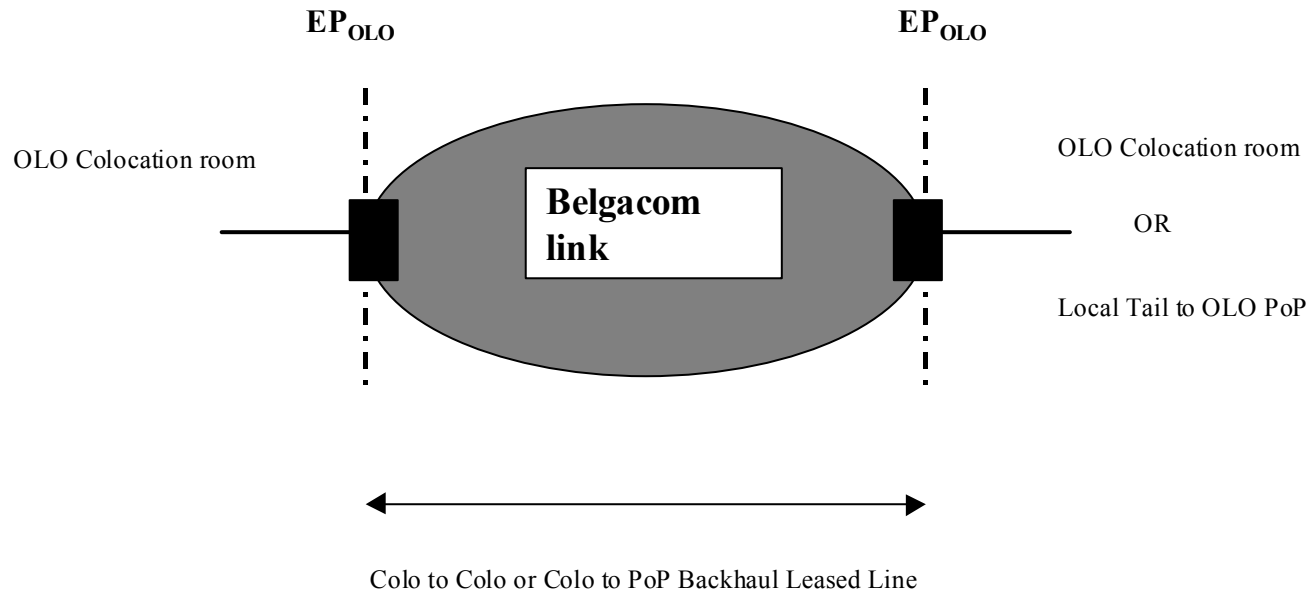
Regarding the safety, the EP complies with EN 60950 (IEC 950).

### 3.3. ElectroMagnetic Compatibility (EMC)

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

**ANNEX 1**

**Generic model for  
Colo to Colo or Colo to PoP Leased Line Specifications**



**EP = End Point**

## ANNEX 2

*Definitions, symbols and abbreviations.*

### **a) Definitions**

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

#### *Background block error ratio*

The ratio of errored blocks over all blocks within a specified measuring period, where neither are counted during unavailability periods nor during severely errored seconds.

#### *Errored block*

A block with one or more bit errors.

#### *Errored second*

A one-second period with one or more errored blocks.

#### *End Point (EP)*

All physical connections which form part of the Belgacom telecommunications network and which are necessary for access to and efficient communication through the Belgacom Colo to Colo or Colo to PoP Backhaul Leased Line.

#### *Severely errored second*

A one-second period which contains at least 30% errored blocks or at least one severely disturbed period.

### **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>DCE:</u>	<i>Data Circuit-terminating Equipment.</i>
<u>DTE:</u>	<i>Data Terminal Equipment.</i>
<u>ES:</u>	<i>Errored Seconds.</i>
<u>ITU:</u>	<i>International Telecommunication Union.</i>
<u>EP:</u>	<i>End Point.</i>
<u>OLO:</u>	<i>Other Licensed Operator.</i>
<u>ppm:</u>	<i>Parts per million</i>
<u>RGIE:</u>	<i>Réglement Général des Installations Electriques.</i>
<u>SES:</u>	<i>Severely Errored Seconds.</i>
<u>UI:</u>	<i>Unit Interval.</i>