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**Transmission and interface characteristics
of telegraph leased lines service**

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1. Introduction

The aim of this document is to describe transmission and interface characteristics of telegraph leased lines service.

In the Belgacom network, two-wire and four-wire telegraph leased lines are available. A few years ago, however, Belgacom decided to offer its *new* customers two-wire telegraph leased lines only, for the following reasons:

- four-wire telegraph leased lines are installed by means of a “double current” technique, which often causes a disturbing, impulsive noise in adjoining conductors (copper pairs) in the same cable;
- the market offers many (cheap) telegraph modems (compliant with ITU-T recommendation R.20) allowing full duplex transmission up to 300 Baud over a two-wire conductor.

2. Network interface characteristics

Depending on the network interface requested, a distinction can be made between the following types of telegraph leased lines:

- telegraph leased line with a two-wire connection in direct current, single current type¹;
- telegraph leased line with a four-wire connection in direct current, double current type¹;
- telegraph leased line with a two-wire connection equipped with a telegraph modem, compliant with ITU-T recommendation R.20.

2.1. Mechanical characteristics

- The interface made available to a customer for a telegraph leased line theoretically consists of an 8-poles wall socket. This wall socket is described in detail in Appendix 2 of technical approval specification BE/SP-215, both for the direct current connection type and the telegraph modem connection type.
- Upon the customer's request and subject to consultation, Belgacom may be willing to establish an alternative connection e.g., by installing a registered terminal block.

2.2. Electrical characteristics

The electrical characteristics of the network interface offered to a customer for a telegraph leased line depend on the type of connection:

- In the case of a *single current connection*, the network interface offered to the customer is theoretically supplied from a 120V DC source located in a Belgacom telegraph transmission center. The current for status Z (stop polarity)¹ is adjusted by Belgacom at 40 mA with a tolerance of $\pm 5\%$. Status A (start polarity)¹ is 0 mA.
- In the case of a four-wire *double current connection*, the network interface offered to the customer is theoretically supplied by a direct current of + 60V and -60V in relation to the ground, for which the double current line is -10 mA for Status A (start polarity), and + 10 mA for Status Z (stop polarity).
- In the case of a *connection via telegraph modem*, a telegraph modem compliant with ITU-T recommendation R.20, whose sending level (in the customer direction) is adjusted at -6dBm, is interposed in the telegraph transmission center. The transmission method is based on ITU-T recommendation V.21 and uses the following characteristic frequencies:
 - ◇ from telegraph transmission center to customer
 - * Status A (start polarity): 1,180 Hz
 - * Status Z (stop polarity): 980 Hz.
 - ◇ from customer to telegraph transmission center
 - * Status A (start polarity): 1,850Hz
 - * Status Z (stop polarity): 1,650Hz.

¹ for definitions, see ITU-T recommendation R.140

3. Transmission characteristics

The transmission characteristics of a telegraph leased line depend on the type of line requested by the customer:

- Telegraph leased line with a *telegraph modem connection*
 - * The transmission characteristics of this type of telegraph leased lines comply with ITU-T recommendation R.20.
 - * The leased line is a two-wire conductor whose mode of operation may be unilateral, simplex or duplex.
 - * The leased line is able to transport signals whose modulation speed and code combinations are described in ITU-T recommendation R.101(B). The maximum bit speed is 300 Baud.

- Telegraph leased lines with a *direct current connection*
 - * Telegraph leased lines with a single current connection allow only unilateral or simplex operation.
 - * The modulation speed allowed is 50 Baud; the modulation codes allowed are those mentioned in ITU-T recommendation R.101(B).

4. References

- BE/SP-215:* Technische goedkeuringspecificatie voor de aansluiting van eindapparatuur op abonnementsgeleidingen van het telegraaftype.
- ITU-T R.20:* Telegraph modem for subscriber lines.
- ITU-T R.101:* Code and speed dependent TDM system for anisochronous telegraph and data transmission using bit interleaving.
- ITU-T R.140:* Definitions of essential technical terms in the field of telegraph transmission.
- ITU-T V.21:* 300 bits per second duplex modem standardized for use in the general switched telephone network.