INTERNATIONAL TELECOMMUNICATION UNION

ITU-T V.27 *bis*

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

DATA COMMUNICATION OVER THE TELEPHONE NETWORK

4800/2400 BITS PER SECOND MODEM WITH AUTOMATIC EQUALIZER STANDARDIZED FOR USE ON LEASED TELEPHONE-TYPE CIRCUITS

ITU-T Recommendation V.27 *bis*

(Extract fr

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(Extract from the *Blue Book*)

NOTES

1 ITU-T Recommendation V.27 *bis* was published in Fascicle VIII.1 of the *Blue Book*. This file is an extract from the *Blue Book*. While the presentation and layout of the text might be slightly different from the *Blue Book* version, the contents of the file are identical to the *Blue Book* version and copyright conditions remain unchanged (see below).

2 In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

4800/2400 BITS PER SECOND MODEM WITH AUTOMATIC EQUALIZER STANDARDIZED FOR USE ON LEASED TELEPHONE-TYPE CIRCUITS

(Geneva, 1976; amended at Geneva, 1980, Malaga-Torremolinos, 1984)

Introduction

This modem is intended to be used over any general leased circuits not necessarily conforming to Recommendation M.1020 [1]. A provision for a fast start-up sequence is made to allow the use of this modem for multipoint polling applications if the circuits used conform to Recommendation M.1020.

On leased circuits, considering that there exist and will come into being many modems with features designed to meet the requirements of the Administrations and users, this Recommendation in no way restricts the use of any other modems. This Recommendation does not eliminate the need for manually equalized modems according to Recommendation V.27 or application of other automatically equalized 4800 bits per second modems.

The provisions of this Recommendation are to be regarded as provisional in order to provide service where it is urgently required and between locations where it is expected that a reasonably satisfactory service can be given.

1 Principal characteristics

The principal characteristics for this recommended modem are very similar to the characteristics of a modem conforming to Recommendation V.27 with the exception of the equalizer used and these characteristics are as follows:

a) operates in a full-duplex or half-duplex mode over 4-wire leased circuits or in a half-duplex mode over 2-wire leased circuits;

b) at 4800 bits per second operation, modulation is 8-phase differentially encoded as described in Recommendation V.27;

c) reduced rate capability at 2400 bits per second with 4-phase differentially encoded modulation scheme as described in Recommendation V.26, Alternative A;

d) possibility of a backward (supervisory) channel at modulation rates up to 75 bauds in each direction of transmission, the provision and the use of these channels being optional;

e) inclusion of an automatic adaptive equalizer with a specific start-up sequence for Recommendation M.1020 [1] lines and an alternate start-up sequence for much lower grade lines.

2 Line signals at 4800 and 2400 bits per second operation

2.1 *Carrier frequency*

The carrier frequency is to be 1800 ± 1 Hz. No separate pilot tones are provided. The power levels used will conform to Recommendation V.2.

2.1.1 *Spectrum at 4800 bits per second*

A 50% raised cosine energy spectrum shaping is equally divided between the receiver and transmitter. The energy density at 1000 Hz and 2600 Hz shall be attenuated 3.0 dB ± 2.0 dB with respect to the maximum energy density between 1000 Hz and 2600 Hz.

2.1.2 *Spectrum at 2400 bits per second*

A minimum of 50% raised cosine energy spectrum shaping is equally divided between the receiver and transmitter. The energy density at 1200 Hz and 2400 Hz shall be attenuated 3.0 dB ± 2.0 dB with respect to the maximum energy density between 1200 Hz and 2400 Hz.

2.2 *Division of power between the forward and backward channel*

If simultaneous transmission of the forward and backward channels occurs in the same direction, a backward channel should be 6 dB lower in power level than the forward (data) channel.

2.3 *Operation at 4800 bits per second*

2.3.1 *Data signalling and modulation rate*

The data signalling rate shall be 4800 bits per second ± 0.01%, i.e. the modulation rate is 1600 bauds ± 0.01%.

2.3.2 *Encoding data bits*

The data stream to be transmitted is divided into groups of three consecutive bits (tribits). Each tribit is encoded as a phase change relative to the phase of the preceding signal element (see Table 1/V.27 *bis).* At the receiver, the tribits are decoded and the bits are reassembled in correct order. The left-hand digit of the tribit is the one occurring first in the data stream as it enters the modulator portion of the modem after the scrambler.

TABLE 1/V.27 *bis*

Tribit values			Phase change (see Note)
0	0	1	0°
0	0	0	45°
0	1	0	90°
0	1	1	135°
1	1	1	180°
1	1	0	225°
1	0	0	270°
1	0	1	315°

Note - The phase change is the actual on-line phase shift in the transition region from the centre of one signalling element to the centre of the following signalling element.

2.4 *Operation at 2400 bits per second*

2.4.1 *Data signalling and modulation rate*

The data signalling rate shall be 2400 bits per second ± 0.01%, i.e. the modulation rate is 1200 bauds ± 0.01%.

2.4.2 *Encoding data bits*

At 2400 bits per second the data stream is divided into groups of two bits (dibits). Each dibit is encoded as a phase change relative to the phase of the immediately preceding signal element (see Table 2/V.27 *bis).* At the receiver, the dibits are decoded and reassembled in the correct order. The left-hand digit of the dibit is the one occurring first in the data stream as it enters the modulator portion of the modem after the scrambler.

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