



INTERNATIONAL TELECOMMUNICATION UNION

CCITT

V.17

THE INTERNATIONAL
TELEGRAPH AND TELEPHONE
CONSULTATIVE COMMITTEE

DATA COMMUNICATION OVER THE TELEPHONE NETWORK

A 2-WIRE MODEM FOR FACSIMILE APPLICATIONS WITH RATES UP TO 14 400 bit/s

Recommendation V.17



Geneva, 1991

FOREWORD

The CCITT (the International Telegraph and Telephone Consultative Committee) is a permanent organ of the International Telecommunication Union (ITU). CCITT is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The Plenary Assembly of CCITT which meets every four years, establishes the topics for study and approves Recommendations prepared by its Study Groups. The approval of Recommendations by the members of CCITT between Plenary Assemblies is covered by the procedure laid down in CCITT Resolution No. 2 (Melbourne, 1988).

Recommendation V.17 was prepared by Study Group XVII and was approved under the Resolution No. 2 procedure on the 22 of February 1991.

CCITT NOTE

In this Recommendation, the expression “Administration” is used for conciseness to indicate both a telecommunication Administration and a recognized private operating agency.

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A 2-WIRE MODEM FOR FACSIMILE APPLICATIONS WITH RATES UP TO 14 400 bit/s

1 Introduction

This Recommendation defines the modulation methods and operating sequences for a modem intended only for use in high speed facsimile applications.

Appropriate T-Series Recommendations should be consulted regarding operating procedures and other features employed in facsimile transmission applications, as these differ from those recommended for high speed modems for general applications.

The modem has the following principal characteristics:

- a) Provision for half duplex operation at data signalling rates of:
 - 14 400 bit/s synchronous,
 - 12 000 bit/s synchronous,
 - 9600 bit/s synchronous,
 - 7200 bit/s synchronous;
- b) Quadrature amplitude modulation with synchronous line transmission at 2400 symbols per second.
- c) Inclusion of data scramblers, adaptive equalizers and eight-state trellis coding.
- d) Two sequences for training and synchronization: long train and resync.

2 Line signals

2.1 *Carrier frequency*

The channel carrier frequency is 1800 ± 1 Hz. The receiver must be able to operate with received frequency offsets of up to ± 7 Hz.

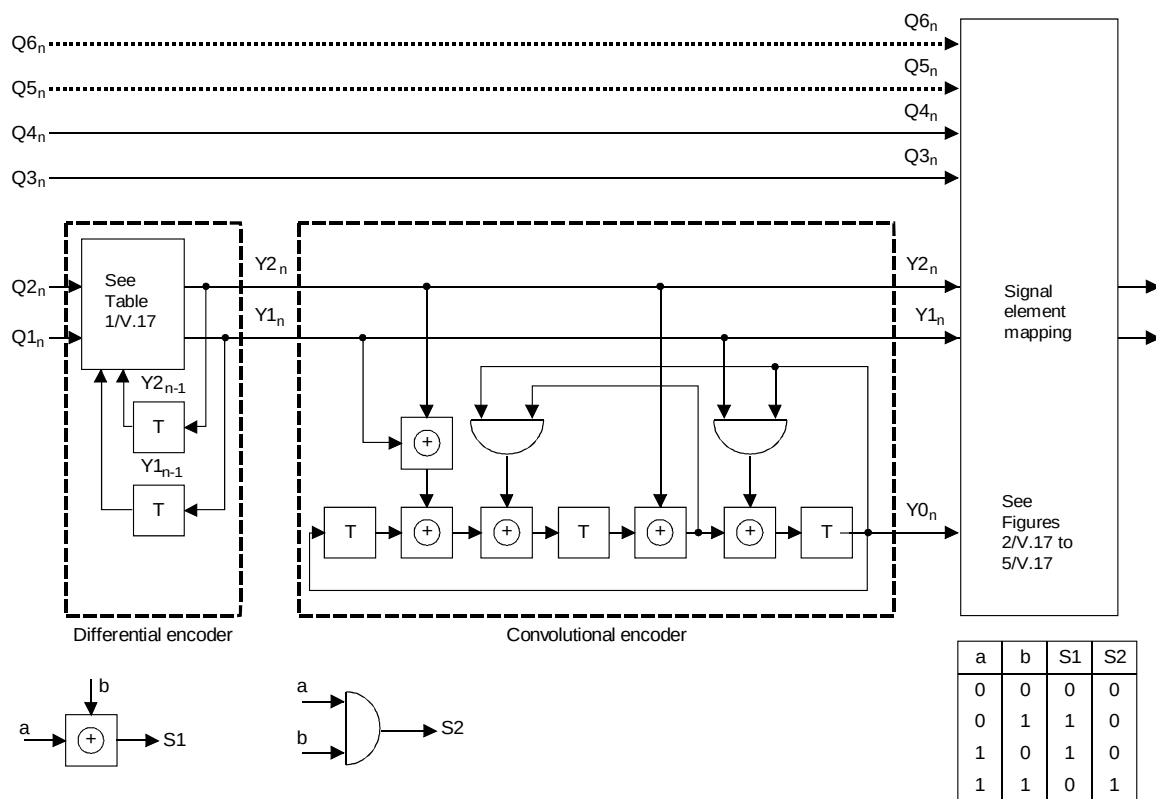
2.2 *Modulation*

The modulation rate shall be $2400 \pm 0.01\%$ symbols per second.

2.3 *Signal element codings*

2.3.1 *Signal element codings for 14 400 bit/s*

The scrambled data stream to be transmitted is divided into groups of six consecutive data bits, which are ordered according to their time of occurrence. As shown in Figure 1/V.17, the first two bits in each group, $Q1_n$ and $Q2_n$ (where n designates the sequence number of the group) are first differentially encoded into $Y1_n$ and $Y2_n$ according to Table 1/V.17.



T1701600-92/d01

FIGURE 1/V.17

Trellis coding at 14 400, 12 000, 9600 and 7200 signalling rates

TABLE 1/V.17

Differential coding for use with trellis coding

Input		Previous outputs		Outputs	
Q1 _n	Q2 _n	Y1 _{n-1}	Y2 _{n-1}	Y1 _n	Y2 _n
0	0	0	0	0	0
0	0	0	1	0	1
0	0	1	0	1	0
0	0	1	1	1	1
0	1	0	0	0	1
0	1	0	1	0	0
0	1	1	0	1	1
0	1	1	1	1	0
1	0	0	0	1	0
1	0	0	1	1	1
1	0	1	0	0	1
1	0	1	1	0	0
1	1	0	0	1	1
1	1	0	1	1	0
1	1	1	0	0	0
1	1	1	1	0	1