



INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

V.4

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

**DATA COMMUNICATION OVER THE TELEPHONE
NETWORK**

**GENERAL STRUCTURE OF SIGNALS OF
INTERNATIONAL ALPHABET No. 5 CODE
FOR CHARACTER ORIENTED DATA
TRANSMISSION OVER PUBLIC TELEPHONE
NETWORKS**

ITU-T Recommendation V.4

(Extract from the *Blue Book*)

NOTES

1 ITU-T Recommendation V.4 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.

Recommendation V.4

GENERAL STRUCTURE OF SIGNALS OF INTERNATIONAL ALPHABET No. 5 CODE FOR CHARACTER ORIENTED DATA TRANSMISSION OVER PUBLIC TELEPHONE NETWORKS¹⁾

(Mar del Plata, 1968; amended at Geneva, 1976 and 1980, and at Melbourne, 1988)

The CCITT,

I. *considering, firstly,*

the agreement between the International Organization for Standardization (ISO) and the CCITT on the main characteristics of a seven-unit alphabet [International Alphabet No. 5 (IA5)] to be used for data transmission and for telecommunications requirements that cannot be met by the existing five-unit International Telegraph Alphabet No. 2 (ITA2);

the interest, both to the users and to the telecommunication services, of an agreement concerning the chronological order of transmission of bits in serial working;

declares the view

that the agreed rank number of the unit in the alphabetical table of combinations should correspond to the chronological order of transmission in serial working on telecommunication circuits;

that, when this rank in the combination represents the order of the bit in binary numbering, the bits should be transmitted in serial working with the low order bit first;

that the numerical meaning corresponding to each information unit considered in isolation is that of the digit:

0 for a unit corresponding to condition A (travail = space), and

1 for a unit corresponding to condition Z (repos = mark),

in accordance with the definitions of these conditions for a two-condition transmission system;

II. *considering, moreover,*

that it is often desirable, in character oriented data transmission, to add an extra "parity" unit to allow for the detection of errors in received signals;

the possibility offered by this addition for the detection of faults in data terminal equipment;

the need to reserve the possibility of making this addition during the transmission itself, after the seven information units proper have been sent;

declares the view

that signals of the International Alphabet No. 5 code for data transmission should, in general, include an additional "parity" unit;

that the rank of this unit and, hence, the chronological order of the transmission in serial working should be the eighth of the combination thus completed;

¹⁾ See Recommendation X.4 [1] for data transmission over public data networks.

III. *considering*

that, in start-stop systems working with electromechanical equipment, the margin of such equipment and the reliability of the connection are considerably increased by the use of a stop element corresponding to the duration of two unit intervals of the modulation;

that for transmissions over telephone circuits via modems installed on the user's premises, the latter must be able to use the connections at the highest possible practical rate in characters per second, and that in such a case a single-unit stop element leads to a gain of about 10% as regards this practical rate;

that, however, it does not appear that the production of electronic devices capable of working at will with start-stop signals having a stop element equal to one or two unit intervals should lead to costly complications and that such an arrangement can have the advantage of appreciably limiting the error rate without greatly reducing the practical efficiency of the connection;

declares the view

that in start-stop systems using combinations of the seven-unit alphabet normally followed by a parity unit, the first information unit of the transmitted combination should be preceded by a start element corresponding to condition A (space);

that the duration of this start element should be a one-unit interval for the modulation rate under consideration, at transmitter output;

that the combination of seven information units, normally completed by its parity unit, should be followed by a stop element corresponding to condition Z (mark);

that for start-stop systems using the seven-unit code on switched telephone networks, a two-unit stop element should be used with electromechanical data terminal equipments operating at modulation rates up to and including 200 bauds. In other cases, the use of a one-unit stop element is preferable. However, this is subject to a mutual agreement between Administrations concerned;

that similar situations when a one-unit stop element can be used may apply to leased circuits;

that the start-stop receivers should be capable of correctly receiving start-stop signals comprising a single-unit stop element, whose duration will be reduced by a time interval equal to the deviation corresponding to the degree of gross start-stop distortion permitted at receiver input. However, for electromechanical equipment which must use a two-unit stop element (eleven-unit code signal) with a modulation rate of 200 bauds or less, receivers should be capable of correctly receiving signals with a stop element reduced to one unit;

IV. *considering, finally,*

that the direction of the parity unit can only be that of the even parity on the perforated tapes, particularly owing to the possibility of deletion (combination 7/15 of the alphabet) which causes a hole to appear in all tracks;

that, on the other hand, the odd parity is considered essential in the equipment which depends on transitions in the signals to maintain synchronism [in cases where combination 1/6 (SYNC) of the alphabet does not permit of an economical solution];

declares the view

that the parity unit of the signal should correspond to the even parity in links or connections operated on the principle of the start-stop system;

that this parity should be odd on links or connections using end-to-end character oriented synchronous operation;

that arrangements should be made when necessary to reverse the direction of the parity unit at the input and output of the synchronous equipment connected either to apparatus working on the start-stop principle or receiving

characters on perforated tape;

that the detection of a character out-of-parity may be represented by:

- a) reverse question mark (¿) graphic character or a representation of the capital letters SB (see ISO 2047) provided that these letters occupy a single character position on the screen or printer, and could have been entered by a single key stroke, recognizing it may be difficult to achieve a legible "SB" character from some matrix printers or displays where the characters are printed; or
- b) a recording of the 1/10 (SUB) character on the tape or other storage medium, where provided

and that, where a SUB character occurs in a received transmission, or is presented to a DTE via a storage medium, e.g. paper tape, then the reaction should be as in a) and b) above.

Reference

- [1] CCITT Recommendation *General structure of signals of International Alphabet No. 5 code for character oriented data transmission over public data networks*, Vol. VIII, Rec. X.4.