



INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

R.102

(03/93)

TELEGRAPHY

TELEGRAPH TRANSMISSION

**4800 bit/s CODE AND SPEED DEPENDENT
AND HYBRID TDM SYSTEMS FOR
ANISOCRONOUS TELEGRAPH AND DATA
TRANSMISSION USING BIT INTERLEAVING**

ITU-T Recommendation R.102

(Previously "CCITT Recommendation")

FOREWORD

The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the International Telecommunication Union. The ITU-T 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 World Telecommunication Standardization Conference (WTSC), which meets every four years, established the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

ITU-T Recommendation R.102 was revised by the ITU-T Study Group IX (1988-1993) and was approved by the WTSC (Helsinki, March 1-12, 1993).

NOTES

1 As a consequence of a reform process within the International Telecommunication Union (ITU), the CCITT ceased to exist as of 28 February 1993. In its place, the ITU Telecommunication Standardization Sector (ITU-T) was created as of 1 March 1993. Similarly, in this reform process, the CCIR and the IFRB have been replaced by the Radiocommunication Sector.

In order not to delay publication of this Recommendation, no change has been made in the text to references containing the acronyms "CCITT, CCIR or IFRB" or their associated entities such as Plenary Assembly, Secretariat, etc. Future editions of this Recommendation will contain the proper terminology related to the new ITU structure.

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

© ITU 1994

All rights reserved. No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the ITU.

CONTENTS

	<i>Page</i>
1 System capacity	1
2 Start-stop channel inputs	2
3 Start-stop channel outputs	3
4 Multiplexing details.....	4
5 Frame structure.....	4
6 Synchronizing	5
7 Telex signalling	10
8 Aggregate signals and interface	10
9 System clock arrangements.....	10
10 System maintenance, control and alarms	10
11 Link performance and availability indicators.....	11
References	11

Recommendation R.102

**4800 bit/s CODE AND SPEED DEPENDENT
AND HYBRID TDM SYSTEMS FOR ANISOCHRONOUS
TELEGRAPH AND DATA TRANSMISSION USING BIT INTERLEAVING**

(Malaga-Torremolinos, 1984; modified at Melbourne, 1988 and at Helsinki, 1993)

The CCITT,

considering

- (a) that there is a demand for a bit-interleaved code and speed dependent TDM system for anisochronous telegraph and data transmission using an aggregate bit rate of 4800 bit/s;
- (b) that an increase of the economical transmission of large numbers of anisochronous telegraph and data signals, especially those of higher modulation rates, e.g. 300 bauds, can be achieved by doubling the system capacity normally carried over a code and speed dependent TDM using an aggregate bit rate of 2400 bit/s;
- (c) that the doubling of system capacity should be based on the already well defined time division multiplexing (TDM) technique used for the multiplexing system according to Recommendation R.101 retaining the frame structure of alternative B;
- (d) that unit modularity, operation and maintenance should best be rationalized for both the basic Recommendation R.101 (alternative B) TDM and the expanded multiplexing system with the higher aggregate bit rate;
- (e) that the expanded multiplexing system should permit the accommodation of code-dependent and code-independent (transparent) channels using the TDM hybrid technique according to Recommendation R.112;
- (f) that the expanded multiplexing system should permit the accommodation of new facilities emerging in the future,

unanimously declares the view

that, where bit-interleaved code and speed dependent TDM systems with the provision for a limited use of code-independent (transparent) channels are used for anisochronous telegraph and data transmission with an aggregate bit rate of 4800 bit/s carried either by an analogue telephone-type circuit or by a higher order TDM, the equipment shall be constructed as an expanded multiplexing system to the basic Recommendation R.101 (alternative B) TDM to comply with the following standard:

1 System capacity

1.1 The capacity of the system shall be 92 channels at 50 bauds (7.5 units including a stop element of 1.5 units).

1.2 For other modulation rates see Table 1.

1.2.1 The modulation rates and character structures shown in Table 1 shall be accommodated with the capacities indicated for homogeneous configurations.

TABLE 1/R.102

System capacity

Modulation Rate (bauds)	Code dependent channels			Code independent channels
	Character structure		Number of channels (homogeneous configuration)	Number of channels (homogeneous configuration)
	Character length (units)	Stop element (units)		
50	7.5	1.5	92	30
75	7.5	1.5	46	–
100	$\left\{ \begin{array}{l} 7.5 \text{ or} \\ 10 \end{array} \right\}$	$\left\{ \begin{array}{l} 1.5 \\ 1 \end{array} \right\}$	46	15
110	11	2	46	–
134.5	9	1	30	–
150	10	1	30	–
200	$\left\{ \begin{array}{l} 7.5, \\ 10 \text{ or} \\ 11 \end{array} \right\}$	$\left\{ \begin{array}{l} 1.5 \\ 1 \\ 2 \end{array} \right\}$	22	7
300	$\left\{ \begin{array}{l} 10 \text{ or} \\ 11 \end{array} \right\}$	$\left\{ \begin{array}{l} 1 \\ 2 \end{array} \right\}$	15	–
NOTE – The system capacity for code-independent channels using the TDM hybrid technique according to Recommendation R.112 is not covered by this table.				

1.2.2 The TDM system shall be capable of multiplexing the eight modulation rates shown in Table 1 simultaneously.

1.2.3 The TDM system shall provide for a limited use of transparent channels. In using the TDM hybrid technique, the system capacity and the overall characteristics of the code-independent channel from the channel input to the channel output shall be in accordance with Recommendation R.112.

NOTE – The overall characteristics of code- and speed-dependent channels are the subject of this Recommendation and are specified in the following clauses.

2 Start-stop channel inputs

2.1 The modulation rate tolerance that shall be accepted on continuous incoming 50- and 75-baud start-stop signals with a stop element of 1.4 units shall be at least $\pm 1.4\%$.

2.2 When receiving characters at 50 or 75 bauds having nominally 1.5-unit stop elements, the system shall be capable of transmitting without error, isolated incoming characters that have a one-unit stop element, occurring at a maximum rate of one per second.

2.3 The minimum interval between start elements of undistorted successive continuous characters that may be presented at the channel input when the nominal modulation rate is 50 or 75 bauds shall be $145 \frac{5}{6}$ or $97 \frac{2}{9}$ ms respectively.