The selection of channel grouping and the method used shall be based on bilateral agreement, particularly when the channels of an existing system have to be branched without there being any possibility of a reconfiguration of the whole.

Tables 3 and 4/R.1xy give an example of remote channel grouping on the basis of muldexes in conformity with Recommendation R.101 or R.102.

TABLE 3/R.1xy

Example of grouping of remote channels for an R.101 muldex

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1) Although incomplete, a sixth remote channel could be implemented with the remaining 50 baud channels.

2) Channel 0516 may not be remoted when the corresponding TS is used to transmit the maintenance channel in the R.101 multiplexer.

TABLE 4/R.1xy

Example of grouping of remote channels for an R.102 muldex

Note - The least significant bits are sent first.

8. Synchronizing

8.1The maximum average synchronization time in the absence of error and imitation shall be 600 ms.

8.2Synchronism shall be considered achieved after recognition of the frame positioning pattern (sequence of two elements of polarity Z followed by an element of polarity A) as described in 5 and at least two successive recognitions of the control channel (6 elements of polarity A followed by one element of polarity Z modulo 12) in compliance with 7.

8.3The maximum time loss of sychronization due to a steady polarity signal shall be 120 ms.

8.4The maximum time loss of synchronization for repeated error on the synchronization pattern in the control channel shall be 380 ms.

9.Telex signalling

9.1Specifications for the signals used to establish, to clear and to control telex calls are laid down in Recommendation U.1 (types A and B), U.11 (type C) and U.12 (type D). Recommendation U.25 lists the modes of both-way telex signalling on a single circuit and the signalling combinations on a given aggregate that a TDM terminal shall be capable of handling.

9.2Recommendation U.25 also lays down the tolerances on the control signals from a TDM terminal to telex and vice versa.

10.Maintenance

The branch looping facilities shall remain in accordance with Recommendation R.115.

11.Numbering of channels

The numbering of channels for the branch line telegraph muldex is given in Tables 1/R.114 and 4/R.114 in accordance with the numbering scheme concerning Recommendations R.101 and R.102.

12.Channel selection

Remote channels shall be grouped so as to provide maximum ease of use of heterogeneous frames, a time slot allocation involving little variation in the sampling rate being retained.

FIGURE 2/R.1.xy

Branch-line muldex control channel

7.3The control channel information provides for the transmission of information in accordance with Table 2/R.1xy.

TABLE 2/R.1xy

Information transmitted by the control channel

FIGURE 1/R.1xy

Branch-line muldex frame

6. Aggregate signal details

6.1 The aggregate signal rate shall be 600 bit/s. The tolerance on the modulation rate of the receive aggregate signals of the TDM system shall be between +2.3% and −0.5%.

6.2 The effective net margin of the aggregate signal receiver of the TDM system shall be at least 40%.

6.3 The maximum degree of isochronous distortion of the send aggregate signals of the TDM system shall be 5%.

6.4 When the TDM system is operated over an international telephone-type circuit, a modem complying with the appropriate aspects of the Series-V Recommendations (in particular Recommendation V.23) should preferably be employed.

7. Control channel encoding

7.1 The 50 bit/s control channel, the position of which in the frame described in 5 is accurately known, enables all risk of imitation to be eliminated.

7.2 The structure of the control channel shall be in accordance with Figure 2/R.1xy. It corresponds to an anisochronous character with a recurrence of 240 ms, formed from a one unit start element of polarity Z, five information elements and a six unit stop element of polarity A.

the channel outputs of the TDM system affected.

3.5The affected terminal shall signal its synchronization status to the distant terminal over the signalling channel provided (control channel).

4.Multiplexing details

4.1Channel interleaving shall be on a bit-by-bit multiplexing basis.

4.2Both start and stop elements of each input character shall be transmitted through the aggregate.

4.3The transfer delay shall not exceed 60 ms.

5.Frame structure

5.1A unique frame of 12 bits, of duration 20 ms, equivalent to an aggregate signal rate of 600 bit/s shall be used, as shown in Table 1/R.1xy:

TABLE 1/R.1xy

Frame details

5.2The frame may be considered as a 600 bit/s start/stop character, time slot "12" being the start element of polarity A, slots 10 and 11 forming the stop element of polarity Z, as shown in Figure 1/R.1xy.

unit stop elements, the system shall be capable of transmitting without error isolated incoming characters that have a 1-unit stop element, occurring at a maximum rate of one per second.

2.3The 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 bauds shall be 145 5/6 ms.

2.4There shall be no restriction on the continuous transmission of all characters (including combination No. 32 of International Telegraph Alphabet No. 2) when they are presented at the maximum permitted rate.

2.5The effective net margin on all channel inputs when undistorted signals are received from a transmitter having a nominal character length and rate shall be at least 40%.

2.6At the nominal modulation rate of 50 bauds, an input character start element shall be rejected if it is less than 0.4 units duration and shall be accepted if it ismore than 0.6 units duration.

2.7Elements corresponding to start polarity (at the distant multiplexer output) shall be inserted in the aggregate stream if the channels are unequipped.

2.8In the case of an open-circuit line condition at the start-stop channel input, it shall be possible to choose to transmit elements corresponding to a steady start or stop polarity in the aggregate bit stream, according to the availability polarity selected.

3.Start-stop channel outputs

3.1The maximum degree of gross start-stop distortion, produced by the system on a start-stop channel, shall be 3% for all modulation rates.

3.2The maximum difference possible between the mean modulation rate of the channel output signals and the nominal modulation rate shall be 0.2%.

3.3The minimum stop element duration released at the output shall be 1.25 units, whatever the distortion, the length of the stop element or the input rate within the range specified in 2.1 - 2.4 of this Recommendation of the character recognized at the other end, whether this character is in accordance with this Recommendation or Recommendations R.101, R.102 or R.112 (for a rate of 50 bauds and a 7.5 unit code).

3.4Within 6 ms of the recognition of one of the failures described in 8.3 and 8.4 or carrier loss signalled by the modem, the steady polarity as selected in accordance with 2.8 shall be applied to

Recommendation R.103(R.1xy)

CODE AND SPEED-DEPENDANT TDM 600 BIT/S SYSTEM FOR USE IN POINT-TO-POINT OR BRANCH-LINE MULDEX CONFIGURATIONS

The CCITT,

considering

(a) that telex subscribers are often geographically located in small groups;

(b) that TDM multiplexing systems are economical for the transmission of large numbers of channels;

(c) that certain telex switches handle TDM frames in accordance with Series-R Recommendations directly and that frame fill should be optimized;

(d) that telex switches handle channels at 50 bauds and a 7.5 unit code;

(e) that a facility for regenerating start-stop signals is used in new TELEX networks;

(f) that the branch-line multiplexing system should be capable of accepting and regenerating all the signals of the TELEX signalling system;

(g) that the minimum signal transfer delay through TDM systems is achieved by the transmission of interleaved elements;

recommends

that, where branch-line remote or low multiplex capacity TDM systems are to be used for telegraphy, the equipment shall comply with the following standards:

1. System capacity

The system shall be capable of multiplexing up to 8 channels at 50 bauds (7.5 bits including a stop element of 1.5 units).

2. Start-stop channel inputs

2.1 The modulation rate tolerance that shall be accepted on incoming 50 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 bauds having nominally 1.5-