



INTERNATIONAL TELECOMMUNICATION UNION

**ITU-T**

**M.850**

TELECOMMUNICATION  
STANDARDIZATION SECTOR  
OF ITU

**MAINTENANCE:  
INTERNATIONAL TELEGRAPH SYSTEMS  
AND PHOTOTELEGRAPH TRANSMISSION**

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**INTERNATIONAL TIME DIVISION  
MULTIPLEX (TDM) TELEGRAPH  
SYSTEMS**

**ITU-T Recommendation M.850**

(Extract from the *Blue Book*)

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## NOTES

1 ITU-T Recommendation M.850 was published in Fascicle IV.2 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.

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## Recommendation M.850

# INTERNATIONAL TIME DIVISION MULTIPLEX (TDM) TELEGRAPH SYSTEMS

## 1 General description of an international TDM system

1.1 Figure 1/M.850 illustrates a basic international TDM telegraph system. The system operates via an international TDM telegraph link operated at 2400 bit/s and has a capacity of 46 telegraph channels at 50 bauds. Other modulation rates up to 300 bauds can be accommodated (with resulting reduction in channel capacity) as shown in Recommendation R.101, Table 1/R.101 [1].

1.2 The international TDM telegraph system may be carried over a dedicated voice-frequency link as shown in Figure 1/M.850 or multiplexed with other TDM systems or other services onto a higher bit rate data transmission system on a voice-frequency or digital data transmission link as shown in Figure 2/M.850.

1.3 International telegraph systems may also be carried on high level (e.g. 50, 56 kbit/s) data transmission links utilizing analogue group band or on digital (64 kbit/s) paths. Examples of such multiplexing arrangements are illustrated in Recommendation M.1300.

## 2 Basic TDM telegraph links (Figure 1/M.850)

2.1 Basic TDM telegraph links may be carried on 4-wire analogue telephone circuits. The link comprises two unidirectional transmission paths, one for each direction of transmission, between the terminal TDM telegraph equipments. The TDM telegraph links are terminated with data modems, usually (but not necessarily) located within the terminal TDM telegraph equipment, which operate at 2.4 kbit/s.

2.2 The international TDM telegraph link consists of an international TDM telegraph line together with any terminal national sections connecting the international line to the terminal TDM telegraph equipment. Where the TDM equipment is located in the terminal international centres, the TDM link consists only of the international TDM telegraph line.

2.3 The international TDM telegraph line (between terminal international centres) may be constituted by using a channel in a carrier group or channels in tandem on a number of groups. National and international sections can be interconnected to set up an international TDM telegraph link.

Wherever possible, an international TDM telegraph line should be provided on a channel of a single carrier group, thereby avoiding intermediate audio-frequency points. However it is recognized that in some cases such a direct group may not exist or, for special routing reasons, it may not be possible to set up the international TDM line in this preferred way.

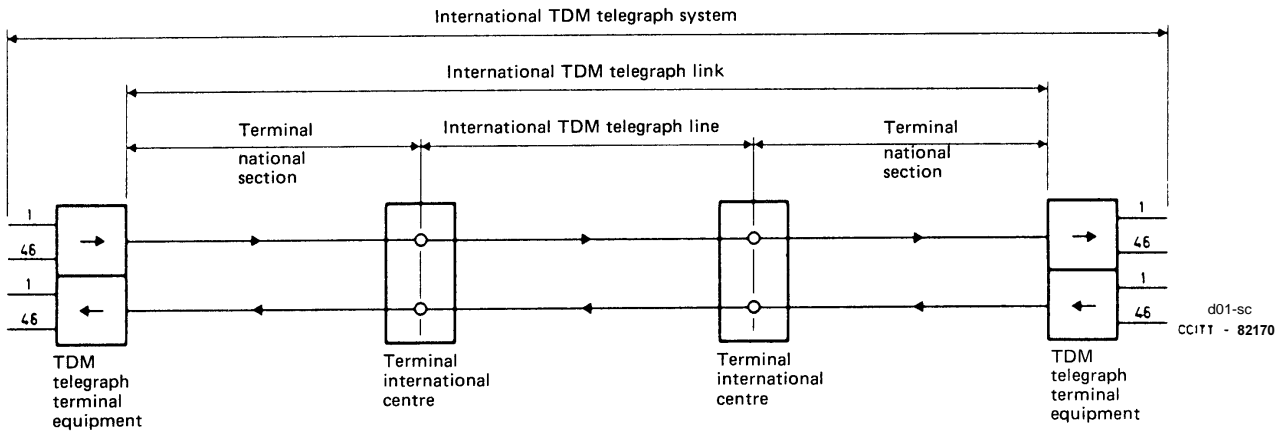
### 2.4 *Terminal national sections connected to the international TDM telegraph line*

In some cases the TDM telegraph terminal equipment is remote from the terminal international centre of the international TDM telegraph line (Figure 1/M.850), and such cases necessitate the provision of terminal national sections in order to establish international TDM telegraph links. These sections may be routed on channels of carrier groups or on audio plant (amplified or unamplified) or on digital streams.

## 3 TDM telegraph links multiplexed on higher bit rate data systems (Figure 2/M.850)

3.1 When TDM telegraph links are multiplexed onto higher bit rate data transmission systems, the associated analogue voice-frequency data links generally follow the principles outlined in § 2, with the exception that these data links are operated at higher bit rates (usually 4.8, 7.2 or 9.6 kbit/s).

Should a TDM telegraph link be extended from the higher level multiplexer, for example, to a remote point such as a third country or to renters premises, then it is necessary to use an appropriate modem as shown in Figure 2/M.850.



Note — It is assumed that the TDM telegraph terminal equipment includes a modem. It should be noted, however, that modems may be provided separately.

FIGURE 1/M.850  
The components of an international TDM telegraph system

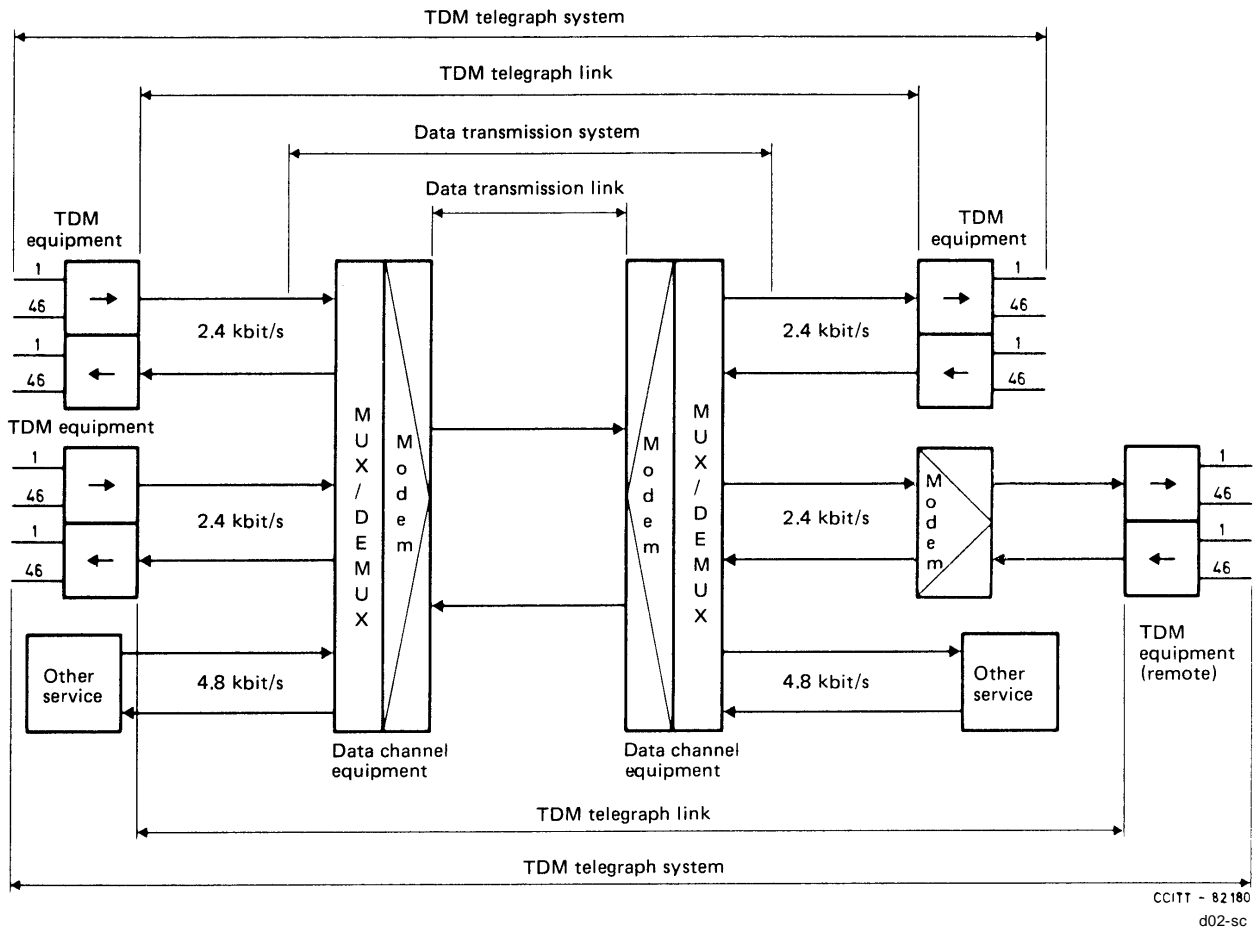


FIGURE 2/M.850  
Example of two international TDM telegraph systems multiplexed onto a higher bit rate data transmission system

3.2 TDM telegraph links multiplexed onto voice-frequency data transmission systems operated at 4.8, 7.2 or 9.6 kbit/s may be further multiplexed onto higher bit rate data transmission systems operated at 50, 56, 64 kbit/s etc. Examples of such arrangements are shown in Recommendation M.1300.

#### **4 Characteristics, line-up, and maintenance of TDM telegraph links and systems**

##### *4.1 Characteristics and line-up*

Guidance on the transmission characteristics and line-up procedures for both analogue and digital TDM telegraph links may be found in Recommendation M.1350, §§ 2 and 3. In this regard, the TDM telegraph link is identical to a 2.4 kbit/s data transmission link.

##### *4.2 Maintenance*

Maintenance procedures and limits for both analogue and digital TDM telegraph links may be found in Recommendation M.1355.

Maintenance procedures and limits for TDM telegraph systems are under study. However, guidance on the maintenance of these systems may be found in Recommendations R.75 [2] and V.51 to V.53 [3].

#### **5 Reserve arrangements for TDM telegraph links**

##### *5.1 General requirements*

All necessary action should be taken to ensure that the number of interruptions on TDM telegraph systems be kept to a minimum, and further that interruptions, when they do occur, be kept as short as possible.

##### *5.2 Basic international telegraph links*

Reserve arrangements for international TDM telegraph systems operated over links at 2.4 kbit/s should be in accordance with the principles and procedures specified for international voice frequency telegraph systems. Refer to Recommendation M.800, § 2. In some instances, it may be desirable to establish dual, diversely routed international TDM telegraph links and to change over from the active link to the reserve link when the international TDM telegraph system fails or becomes degraded. The change over may be done automatically, semi-automatically, or manually, by agreement between Administrations involved. Guidance on changeover arrangements may be found in Recommendations M.800 and R.150 [4].

##### *5.3 TDM telegraph links multiplexed on higher level data transmission systems*

When international TDM telegraph links are multiplexed onto higher bit rate data transmission systems, reserve arrangements will normally depend upon the principles and procedures adopted for the higher level data transmission link. Reserve arrangements for these data transmission links require further study.

#### **6 TDM telegraph link designation**

The form of designation for the TDM telegraph link and its reserve is given in Recommendation M.140, § 1.2.2 [5].

#### **7 Marking of equipment associated with TDM telegraph links**

It is recommended that all equipment associated with the TDM telegraph link and nominated reserve circuits (channel translating equipment, distribution frames, etc.) be positively marked to make them readily identifiable to the maintenance staff.

#### **8 TDM telegraph link control and sub-control stations**

8.1 One control station should be agreed bilaterally between the Administrations involved for each TDM telegraph link prior to setting up the link. Principles concerning the definition, responsibilities, functions, and appointment of control stations may be found in Recommendation M.1012.

8.2 One sub-control station should be agreed bilaterally between Administrations involved for each TDM telegraph link prior to setting up the link. Principles concerning the definition, responsibilities, functions, and appointment of sub-control stations may be found in Recommendation M.1013.

## References

- [1] CCITT Recommendation *Code and speed dependent TDM system for anisochronous telegraph and data transmission using bit interleaving*, Vol. VII, Rec. R.101.
- [2] CCITT Recommendation *Maintenance measurements on code independent international sections of international telegraph circuits*, Vol. VII, Rec. R.75.
- [3] CCITT Recommendations on the *Maintenance of international telephone – Type circuits used for data transmissions*, Vol. VIII, Recs. V.51 to V.53.
- [4] CCITT Recommendation *Automatic protection switching of dual diversity bearers*, Vol. VII, Rec. R.150.
- [5] CCITT Recommendation *Designation of international circuits, groups, group and line links, digital blocks, digital paths, data transmission systems and related information*, Vol. IV, Rec. M.140.