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THE INTERNATIONAL
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CONSULTATIVE COMMITTEE

M.1300

(10/92)

MAINTENANCE: INTERNATIONAL DATA TRANSMISSION SYSTEMS

INTERNATIONAL DATA TRANSMISSION SYSTEMS OPERATING IN THE RANGE 2.4 kbit/s TO 2048 kbit/s

Recommendation M.1300

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 M.1300 was revised by Study Group IV and was approved under the Resolution No. 2 procedure on the 5th of October 1992.

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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Recommendation M.1300

INTERNATIONAL DATA TRANSMISSION SYSTEMS OPERATING IN THE RANGE 2.4 kbit/s TO 2048 kbit/s

(Published 1984; revised 1988 and 1992)

Abstract

Provides a general description of international data transmission systems and of the basic requirements for their effective operation.

Keywords

– international data transmission links;

– international data transmission systems;

– international leased circuits.

1 General

1.1 *Terminology*

Terminologies and definitions relating to this Recommendation are provided in Recommendation M.60 [23].

1.2 *Operational procedures*

Recommendation M.1370 [19] covers the setting up and bringing into service of international data transmission systems. Maintenance issues are covered by Recommendation M.1375 [20].

The bringing-into-service and maintenance issues relating to international leased circuits with a digital presentation at renters' premises that are supported by international data transmission systems are covered by Recommendations M.1380 [21] and M.1385 [22], respectively.

1.3 *Performance limits*

Performance limits applicable to international data transmission systems and links are provided in Recommendation M.1340 [18].

2 General description of international data transmission systems

An international data transmission system is comprised of an international data transmission link combined with multiplexing equipments[1)] at each end and is primarily used for the point-to-point transmission of international leased circuits (see Figure 1/M.1300). Typical data rates of interest are: 2.4, 4.8, 7.2, 9.6, 14.4, 19.2, 48, 56, 64, 128, 192, 256, 384, 512, 768, 1024, 1536, 1544, 1920, 1984 and 2048 kbit/s. A system may be carried as a channel on a higher order system (see Figure 2/M.1300).

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1) Multiplexing equipment includes digital cross connect equipment as defined in Recommendation M.60 [23].

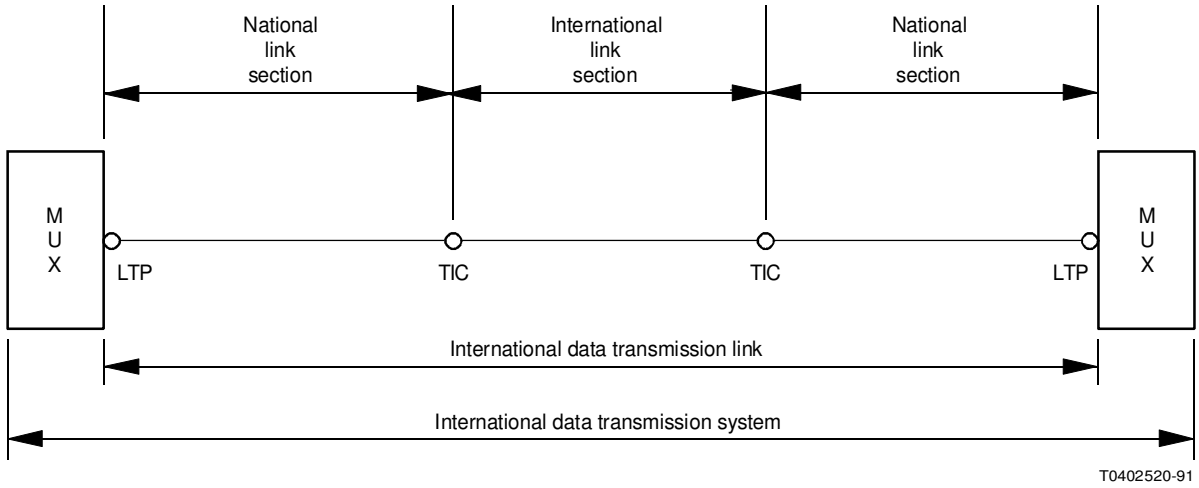
The international data transmission link that supports the aggregate transmission from the terminal multiplexing equipment of the international data transmission system will be presented via a digital interface that is referred to as the Link Terminating Point (LTP). Where an international data transmission link incorporates an analogue transmission path, the associated modems required to derive the digital interface are considered to be part of the link[2)].

In general, an international data transmission link can be divided into sectional components. The international link section is considered to exist between Terminal International Centres (TIC) and the national link section is considered to exist between a TIC and LTP, where the LTP could be located at numerous points, including Terminal National Centres (TNC) or renters' premises. Several typical configurations of an international data transmission system are shown in Figure 3/M.1300. It should be noted that where an LTP exists at a TIC, no national link section will exist.

Exceptionally, an international data transmission system may not be routed via any administration's premises. Figure 3d)/M.1300 shows an international data transmission system routed directly between renters' premises, e.g. via satellite.

An international data transmission system can support circuits with either analogue or digital presentations at the renter's premises. Typical uses include data, facsimile, voice, etc. (see Figure 4/M.1300).

For data transmission systems operating with an aggregate data rate of 1544 or 2048 kbit/s, the multiplexing equipment used should conform to Table 1/M.1300.

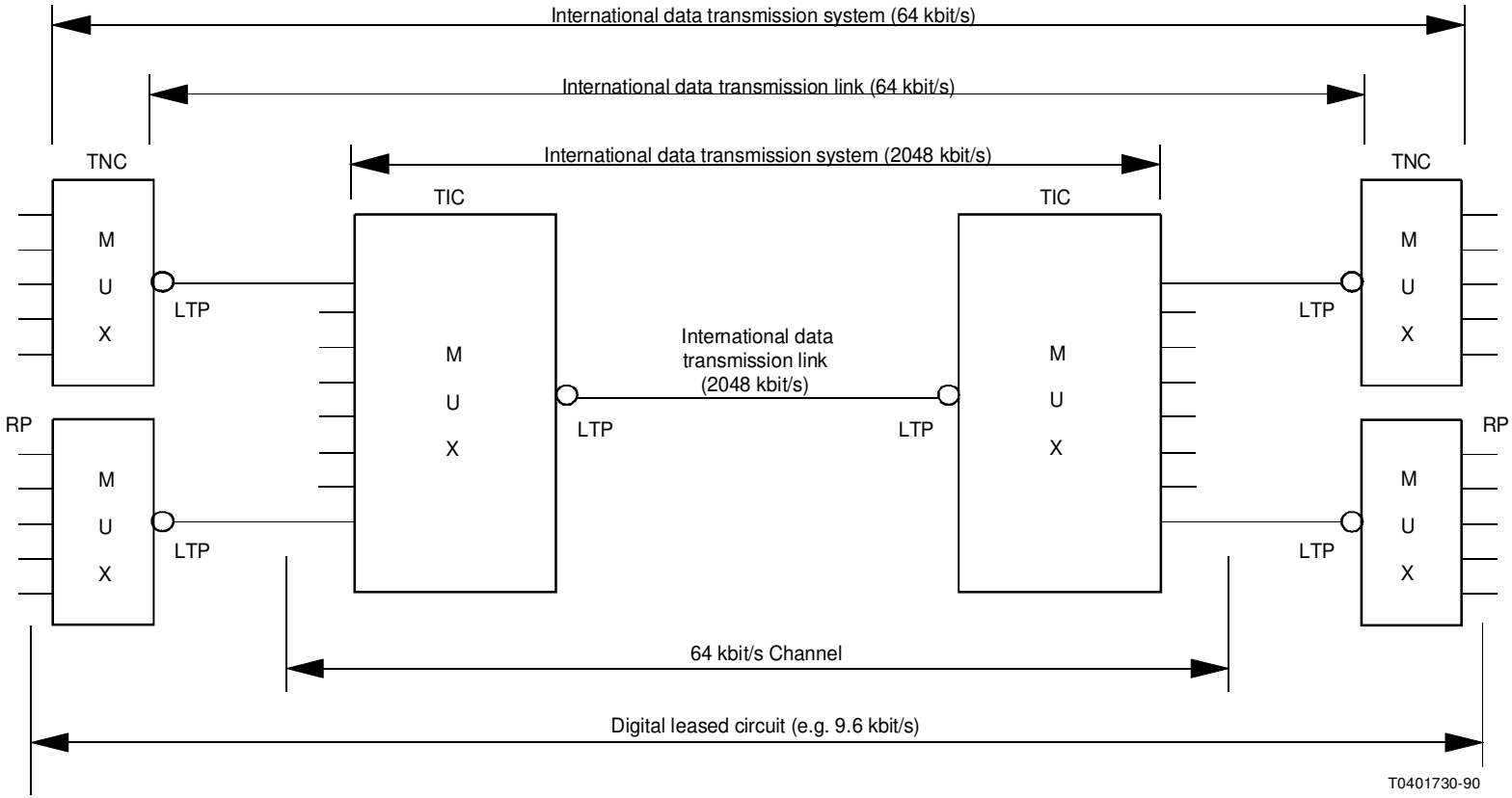


Note – Where an LTP is located at a TIC, there will be no national link section at that end of the international data transmission link.

FIGURE 1/M.1300

An international data transmission system

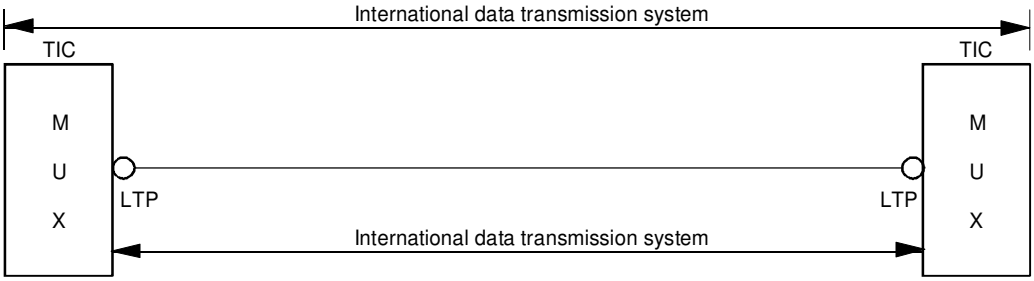
2) Certain terminal equipment incorporates modem and multiplex functions and there may consequently be no physical LTP at which testing is possible. A similar situation can exist where a channel card in a primary multiplex equipment operates as a lower order multiplexing equipment in its own right (e.g. in accordance with Recommendation X.50 [24]). Where a physical LTP does not exist, Administrations should bilaterally develop alternative testing arrangements.



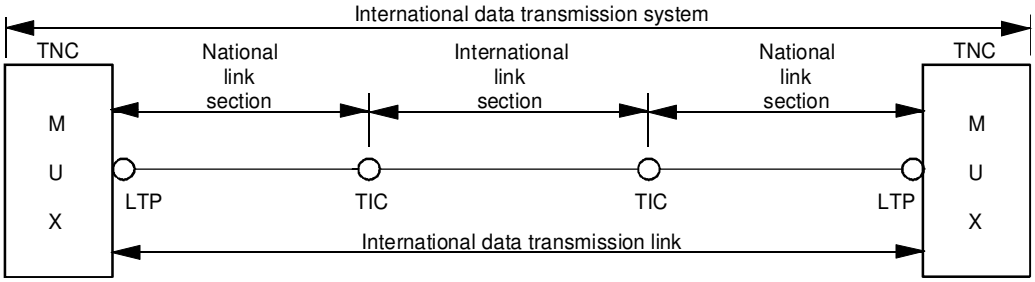
TIC Terminal international centre
TNC Terminal national centre
RP Renters' premises
LTP Link terminating point

FIGURE 2/M.1300

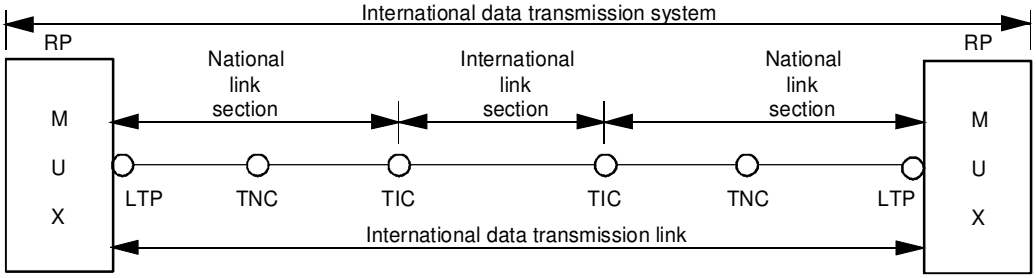
A typical international data transmission system carried on a higher order system



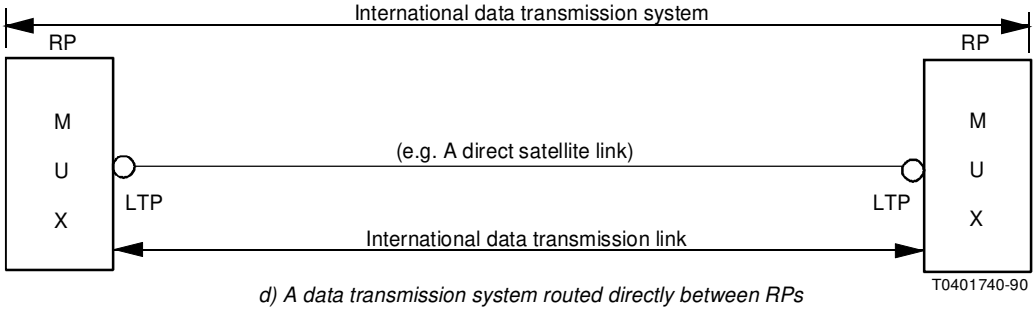
a) Multiplex/Demultiplex equipment located at the TIC



b) Multiplex/Demultiplex equipment located at the TNC



c) Multiplex/Demultiplex equipment located at the RP



d) A data transmission system routed directly between RPs

RP Renters' premises
LTP Link terminating point
TIC Terminal international centre
TNC Terminal national centre

FIGURE 3/M.1300

Typical configurations of an international data transmission system

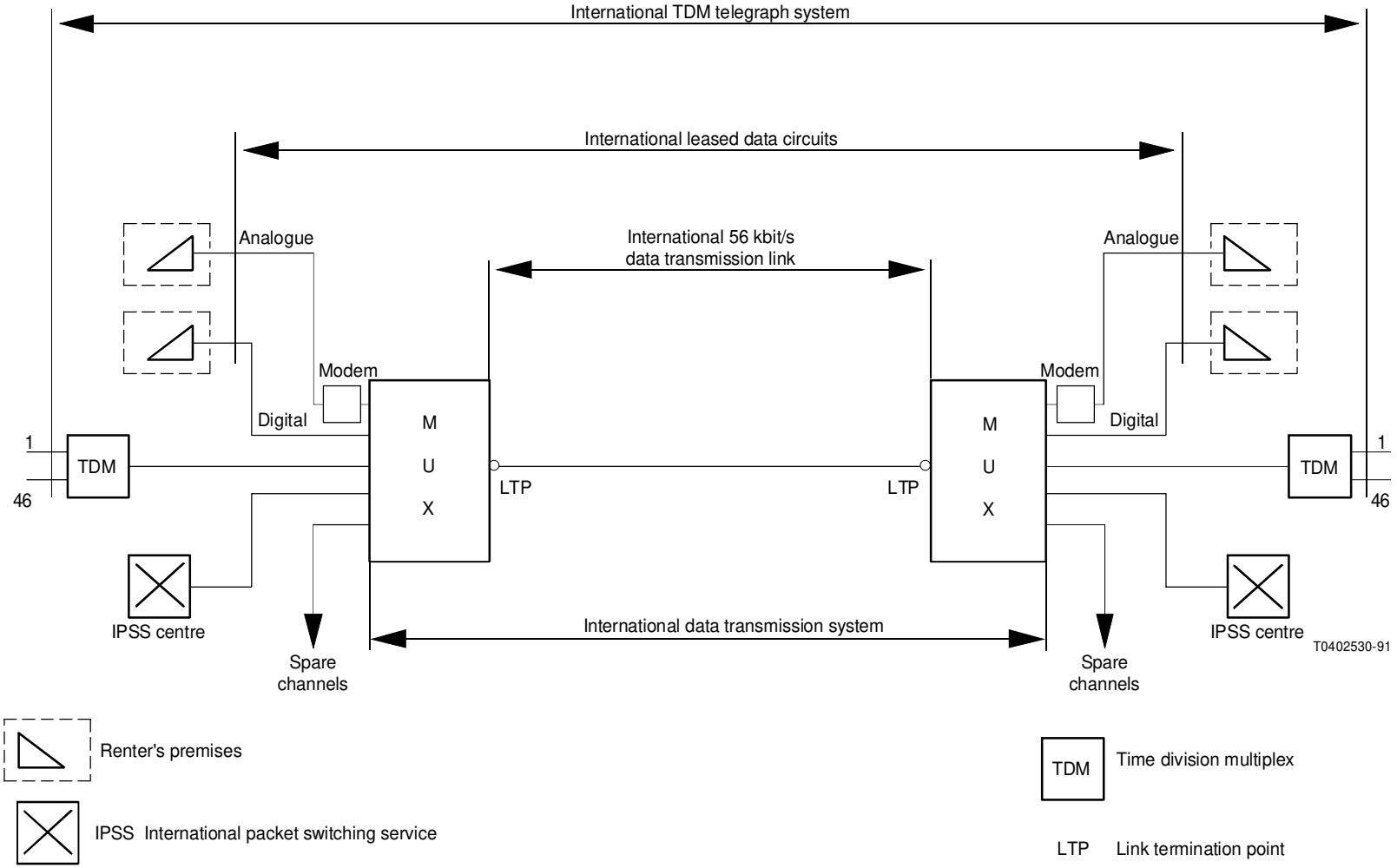


FIGURE 4/M.1300

An example of an international data transmission system with different presentations at renter's premises

TABLE 1/M.1300

Interfacing and frame structuring requirements for multiplexing equipment operating at 1544 or 2048 kbit/s

	CCITT Recommendation	
	Electrical/physical interface characteristics	Framing structure
1544 kbit/s	G.703 [1], § 2	G.704 [2], § 2.1
2048 kbit/s	G.703 [1], § 6	G.704 [2], § 2.3

Note 1 – Channel associated signalling for 2048 kbit/s frame structures, where required, should conform to Recommendations G.704 [2], § 5.1.3.2 and G.732 [3], § 5.1.

Note 2 – 2048 kbit/s frame structures that provide common channel signalling should conform to Recommendation G.736 [4], § 2.

Note 3 – Signalling arrangements for 1544 kbit/s frame structures, where required, are described in Recommendation G.704 [2], § 3.1.3.

3 General description of international data transmission links

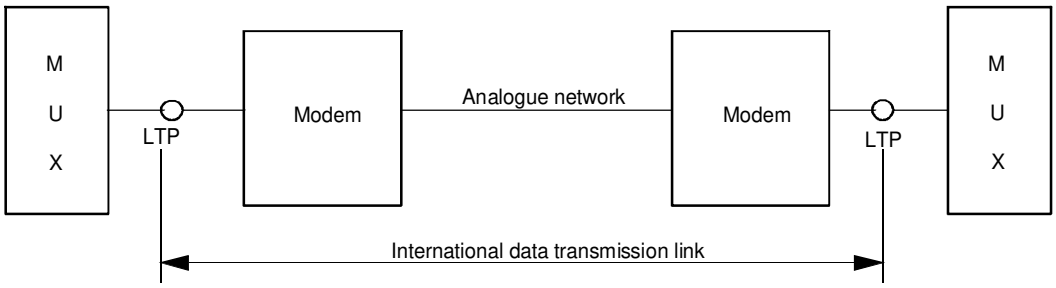
International data transmission links may typically be provided on a variety of transmission media in various combinations:

- paired copper cable;
- FDM carrier systems (group or supergroup) via symmetric pair or coaxial cable systems, microwave radio links, satellites;
- voice grade analogue or digital channels;
- digital links via coaxial or optical fibre cable systems, microwave radio links or satellite systems.

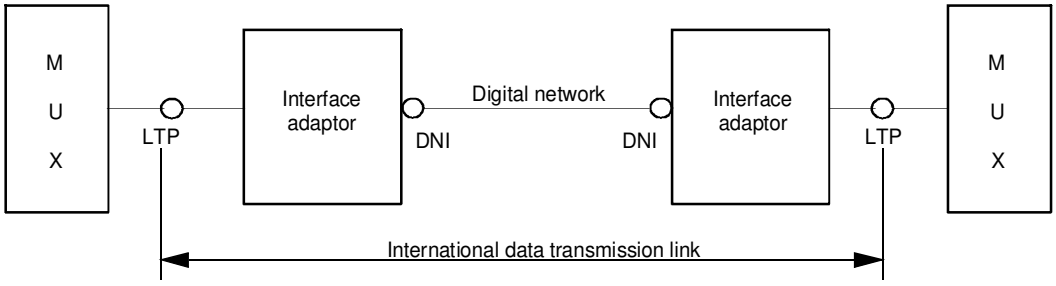
Modems or interface adaptors can be used to derive appropriate signals for the transmission medium being used. The LTPs of an international data transmission link provide digital interface test points and should preferably operate as standard CCITT defined interfaces (e.g. per Recommendations V.24 [7], V.28 [8], X.21[9], V.11 [6], G.703 [1], etc.).

Figure 5/M.1300 gives an overview of possible configurations for an international data transmission link. While hybrid combinations of link configurations are possible, it is preferable that the same interface type be presented at each end. It should be noted that certain multiplexing equipment will not interwork correctly if differing interface presentations are provided at each LTP.

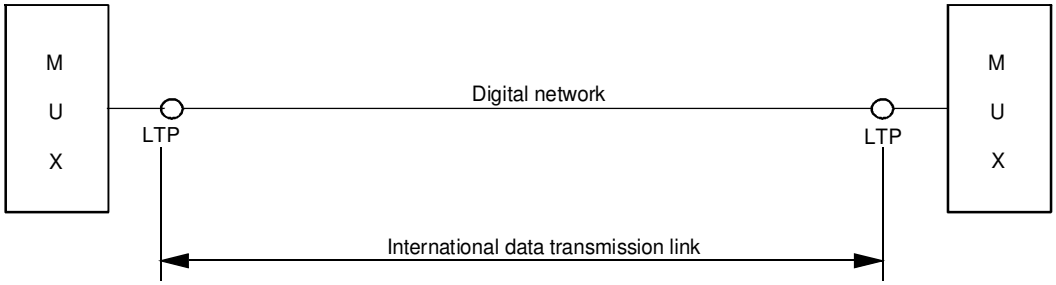
For data transmission links routed via a mixture of transmission media (e.g. microwave, optical fibre or satellite, etc.) the term “section” is used to refer to a section of the overall link, or international or national link section, routed wholly on one type of transmission medium.



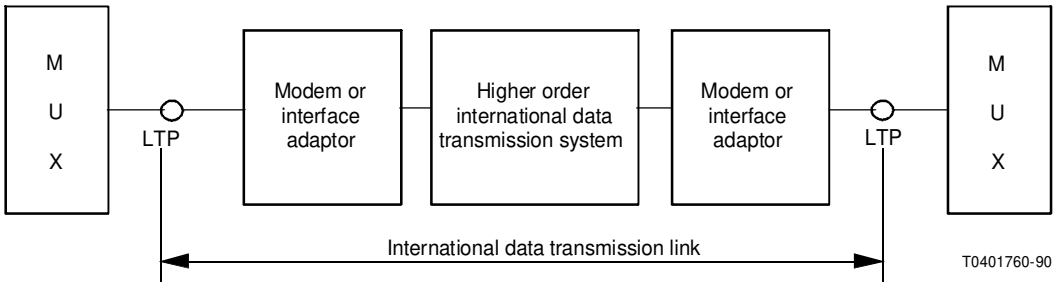
a) Direct connection via an analogue network



b) Connection to a digital network via interface adaptors



c) Direct connection to a digital network



d) Routed via higher order international data transmission system

LTP Link terminating point (digital interface)
DNI Digital network interface
MUX Multiplexer/demultiplexer (or similar) equipment

FIGURE 5/M.1300

Configurations of an international data transmission link

4 Timing sources

The timing feed at each end of an international data transmission system should be derived from a primary reference clock operating in accordance with Recommendation G.811 [5], § 2.

This will allow for correct plesiochronous operation between Administrations.

5 Control and sub-control stations

Administrations may elect to assign control and sub-control status to the terminal stations of an international data transmission system in accordance with Recommendations M.1012 [12] and M.1013 [13]. However, in order to achieve the fastest possible response times for maintenance activities on behalf of users, it is acceptable for both terminal stations of an international data transmission system to assume control station status. It is however essential for the control stations involved to develop an effective mechanism for coordinating maintenance activity and that they inform each other of specific maintenance actions as rapidly as possible.

6 Reserve arrangements

Since international data transmission links often carry international leased circuits, data systems, and/or TDM telegraph systems, some Administrations find it useful to nominate a reserve link for restoration purposes in the event of failure of the normal link. This should be decided by bilateral agreement between the Administrations at the time of planning the link. Such reserve links must be set up or lined up to meet the requirements of the normal data transmission link and, wherever possible, should follow a different route from the route of the normal link.

7 Designations

The form of designations for international data transmission systems and international data transmission links are described in Recommendation M.1400 [10].

References

[1] CCITT Recommendation G.703 *Physical/electrical characteristics of hierarchical digital interfaces*.

[2] CCITT Recommendation G.704 *Synchronous frame structures used at primary and secondary hierarchical levels*.

[3] CCITT Recommendation G.732 *Characteristics of primary PCM multiplex equipment operating at 2048 kbit/s*.

[4] CCITT Recommendation G.736 *Characteristics of a synchronous digital multiplex equipment operating at 2048 kbit/s*.

[5] CCITT Recommendation G.811 *Timing requirements at the outputs of primary reference clocks suitable for plesiochronous operation of international digital links*.

[6] CCITT Recommendation V.11 *Electrical characteristics for balanced double-current interchange circuits for general use with integrated circuit equipment in the field of data communications*.

[7] CCITT Recommendation V.24 *List of definitions for interchange circuits between data terminal equipment (DTE) and data circuit-terminating equipment (DCE)*.

[8] CCITT Recommendation V.28 *Electrical characteristics for unbalanced double-current interchange circuits.*

[9] CCITT Recommendation X.21 *Interface between data terminal equipment (DTE) and data circuit-terminating equipment (DCE) for synchronous operation on public data networks.*

[10] CCITT Recommendation M.1400 *Designation for international networks.*

[11] CCITT Recommendation M.550 *Performance limits for bringing into service and maintenance of digital paths, sections and line sections.*

[12] CCITT Recommendation M.1012 *Circuit control station for leased and special circuits.*

[13] CCITT Recommendation M.1013 *Sub-control station for leased and special circuits.*

[14] CCITT Recommendation M.1020 *Characteristics of special quality international leased circuits with special bandwidth conditioning.*

[15] CCITT Recommendation M.1025 *Characteristics of special quality international leased circuits with basic bandwidth conditioning.*

[16] CCITT Recommendation M.1030 *Characteristics of ordinary quality international leased circuits forming part of private switched telephone networks.*

[17] CCITT Recommendation M.1040 *Characteristics of ordinary quality international leased circuits.*

[18] CCITT Recommendation M.1340 *Performance allocation and limits for international data transmission links and systems.*

[19] CCITT Recommendation M.1370 *Bringing-into-service of international data transmission systems.*

[20] CCITT Recommendation M.1375 *Maintenance of international data transmission system.*

[21] CCITT Recommendation M.1380 *Bringing-into-service of international leased circuits that are supported by international data transmission systems.*

[22] CCITT Recommendation M.1385 *Maintenance of international leased circuits that are supported by international data transmission systems.*

[23] CCITT Recommendation M.60 *Maintenance terminology and definitions.*

[24] CCITT Recommendation X.50 *Fundamental parameters of a multiplexing scheme for the international interface between synchronous data networks.*