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INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

M.1370

(03/93)

**MAINTENANCE: INTERNATIONAL DATA
TRANSMISSION SYSTEMS**

**BRINGING-INTO-SERVICE OF
INTERNATIONAL DATA TRANSMISSION
SYSTEMS**

ITU-T Recommendation M.1370
Superseded by a more recent version

(Previously "CCITT Recommendation")

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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 M.1370 was revised by the ITU-T Study Group IV (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 Similarly, in this reform process, the CCIR and the IFRB have been replaced by the Radiocommunication Sector.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.

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ABSTRACT

This Recommendation considers the setting up and bringing-into-service of international data transmission systems and links in the range 2.4 kbit/s to 2048 kbit/s.

KEYWORDS

Bringing-into-service, international data transmission links, international data transmission systems, setting up.

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Recommendation M.1370

BRINGING-INTO-SERVICE OF INTERNATIONAL DATA TRANSMISSION SYSTEMS

(Published in 1984, revised in 1988 and 1993)

1 General

1.1 Introduction

The requirements described in this Recommendation should ensure that an international data transmission system is fully tested in terms of performance and interworking of multiplexing equipments¹⁾ prior to introduction into service.

The bringing-into-service tests described in this Recommendation should ideally include periods of normal industrial activity to be representative of typical network conditions.

Figure 1 provides an overview of the bringing-into-service tests and procedures described in this Recommendation.

1.2 Terminology

Recommendation M.1300 [8] provides general descriptions of international data transmission links and international data transmission systems.

Terminologies and definitions relating to this Recommendation are provided in Recommendation M.60 [2].

1.3 Performance limits and objectives

Recommendation M.1340 [9] covers all performance limits and objectives associated with this Recommendation. For all performance tests described in this Recommendation, the errored second (ES) and severely errored second (SES) limits should be met simultaneously for the test result to be considered acceptable.

2 Preliminary exchange of information

To assist the setting up and bringing-into-service of international data transmission systems it is important that Administrations exchange information and agree as necessary the following:

- i) Multiplexing equipment¹⁾ interfacing and data structuring specifications that can confirm the likelihood of compatible interworking.
- ii) An equipment configuration diagram showing connection arrangements and the location and interface types of test points.
This diagram should include reference to the Link Terminating Point (LTP) and all channel test points.
- iii) A schematic routing diagram that identifies the location of LTPs, earth stations, terrestrial frontier stations and terminal international centres showing approximate distances in kilometres (except for any satellite sections or national link sections).
This diagram should be used to calculate performance limits in accordance with Recommendation M.1340 [9] (see 3.1/M.1340 and Figure 1/M.1340).
- iv) Details of test equipments that will be used for normal provision and maintenance operations. Test equipment specifications should be compared to ensure a consistent interpretation of typical transmission error events.

¹⁾ Multiplexing equipments include digital cross connect equipments as defined in Recommendation M.60.

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- v) Pseudo-random test patterns to be used. These should be in accordance with Recommendations O.151 [13] and O.153 [14] as appropriate. (More severe test patterns that are available on some test equipments may be used following bilateral agreement. However, it should be appreciated that certain pseudo-random test patterns may stress a transmission system beyond its original design specification.)
- vi) A bringing-into-service schedule taking account of the test requirements and sequence of clauses 3 and 4 below. Dependent upon resource constraints, Administrations may need to schedule testing several weeks or even months in advance of the proposed bringing-into-service date.
- vii) A designation in accordance with Recommendation M.1400 [11].
- viii) Contact details for operational and planning personnel.
- ix) Administrations should agree on a dual control or a control and sub-control relationship for the terminal stations of the international data transmission system (see 5/M.1300 [8]).

The bringing-into-service information exchanged, as detailed above, should be retained for future reference.

3 Bringing-into-service procedures for an international data transmission link

3.1 Setting up and lining up individual link sections

Individual link sections should be set up or lined up as separate entities in accordance with the Recommendations and procedures appropriate to the transmission medium involved. See Annex A.

Where an individual link section exists wholly within the network of a single Administration, the internal practices of that Administration may be used for setting up or lining up provided that the limits used are consistent with the overall performance requirements for an international data transmission link.

3.2 Setting up and testing procedures for national and international link sections

When successfully tested, the individual link sections described in 3.1 above, should be interconnected to form the national or international sections as appropriate. These should then be checked for data transmission performance using limits that are consistent with the requirements of Recommendation M.1340 [9]. A minimum test duration of 24 hours is desirable.

3.3 Setting up and testing procedures for an overall international data transmission link

When the international and any national sections have been tested and found to be satisfactory (see 3.2 above) they should then be interconnected to form the overall international data transmission link.

It should be confirmed that test access arrangements are such that no part of the overall international data transmission link can be excluded from test. In accordance with Recommendation M.1300 [8], the LTPs at either end of an international data transmission link should provide a digital interface. Any equipments necessary to provide this interface are considered to be part of the link.

The international data transmission link should be tested for a minimum of 24 hours using limits derived in accordance with Recommendation M.1340 [9]. However, where an international data transmission link (LTP – LTP) is wholly contained within an existing international data transmission system that has already been extensively tested, Administrations may agree to reduce this requirement to a short duration test.

Where the 24 hour performance limits given in Recommendation M.1340 [9] are not met, Administrations should use practical judgment to determine an agreed course of action taking account of the relevant Recommendations covering the transmission media used. See Annex A for guidance.

Any possible affects of network traffic loading on data tests are for further study.

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(i) International data transmission link

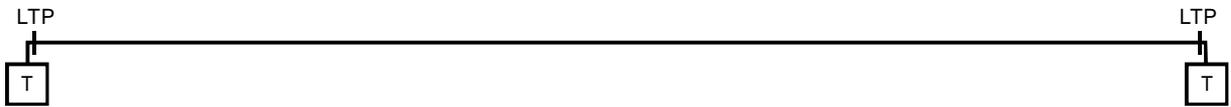
Stage 1: Setting up and lining up of individual link sections (see 3.1)



Stage 2: Setting up and testing of national and international link sections (see 3.2)

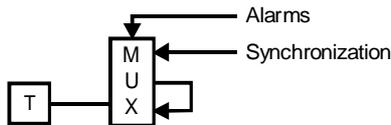


Stage 3: Setting up and testing of an overall international data transmission link (see 3.3)

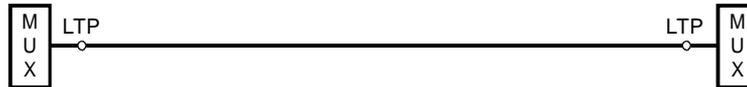


(ii) International data transmission system

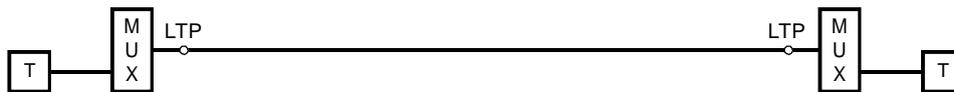
Stage 1: Local multiplexing equipments tests (see 4.2)



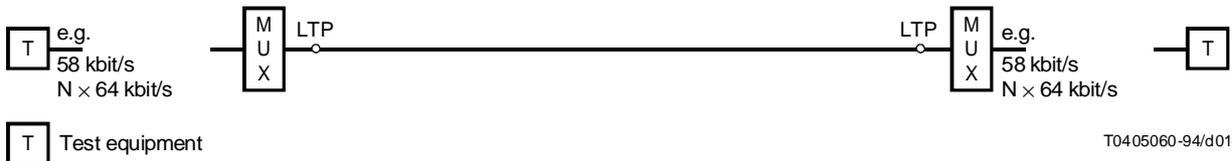
Stage 2: Multiplexing equipment interworking tests (see 4.3)



Stage 3: System test (see 4.4)



Stage 4: System configuration tests (see 4.5)



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FIGURE 1/M.1370

Bringing into service of an international data transmission system

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4 Bringing-into-service procedures for an international data transmission system

4.1 General

These tests are intended to prove the error performance stability and correct operation of an international data transmission system.

4.2 Local multiplexing equipment²⁾ tests

Each Administration should check the operation of the multiplexing equipment²⁾ that will be used to support the international data transmission system. This should include a check of peripheral equipments such as power supplies and connecting leads. These checks should be performed well in advance prior to actual connection to an international data transmission link.

4.3 Multiplexing equipment²⁾ interworking tests

With the multiplexing equipment²⁾ connected to the international data transmission link, the interworking of alarms should be confirmed. The LTP receive and transmit connections should be disconnected at each end in turn and the alarm conditions detected should be recorded (e.g. Alarm Indication Signal – Recommendation M.20 [1]).

On some occasions it may be possible to introduce simulated error transmissions. Where this is possible, errors should be injected in turn at each end of the international data transmission link at the LTPs. A check should be made to confirm that the appropriate alarm condition is observed at the distant end.

4.4 System test

This test is intended to confirm the stable interworking of terminal multiplexing equipments and to provide further confirmation of the performance of the international data transmission link. Channel error performance tests are performed simultaneously in each direction of transmission.

A system stability test, at one particular channel data rate, should be undertaken. The test duration and data rate used should be set by bilateral agreement taking account of past experience. To provide a reliable indication of overall system stability, a minimum test duration of 24 hours is recommended³⁾. Subject to agreement between the Administrations involved, where system stability has already been confirmed for an identical equipment configuration using the same transmission facility, a short duration test may be appropriate.

Where the performance limits derived in accordance with Recommendation M.1340 [9] are not met, Administrations should use practical judgment to determine an agreed course of action. Reference should be made to the performance results achieved during tests of the international data transmission link.

4.5 System configuration tests

These tests are intended to confirm the ability of an international data transmission system to support the intended range of channel types. A 15 minute test duration is considered appropriate. Tests should be performed at all digital channel data rates to be offered on the particular system being set up. Recommendation M.1340 [9] (see Table 3/M.1340) provides short duration test objectives that are appropriate for digital configuration testing.

Any requirement to support analogue channels should be confirmed by testing to 1/3 limits of Recommendation M.1020 [4], M.1025 [5] or M.1040 [6] in accordance with Recommendation M.1050 [7].

²⁾ Multiplexing equipments include digital cross connect equipments as defined in Recommendation M.60.

³⁾ The impact of in-service monitoring on the out-of-service test duration is for further study.

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Where a configuration test objective is not met, administrations should use practical judgment to determine an agreed course of action. Provided that the system stability test was completed satisfactorily, a configuration test failure ought not be indicative of a transmission quality problem. It may be appropriate to check the configuration of the multiplexing equipment that is being used, especially where the problem only exists for one channel type.

4.6 Introduction into service

The Administrations involved should jointly confirm that all testing has been satisfactorily completed prior to opening an international data transmission system for commercial service.

5 System and link integration

Throughout the bringing-into-service procedures described above, Administrations should pay particular attention to highlighting any problems associated with the interconnection of separately timed networks (See also Recommendation M.1380 [10]).

6 Measurement configurations

Several test measurement configurations are possible, see Figure 1/M.2110 [12]. Where possible bi-direction test measurement configurations should be used. Where loop tests are employed, the M.1340 [9] performance limits applicable to one direction of transmission should be used (i.e. doubling of limits is not recommended).

Annex A

Guidance for setting up and lining up individual link sections of international data transmission links

(This annex forms an integral part of this Recommendation)

A.1 Satellite link sections

A satellite link section should be lined up in accordance with the procedures provided by the appropriate Satellite System Operations Guide (SSOG).

When dealing with link sections carried by satellite it should be borne in mind that some Administrations use one polarity for transmission whilst others use the opposite polarity. For this reason associated test equipments typically have a normal/inverted polarity switch. It is necessary to establish the polarity convention being used and to set the test equipment accordingly.

For the case of a satellite single-channel-per-carrier (SCPC) section in which the SCPC modems provide forward error correction (FEC), data tests should normally be carried out with the FEC facility switched out. This will ensure that the section meets basic requirements without protection and that the FEC facility is not masking transmission impairments. It may be necessary to switch the FEC facility in to meet the overall limits specified in Recommendation M.1340 [9]. For future reference it is desirable to make a record of data transmission performance with the FEC facility switched both in and out.

A.2 Group band link sections

A group band link section should be lined up in accordance with the procedures and limits given in Recommendation M.910 [3]. However, it should be noted that the terminology used in Recommendation M.910 [3] applies to international leased group links, and is not entirely appropriate to international data transmission link sections.

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A.3 Voice band link sections

A voice band link section should be lined up in accordance with the procedures and limits given in Recommendation M.1050 [7]. However, it should be noted that the terminology used in Recommendation M.1050 [7] applies to an international leased circuit and is not entirely appropriate to international data transmission link sections.

A.4 Digital link sections

Digital link sections should be set up and tested in accordance with the requirements given in Recommendation M.2110 [12].

References

- [1] CCITT Recommendation *Maintenance philosophy for telecommunications networks*, Rec. M.20.
- [2] CCITT Recommendation *Maintenance terminology and definitions*, Rec. M.60.
- [3] CCITT Recommendation *Setting up and lining up an international leased group link for wide-spectrum signal transmission*, Rec. M.910.
- [4] CCITT Recommendation *Characteristics of special quality international leased circuits with special bandwidth conditioning*, Rec. M.1020.
- [5] CCITT Recommendation *Characteristics of special quality international leased circuits with basic bandwidth conditioning*, Rec. M.1025.
- [6] CCITT Recommendation *Characteristics of ordinary quality international leased circuits*, Rec. M.1040.
- [7] CCITT Recommendation *Lining up an international point-to-point leased circuit*, Rec. M.1050.
- [8] CCITT Recommendation *International data transmission systems operating in the range 2.4 kbit/s to 2048 kbit/s*, Rec. M.1300.
- [9] CCITT Recommendation *Performance, allocation and limits for international data transmission links and systems*, Rec. M.1340.
- [10] CCITT Recommendation *Bringing-into-service of international leased circuits that are supported by international data transmission systems*, Rec. M.1380.
- [11] CCITT Recommendation *Designations for international network*, Rec. M.1400.
- [12] CCITT Recommendation *Bringing-into-service international digital paths, sections and transmission systems*, Rec. M.2110.
- [13] CCITT Recommendation *Error performance measuring equipment operating at the primary rate and above*, Rec. O.151.
- [14] CCITT Recommendation *Basic parameters for the measurement of error performance at bit rates below the primary rate*, Rec. O.153.