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SERIES M: TMN AND NETWORK MAINTENANCE:
INTERNATIONAL TRANSMISSION SYSTEMS,
TELEPHONE CIRCUITS, TELEGRAPHY, FACSIMILE
AND LEASED CIRCUITS

International data transmission systems

**Bringing-into-service of international data
transmission systems**

ITU-T Recommendation M.1370

(Previously CCITT Recommendation)

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ITU-T RECOMMENDATION M.1370

BRINGING-INTO-SERVICE OF INTERNATIONAL DATA TRANSMISSION SYSTEMS

Summary

This Recommendation describes bringing-into-service procedures for international data transmission systems with a PDH presentation.

Source

ITU-T Recommendation M.1370 was revised by ITU-T Study Group 4 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on the 26th of June 1998.

Keywords

Bringing-into-service, exchange of information for bringing-into-service, international data transmission link, international data transmission system.

FOREWORD

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In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

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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BRINGING-INTO-SERVICE OF INTERNATIONAL DATA TRANSMISSION SYSTEMS

(Published in 1984; revised in 1988, 1993 and 1998)

1 Scope

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 equipment¹ 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.

2 References

The following ITU-T Recommendations contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; all users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations listed below. A list of the currently valid ITU-T Recommendations is regularly published.

- [1] CCITT Recommendation M.20 (1992), *Maintenance philosophy for telecommunications networks.*
- [2] ITU-T Recommendation M.60 (1993), *Maintenance terminology and definitions.*
- [3] ITU-T Recommendation M.1045 (1996), *Preliminary exchange of information for the provision of international leased circuits and international data transmission systems.*
- [4] ITU-T Recommendation M.1300 (1997), *International data transmission systems operating in the range 2.4 kbit/s to 140 Mbit/s.*
- [5] ITU-T Recommendation M.1340 (1996), *Performance allocations and limits for international data transmission links and systems.*
- [6] ITU-T Recommendation M.1380 (1997), *Bringing-into-service of international leased circuits that are supported by international data transmission systems.*
- [7] ITU-T Recommendation M.1400 (1997), *Designations for international networks.*
- [8] ITU-T Recommendation M.2110 (1997), *Bringing-into-service of international digital paths, sections and transmission systems and SDH paths and multiplex sections.*
- [9] CCITT Recommendation O.151 (1992), *Error performance measuring equipment operating at the primary rate and above.*
- [10] CCITT Recommendation O.152 (1992), *Error performance measurement equipment for bit rates of 64 kbit/s and $N \times 64$ kbit/s.*
- [11] CCITT Recommendation O.153 (1992), *Basic parameters for the measurement of error performance at bit rates below the primary rate.*

3 Terminology and definitions

Recommendation M.1300 [4] provides general descriptions of international data transmission links and international data transmission systems.

¹ The term "multiplexing equipment", as defined in Recommendation M.60 [2], includes digital cross-connect equipment.

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

4 Abbreviations

This Recommendation uses the following abbreviations:

DXC	Digital Cross-Connect
ES	Errored Second
LTP	Link Terminating Point
MUX	Multiplexing Equipment
PDH	Plesiochronous Digital Hierarchy
SES	Severely Errored Second

5 Performance limits and objectives

Recommendation M.1340 [5] 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.

6 Preliminary exchange of information

To assist in the setting-up and bringing-into-service of international data transmission systems, it is important that Network Operators/Service Providers exchange information (as detailed in Recommendation M.1045 [3]) and agree as necessary on 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 [5] (see 3.1/M.1340 and Figure 1/M.1340).

- iv) Details of test equipment 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.
- v) Pseudo-random test patterns to be used. These should be in accordance with Recommendations O.151 [9], O.152 [10] and O.153 [11] as appropriate. (More severe test patterns that are available on some test equipment 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 7 and 8 below. Dependent upon resource constraints, Network Operators/Service Providers 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 [7].
- viii) Contact details for operational and planning personnel.
- ix) Network Operators/Service Providers should agree on a dual control or a control and sub-control relationship for the terminal stations of the international data transmission system (see clause 10/M.1300 [4]).

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

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

7.1 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.

Where an individual link section exists wholly within the network of a single Network Operator/Service Provider, the internal practices of that Network Operator/Service Provider 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.

Where an individual link section is wholly contained within an existing data transmission system that has already been extensively tested, Network Operators/Service Providers may agree to reduce this requirement to a short duration test of 15 minutes, with performance limits as given in Table 3/M.1340 [5].

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

When successfully tested, the individual link sections described in 7.1 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 [5]. A test duration of 24 hours is desirable; however, a shorter duration test, as described in 7.1, may be appropriate.

7.3 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 7.2 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 [4], the LTPs at either end of an international data transmission link should provide a digital interface. Any equipment necessary to provide this interface is considered to be part of the link.

The international data transmission link should be tested for 24 hours using limits derived in accordance with Recommendation M.1340 [5]. However, a shorter duration test, as described in 7.1, may be appropriate.

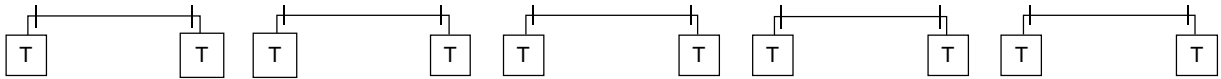
Where the 24-hour performance limits given in Recommendation M.1340 [5] are not met, Network Operators/Service Providers should investigate the reasons for the test failure and endeavour to rectify any problems identified.

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

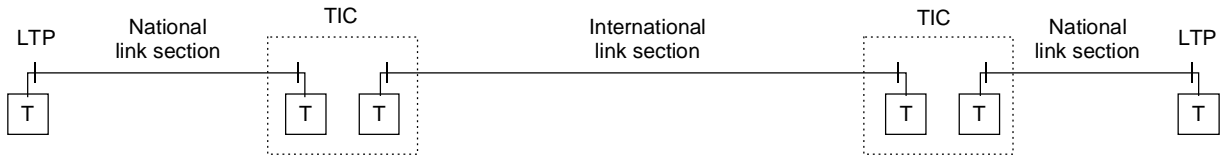
Figure 1 illustrates the bringing-into-service tests and procedures.

i) International data transmission link

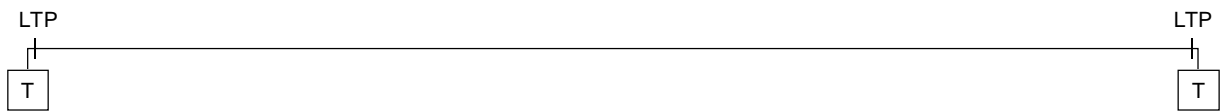
Stage 1: Setting-up and lining-up of individual link sections (see 7.1)



Stage 2: Setting up and testing of national and international link sections (see 7.2)

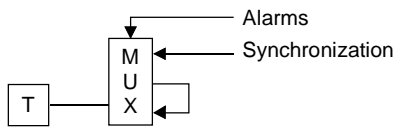


Stage 3: Setting-up and testing of an overall international data transmission link (see 7.3)

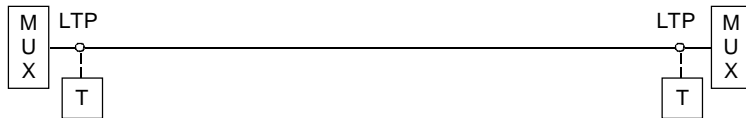


ii) International data transmission system

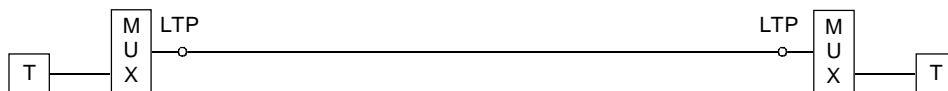
Stage 1: Local multiplexing equipment tests (see 8.2)



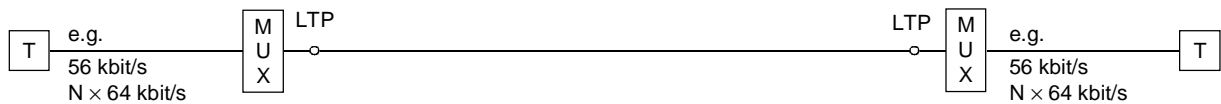
Stage 2: Multiplexing equipment interworking tests (see 8.3)



Stage 3: System test (see 8.4)



Stage 4: System configuration tests (see 8.5)



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T Test equipment

M U X Multiplexer or Digital Cross-connect

LTP Link Terminating Point
TIC Terminal International Centre

Figure 1/M.1370 – Bringing-into-service of an international data transmission system

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

8.1 General

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

8.2 Local multiplexing equipment² tests

Each Network Operator/Service Provider 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 equipment 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.

8.3 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.

8.4 System stability test

This test is intended to confirm the stable interworking of terminal multiplexing equipment 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 recommended. However, there are two cases where a short duration test may be appropriate. The first is if system stability has been confirmed for an identical equipment configuration using the same transmission facility. The second is if in-service performance monitoring (described in clause 5/M.1340 [5]) is available and that the performance of the system is shown to be good. In both of these cases, agreement between the Network Operators/Service Providers is required.

If the MUX in Figure 1 is in practice a Digital Cross-Connect (DXC), then the cross-connect function should be used to test at the channel rate.

Where the performance limits derived in accordance with Recommendation M.1340 [5] are not met, reference should be made to the performance results achieved during tests of the international data transmission link. If these results are inconsistent, fault localization should be performed.

8.5 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 [5] (see Table 3/M.1340) provides short-duration test objectives that are appropriate for digital configuration testing.

² The term "multiplexing equipment", as defined in Recommendation M.60 [2], includes digital cross-connect equipment.

If the MUX in Figure 1 is in practice a Digital Cross-Connect (DXC), then the cross-connect function should be used to test at the channel rate. Network Operators/Service Providers may agree to forego the system configuration tests if an identical equipment configuration has been previously tested.

Provided that the system stability test was completed satisfactorily, a configuration test is unlikely to indicate a transmission quality problem. It may be appropriate to check the configuration of the multiplexing equipment that is being used, especially where the problem exists for only one channel type.

8.6 Introduction into service

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

9 System and link integration

Throughout the bringing-into-service procedures described above, Network Operators/Service Providers should pay particular attention to highlighting any problems associated with the interconnection of separately timed networks (see also Recommendation M.1380 [6]).

10 Measurement configurations

Several test measurement configurations are possible (see Figure 1/M.2110 [8]). Where possible, bidirection test measurement configurations should be used. Where loop tests are employed, the M.1340 [5] performance limits applicable to one direction of transmission should be used (i.e. doubling of limits is not recommended).

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